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The World Bank

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Report No: PAD2392

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF

US$150 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

ZHEJIANG QIANDAO LAKE AND XIN'AN RIVER BASIN WATER RESOURCES AND ECOLOGICAL ENVIRONMENT PROTECTION PROJECT

May 15, 2018

Environment and Natural Resources Global Practice
East Asia And Pacific Region

CURRENCY EQUIVALENTS

Exchange Rate Effective December 31, 2017

Currency Unit	=	Chinese Yuan(CNY)
CNY1.00	=	US$0.15
US$1.00	=	CNY 6.70

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

ADB	Asia Development Bank
CA	Conservation Agriculture
CFB	Chun'an Finance Bureau
CO_2	Carbon Dioxide
CPMO	County Project Management Office
CQS	Selection Based on the Consultants' Qualifications
CSA	Climate Smart Agriculture
DA	Designated Account
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ESMP	Environmental and Social Management Plan
FBS	Selection under a Fixed Budget
FM	Financial Management
FMM	Financial Management Manual
GHG	Greenhouse Gases
GoC	Government of China
GoZ	Government of Zhejiang
GRS	Grievance Redress Service
IC	Individual Consultant Selection Procedure
ICB	International Competitive Bidding
ICR	Implementation Completion and Results Report
IPM	Integrated Pest Management
IOC	Incremental Operating Cost
JFB	Jiande Finance Bureau
LCS	Least-Cost Selection
LWM	Livestock Waste Management
M&E	Monitoring and Evaluation
MOF	Ministry of Finance
NCB	National Competitive Bidding
NDRC	National Development and Reform Commission
O&M	Operation and Maintenance
PDO	Project Development Objective

PDRC	Provincial Development and Reform Commission
PES	Payment for Ecological Services
PIP	Project Implementation Plan
PIU	Project Implementation Unit
PLG	Project Leading Group
PMO	Project Management Office
PMP	Pest Management Plan
PP	Procurement Plan
PPMO	Provincial Project Management Office
PPSD	Project Procurement Strategy for Development
QCBS	Quality- and Cost-Based Selection
RAP	Resettlement Action Plan
RCS	River Chief System
RPF	Resettlement Policy Framework
SA	Social Assessment
SOE	State-owned Enterprise
STEP	Systematic Tracking of Exchanges in Procurement
SWAT	Soil and Water Assessment Tool
TN	Total Nitrogen
TNC	The Nature Conservancy
TOR	Terms of Reference
TP	Total Phosphorus
WWTP	Wastewater Treatment Plant
ZPFB	Zhejiang Provincial Finance Bureau

Regional Vice President: Victoria Kwakwa

Country Director: Bert Hofman

Senior Global Practice Director: Karin E. Kemper

Practice Manager: Iain G. Shuker

Task Team Leader(s): Jin Liu, Sing Cho

BASIC INFORMATION

Is this a regionally tagged project?	Country(ies)	Financing Instrument
No		Investment Project Financing

[ ] Situations of Urgent Need of Assistance or Capacity Constraints

[ ] Financial Intermediaries

[ ] Series of Projects

Approval Date	Closing Date	Environmental Assessment Category
06-June-2018	30-June-2024	B - Partial Assessment
Bank/IFC Collaboration		
No		

Proposed Development Objective(s)

To strengthen integrated pollution and watershed management and increase access to improved water supply in selected landscapes in support of Zhejiang's program for the protection of Qiandao Lake and Xin'an River Basin.

Components

Component Name	Cost (US$, millions)
Component 1: Landscape Management Improvement	86.02
Component 2: Water Resources Management Improvement	54.36
Component 3: Institutional Capacity Building, Monitoring and Project Management	9.25

Organizations

Borrower :	People's Republic of China
Implementing Agency :	Zhejiang Provincial Construction Department

PROJECT FINANCING DATA (US$, Millions)

[✓] Counterpart Funding	[✓] IBRD	[ ] IDA Credit	[ ] IDA Grant	[ ] Trust Funds	[ ] Parallel Financing

Total Project Cost:	Total Financing:	Financing Gap:
293.46	293.46	0.00
	Of Which Bank Financing (IBRD/IDA): 150.00	

Financing (in US$, millions)

Financing Source	Amount
International Bank for Reconstruction and Development	150.00
Local Govts. (Prov., District, City) of Borrowing Country	143.46
Total	**293.46**

Expected Disbursements (in US$, millions)

Fiscal Year	2018	2019	2020	2021	2022	2023	2024	2025
Annual	0.00	4.53	11.61	15.13	32.20	35.44	33.51	17.59
Cumulative	0.00	4.53	16.14	31.27	63.46	98.90	132.41	150.00

INSTITUTIONAL DATA

Practice Area (Lead)

Environment & Natural Resources

Contributing Practice Areas

Water

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

No

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

No

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

No

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Low
2. Macroeconomic	Low
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	
10. Overall	Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36	✓	
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37	✓	
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Institutional Arrangements

Project Agreement, Section I. A.1 of Schedule . The Project Implementing Entity shall maintain, and cause to be maintained, the following entities with composition, powers, functions, staffing, facilities and other resources acceptable to the Bank: (a) The Provincial and County Leading Groups; and (b) The Provincial and County Project Management Offices.

Sections and Description

Annual Work and Budget Plan

Project Agreement, Section I. B.2 of Schedule . The Project Implementing Entity shall furnish to the Bank no later

than December 15 in each year, beginning in 2018, the final Annual Work and Budget Plan, acceptable to the Bank; and thereafter ensure the implementation of the Project during the following calendar year in accordance with the Annual Work and Budget Plan agreed with the Bank and in a manner acceptable to the Bank.

Sections and Description
Project Implementation Plan

Project Agreement, Section I.B.1 of Schedule. Throughout the implementation of the Project, the Project Implementing Entity shall, and shall cause the Project Counties and the Project Implementation Units to apply, the Project Implementation Plan in a timely and efficient manner acceptable to the Bank. Amendments to the Project Implementation Plan require prior written agreement of the Bank.

Sections and Description
Safeguards

Project Agreement, Section I.C.2 of Schedule. The Project Implementing Entity shall, and shall cause the Project Counties and the Project Implementation Units to, implement the Safeguards Instruments in a manner and substance acceptable to the Bank. Amendments to any of these Safeguards Instruments require prior written agreement of the Bank.

Sections and Description
Dam Safety Expert

Project Agreement, Section I.C.8 of Schedule. The Project Implementing Entity shall, and shall cause the Project Counties to: (a) maintain throughout Project implementation, one dam safety expert for the Project having experience and qualifications in the relevant technical fields, acceptable to the Bank, and under terms of reference, including a time-table and adequate budget for its activities, acceptable to the Bank, to, inter alia: (i) inspect and evaluate the status of the Project Dams, their appurtenances, and their performance history; (ii) review and evaluate operation and maintenance procedures of the Project Dams; (iii) provide a written report to the Project Implementing Entity, and the Bank of findings and recommendations for any remedial work or safety measures necessary to upgrade the Project Dams to an acceptable standard of safety; and (iv) monitor the implementation of the Dam Safety Plan; (b) provide all support and cooperation to the dam safety expert referred to in subparagraph 8 (a) above, necessary to carry out the functions set forth in said expert's terms of reference; and (c) furnish to the Bank by December 31 of each calendar year, beginning in December 31, 2018, the report referred in (a) (iii) above, including an action plan to address the findings and recommendations thereof.

Sections and Description
Output-based Incentive Payment

Project Agreement, Section I.F.1 of Schedule. The Project Implementing Entity shall: (a) cause the PIUs to provide

the Output-based Incentive Payments under an Implementation Agreement with the respective Project Beneficiary, on terms and conditions acceptable the Bank and set out in the Project Implementation Plan; and (b) maintain, throughout the period of implementation of the Project, a grievance redress mechanism acceptable to the Bank and set out in the Project Implementation Plan, to address any complaints associated with the Output-based Incentive Payments. Amendments to any of the Implementation Agreements require prior written agreement of the Bank.

Sections and Description
Mid-term review

Project Agreement, Section II.2 of Schedule. The Project Implementing Entity shall prepare, under terms of reference acceptable to the Bank, and furnish to the Bank no later than June 30, 2021, a consolidated mid-term review report for the Project, summarizing the results of the monitoring and evaluation activities carried out from the inception of the Project, and setting out the measures recommended to ensure the efficient completion of the Project and to further the objectives thereof.

Conditions

Type	Description
Effectiveness	Conditions Effectiveness: Subsidiary Agreements Loan Agreement, Article IV, Section 4.01. The Subisidary Agreements have been executed on behalf of the Project Implementing Entity, through the respective Project County, and the PIUs, and are binding and enforceable upon the respective parties thereto in accordance with their terms.

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Jin Liu	Team Leader(ADM Responsible)	Sr. Environmental Specialist	GEN2A
Sing Cho	Team Leader	Sr. Water & Sanitation Specialist	GWA02

Yunlong Liu	Procurement Specialist(ADM Responsible)	Procument Specialist	GGOPP
Yi Geng	Financial Management Specialist	Sr. Financial Management Specialist	GGOEA
Aristeidis I. Panou	Counsel	Counsel	LEGES
Xiaodan Huang	Environmental Safeguards Specialist	Environemental Specialist	GEN2A
Xieli Bai	Team Member	Program Assistant	EACCF
Yiren Feng	Environmental Safeguards Specialist	Sr. Environment Specialist	GEN2A
Zhefu Liu	Social Safeguards Specialist	Sr. Social Development Specialist	GSU02
Zhuo Yu	Team Member	Finance Officer	WFACS

Extended Team

Name	Title	Organization	Location
Birun Lin	Senior Agriculture Specialist		
Jinbao Sheng	Senior Water Resources Management Specialist		China
Kathleen Boomer	Senior Monitoring Specialist		
Lijun Cui	Senior Wetland Management Specialist		
Quan Mu	Security Water Project Manager	The Nature Conservancy (TNC)	Beijing,China
Richard Owen	Senior Forestry Specialist		United Kingdom
Xueming Liu	Senior Economist	FAO	

CHINA

ZHEJIANG QIANDAO LAKE AND XIN'AN RIVER BASIN WATER RESOURCES AND ECOLOGICAL ENVIRONMENT PROTECTION PROJECT

TABLE OF CONTENTS

I. STRATEGIC CONTEXT

A. Country Context

1. Globally, pressure on water is rising: growing populations, gaps in access to water supply and sanitation, more water-intensive patterns of growth, increasing rainfall variability, and pollution are combining in many places to make water one of the greatest risks to sustainable development. As in many other countries, water is one of China's key development challenges. Water pollution, scarcity and flooding threaten China's sustainable development. Currently, some 110 cities across China face severe water shortages. This precarious situation has been exacerbated by both China's rapid economic growth, increases in water consumption, rising pollution discharges, and ecosystem degradation with water pollution imposing economic, ecological, and health-related costs. According to 2015 data[1], some 61 percent of monitored groundwater, 28 percent of major rivers and 30 percent of lakes failed to meet basic water quality standards in China.

2. While major progress has already been made regarding point source pollution, non-point and diffuse sources of water pollution, including agricultural pollution, is a serious threat to water pollution and associated ecological functions in China, with global implications. According to the recent Bank publication[2], agriculture to be the leading source of surface water pollution with more than 50 percent of nitrogen and phosphorous discharges associated with agricultural activities, making China a globally significant contributor to active nitrogen and other nutrient runoff into the oceans. The same report finds agriculture as a leading cause of eutrophication in the Yellow and South China Sea (Strokal, et al 2014). Excessive and improper fertilizer and pesticide use are deemed the key sources of water pollution and soil contamination. Studies show that, in China's intensive grain-producing areas, there is potential for cutting nitrogen applications by 30 – 60 percent without harming yields. Globally, the level of active nitrogen in the ecosystem already exceeds the earth planetary boundaries (like carbon dioxide) making it an important global externality that should be reduced whenever possible.

3. In addition to the water pollution challenges highlighted above, China's rapid economic development model over the last decades combine with limited forest resources to a scenario of ecological environment degradation. The total area subject to soil, water and wind erosion in China is about 2.95 million km^2 or approximately 30.7 percent of the country's territory. This alarming exposure to erosion results in annual losses of around 4 billion-ton soils and around 67,000 ha crop land; the biodiversity and ecological functions have also significantly declined as human demands grew. The 2015 WWF report indicates that, since 1970, China's terrestrial vertebrates have declined by half, while the nation's Ecological Footprint has more than doubled[3]. Habitat loss and nature degradation by human activities and development are said to be the most significant threats to biodiversity and ecosystem stability and resilience in China.

4. Realizing that those key development challenges are fundamental to sustainable development and social well-being, the Government of China (GoC) has placed water resources management and environmental protection at the top of the political agenda. It has also established measures to ensure

[1] Ministry of Environmental Protection of China: 2015 STATE OF ENVIRONMENT REPORT.
[2] Cassou, Emilie, Steven M. Jaffee, and Jiang Ru. 2017. The Challenge of Agricultural Pollution: Evidence from China, Vietnam, and the Philippines. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-1201-9.
[3] WWF (2015): Living Planet Report China.

that environmental stability is not jeopardized by future economic development. The approach to developing and managing the nation's water resources, pollution control, and watershed forest ecosystem protection is embodied in the Resolution of State Council of China for Acceleration of Ecological Civilization Progress (the Resolution). This resolution, issued by the State Council of China in April 2015, states that by 2020, China's ecological environment will be improved by reducing the discharge of main pollutants, and that water quality in over 80 percent of key water basins and lakes must reach minimum legal standards; the quality of drinking water is to be improved; over 1.4 percent of additional forest cover will be created (over 2015 levels); and biodiversity degradation of ecosystems will be controlled. Consistent with the resolution, targets in the 13th sectoral development plans (2016–2020) of Government line agencies were set for erosion reduction, wastewater treatment in urban and rural areas, pollution reduction from agriculture, improved river management, and water resources safety.

B. Sectoral and Institutional Context

5. The 573 km^2 Qiandao Lake (the Lake) is located in the western Zhejiang Province, near the province's boundary with the neighboring Anhui Province. The Lake came into being in 1959 with the construction of a 105-meter-high dam across the Xin'an River in Jiande City, with more than 90 percent of the Lake being located behind the dam in Chun'an County and less than 10 percent in Jiande City. The immense size of the Xin'an River Basin makes it an important source of water for the Yangtze River Delta system. The ecological and economic importance of the facility has grown over time due to the Lake's water becoming the main source of potable water for Chun'an, Jiande, Hangzhou Cities, and other cities along the river. Many of the large numbers of inhabitants of the catchment extract water that is often contaminated and unfit to drink from seasonal streams without adequate treatment facilities. In addition to its importance as a source of potable water, the Lake's waters are used for hydroelectricity generation and irrigation. The Lake and its surrounding scenery also provide the setting for a rapidly growing tourist industry with tourist numbers having reached 11 million each year. The rapid economic development, urbanization, intensive agriculture production, improved living conditions, and the growth of tourism have increased both environmental pressures on, as well as value of ecological services from Qiandao Lake over the last 30 years.

6. Recognizing the importance of the Lake and the threats posed by rising pollution levels, the National Development and Reform Commission (NDRC) led a multi-sectoral initiative aimed at addressing the issues faced by the Lake and its catchment. The first step comprised a comprehensive study of the issues being faced, with this being used to develop a blueprint for the sustainable management of the area. The resulting Integrated Plan for Water Resources and Eco-Environmental Protection in the Basin of Qiandao Lake and its Upstream Xin'an River (2013–2020) (the Plan) was approved by the State Council in December 2013. The Plan redefines the key functions for the Xin'an River and Qiandao Lake as a water source for domestic use, hydropower, and irrigation and as a facility for ecological protection and flood control; and it also contains proposals for the sustainable development of the area. Based on the Plan, both Zhejiang and Anhui have prepared provincial-level Plans.

7. The main challenge facing the Xin'an River and Qiandao Lake is the large amount of pollutants being released into the River and Lake from their catchments. The main discharges come from domestic sources and agriculture (mainly tree crops and farming crops), with agriculture accounting for around 60 percent of total nitrogen and 80 percent of total phosphorous. More specifically in Zhejiang Province, the main forms of land use in the catchment comprise forestry (70 percent) and agriculture, including dryland,

orchard, and paddy fields (17 percent); rivers, roads, and settlements account for the remainder. The widely dispersed nature of agricultural activities in remote locations has made the control of nonpoint sources of pollution challenging. This is driven by traditional and inefficient agricultural practices which produce high levels of agricultural nutrient runoff into the lake. For instance, farmers tend to use excessive amounts of both fertilizers and herbicides, combined with extensive soil cultivation for crop production, and this causes the serious nutrient runoff; it also results in soil carbon release. On average, 370 kg/ha of chemical fertilizers are used for crop production in the lake's catchment (compared with the international standard of 225kg/ha), with rates reaching 1,000kg/ha in some areas. As a result, government reports indicate that around 10,460 tons of chemical oxygen demand (COD) and 930 tons of ammonia nitrogen (NH3-N) were released into the Lake and the River in 2015 in Chun'an County and Jiande City, Zhejiang Province, with total nitrogen and total phosphorous from agricultural discharges accounted for around 60-70 percent of the total discharges. The traditional farming practice also poses a risk to the increase of greenhouse gas (GHG) emission contributing to climate change.

8. Forest cover in the Lake's catchment consists mainly of planted conifer monocultures. Unfortunately, the planting of monocultures has increased the susceptibility of plantations to pests and diseases, which has reduced tree growth and tree vigor at some sites. In 2016, around 30 percent of conifers—in particular mason pine—were found to be infested by the *Monochamus* beetle which has left the forest floor below exposed to erosion and leaching of the phosphorus-rich soils. Fire is an additional hazard in the forests of the Lake's catchment, especially in dry season when, coincidently, tourism is at its peak. With the growth in tourism and trends toward drier, hotter summers brought on by climate change, the fire risk is likely to increase in the future. The loss of forest cover through insect attacks and fires expose the soils beneath to erosion and nutrient leaching, as well as to impair the soil's capacity to store moisture and reduce biodiversity and forest ecosystem resilience to climate change. Monoculture tree planting system also enhances flush flood. Due to loss of vigor and biomass, monoculture tree planting also reduces the capacity for carbon dioxide ($CO_{2)}$ sequestration.

9. The negative effects of forest fires on soils has been studied on sites similar to those in the Lake's catchment and, using this data, it has been estimated that the forest fire potential in lakeshore pine monocultures could cause soil loss of around 39, 660 tons/year, and that water storage capacity could be reduced by 1,031,140 tons per year. It has also been estimated that the effective flood regulation capacity could be reduced by 1,038,320m^3 per year and that the dry season water supply could be reduced by 2,253,970m^3 per year. These data underline the importance of maintaining a healthy forest cover in the Lake's catchment.

10. In addition, water quality in the Qiandao Lake has been adversely affected by the collapse of embankments of its tributaries during the flood season, thereby releasing both pollutants and sediments into the rivers, and subsequently into the Lake. River floods are also a cause for concern in the area due to weak river embankments that reduce water storage capacity in valley bottoms and lower the flood control capacity of rivers, with the latter posing risks to farmland and villages in areas adjacent to rivers. During periods of intense precipitation, the erosion of river bank and sedimentation of river bed threaten the livelihoods of a large segment of the communities in area.

11. To realize the aims of the Plan, the Government of Zhejiang (GoZ) has made progress in controlling pollution from industrial and domestic sources by improving wastewater treatment facilities in urban and rural settlements. It has also closed many large livestock farms which caused pollution. The same efforts

have been also made by the Anhui Provincial Government. However, non-point sources of pollution from agriculture remain stubbornly high, accounting for around 60-70 percent of ammonia nitrogen (NH3-N), phosphorus, and nitrate discharges mainly due to the poorly regulated and unmanaged disposal of manure and the inappropriate use of fertilizers and herbicides.

12. The data on water quality in the Lake indicate that total nitrogen, an important indicator of water quality, increased from 0.82mg/l to 1.23mg/l between 2010 and 2015. The trophic state indices also rose from 29 to 31 (reaching 34 at one point) over the same period, thereby giving the water body an intermediate trophic state rating. Fecal coliform 'spikes' also occurred, temporarily lowering water quality ratings in some areas to Class III–IV. Increases in pollution have also caused the chlorophyll content to rise from 2.9 (10^3 mg/l) to 5.9 (10^3 mg/l), resulting in a reduction of water transparency from 4.36 m to 4.25 m. The slow decline in water quality in the Lake and its catchment gives rise for concern given its economic importance in particular as the main source of drinking water for the cities along the river.

13. To improve the quality of water in the Qiandao Lake and its catchment, a number of challenges need to be addressed. These include reducing nonpoint pollution in a cost-effective way, restoring degraded ecosystems to strengthen the natural resilience of landscapes and watersheds, developing long-term mechanisms for pollution management and natural resources management, and strengthening coordination between the various stakeholders and line agencies. To help achieve these aims, and to strengthen the effectiveness of planning and implementation of government River and Lake Basin management program, the GoZ has requested the World Bank's support to develop and demonstrate a package of mutually supportive sustainable interventions aimed at improving water quality and restoring landscape in Qiandao Lake and its catchment.

C. Higher Level Objectives to which the Project Contributes

14. The project is closely aligned with the FY 2013–2016 World Bank Group's Country Partnership Strategy for China (Report 67566-CN), discussed by the Board of Executive Directors on November 6, 2012, especially objectives set out under Focus Area I 'Supporting greener growth' by demonstrating sustainable natural resources management. The project's design is also in line with the national ecological conservation and water management strategies and is supportive of the GoZ's desire to improve the effectiveness of its Integrated Plan for Water Resources and Eco-Environment Protection in the Basin of Qiandao Lake and Xin'an River (2016), which, in turn, is supportive of the 13th Five-Year Plan for Zhejiang Province. To underpin these higher-level objectives, the project would promote climate smart agriculture (CSA) practice, environmentally sustainable forest management, integrated landscape management, multisector cooperation in water resources management and ecosystem restoration, and strengthen cross-border collaboration in pollution control between Anhui and Zhejiang Provinces. It would also promote the use of innovative and cutting-edge watershed assessment and management models, and pioneer the innovative compensation mechanism for ecological services—the payments for ecological services (PES).

15. This project is part of a large government watershed management program, including the Yangtze River Economic Belt Eco-civilization Program. In addition to support to the Government Integrated Plan for Qiandao Lake and its Upstream Xin'an River Basin Protection Program in Zhejiang and Anhui provinces, for which the Government would invest around US$ 2.1 billion, the lessons learned from the project, such as PES and other innovative elements including the integrated watershed management and hydrological

modeling for pollution control especially from non-point sources, institutional coordination mechanism to implement pollution management and landscape restoration, sustainable and market-based financing model will be introduced to broader ecological protection and environmental management in China. Project experience and results will also provide valuable support to an operation that is planned to be financed by the Asia Development Bank (ADB) in coming years on Xin'an River ecological environment protection and green development in the upper reaches of the Xin'an River in neighboring Anhui Province. Given China's large investment in water and ecological environment protection projects, the innovations supported by the Project will be instructive for these investments to be implemented in an efficient way.

16. The project will also contribute to global public goods through pollution reduction, knowledge sharing and climate change Co-Benefits. The project will reduce pollution, such as active nitrogen that already exceeds global limits, into the river system and the ocean. Agriculture is a major contributor to eutrophication in the oceans surrounding China and the project promoted CSA practice will reduce the relevant pollution discharge to water systems; lessons learned from the project will be shared not only within China but also with other countries that face similar challenges. Moreover, the project will also contribute to mitigating climate change as well as adapting to its impacts. By adopting integrated ecosystem-based adaptation design approaches, the project will contribute to increasing landscape resilience, reducing flood and forest fire risks, increasing forest carbon sequestration, and reducing GHG emission through agrochemical use and the extent of soil cultivation reduction, energy and water saving for drinking water supply operations, and greening water course management.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

17. The project development objective (PDO) is to strengthen integrated pollution and watershed management and increase access to improved water supply in selected landscapes in support of Zhejiang's program for the protection of Qiandao Lake and Xin'an River Basin.

B. Project Beneficiaries

18. The key beneficiaries of the project would be farmers, forest plantation owners, livestock producers, and companies who engage in low impact agriculture and tree planting, wastewater management, potable water supply in Chun'an County and Jiande City, together with approximately 720,000 people. The project will also generate employment through the construction of weirs, wetlands, river embankments, and the dredging of rivers, as well as forest rehabilitation and restoration. Indirect beneficiaries will include residents living around the lake, as well as the tourists who visit the lake each year.

C. PDO-Level Results Indicators

19. The PDO results indicators are (a) Nitrogen load reduction achieved under the project; (b) Phosphorus load reduction achieved under the project; (c) Decrease of soil erosion; and (d) People provided with access to improved water sources. These indicators have been chosen because nitrogen, phosphorus, and sediments are key pollutants in the lake, and poor access to potable water is a water quality issue faced by rural people.

III. PROJECT DESCRIPTION

A. Project Components

Project Area

20. The project will focus its activities in Chun'an County and Jiande City in Zhejiang Province. Based on levels of pollution in individual catchments, five catchments were identified in Chun'an County, namely the tributaries of Wuqiang, Shangwu, Zitong, Yuchuan, and Liudu, and three catchments were identified in Jiande City, namely the tributaries of Wulongxi, Datongxi, and Tongjiaxi as key areas for integrated watershed management demonstration. These catchments experience the highest pollution levels and are in urgent need of pollution reduction measures. A Xin'an River basin-wide assessment was conducted to identify pollution sources, analyze pollution status, and prioritize the most-needed watershed areas for water pollution management. In addition to the eight catchments, an afforested area which runs around the Lake, between the first ridge and the lakeside, in Chun'an was also identified as an important project area due to the important role it plays in the protection of the Lake's hydrology, its shoreline and the quality of water.

Project Design Approach and Components

21. An integrated landscape management approach is adopted in selected watershed area. Given the vastness of the catchment area combined with the diverse nature of land usage, a clearly focused demonstration approach is used to identify and plan the most effective and sustainable ways of reducing pollution discharges, adopting CSA practices, improving ecological resilience, protecting rural livelihoods and enhancing environmental functions. To achieve those aims, the innovative practices have been brought to the project design such as using watershed modeling and piloting payment for environmental services (in cooperation with The Nature Conservancy), focusing on landscape ecosystem restoration, and promoting CSA activities. Demonstration will also involve the identification and planning of institutional arrangements (networking, partnerships, out-sourcing) which offer the most promise to address the multi-sectoral and interdisciplinary nature of sustainable landscape management and water pollution control.

22. More specifically, project activities will aim to identify and demonstrate the cost effective ways of reducing fertilizer and pesticide use and improving soil management in crop production, expanding and improving the efficiency of domestic wastewater treatment plants (WWTPs), strengthening flood control measures, restoring wetlands, rehabilitating ecologically degraded, pest-infested and fire-damaged forest plantations, and upgrading and expanding potable water facilities in rural areas, as well as establishing a technologically advanced system of water quality monitoring in the Lake and River catchment.

23. The interdisciplinary nature of pollution control in the project area presents special challenges to the project implementation, especially for reducing nonpoint sources of pollution where innovative practices will be promoted and the project design reflects this. For example, project activities will need to cater for different cropping patterns, the diverse ecological and social profiles of the areas, the widely dispersed locations of pollution sources, differences in site conditions, and the widely dispersed and interdisciplinary nature of the problem. For these reasons, a cautious and clearly focused demonstration approach will be taken, which seeks to identify the most appropriate and sustainable models for individual

sites/watershed units, with the financial and environmental impacts of each being closely monitored. To complement the demonstration approach, piloting of PES will help identify the most effective incentive mechanisms needed to compensate farmers who adopt CSA practices. The field practices would be used to demonstrate cost effective pollution reduction measures, with these being used to show-case and scale up in the Lake and River Basin, and watershed management elsewhere.

24. The potential impacts of the climate change in the project area have been taken into consideration in the project design. To mitigate the risks, an ecosystem-based adaptation approach will be used to help rural communities strengthen the resilience of large landscapes and mitigate the risks of intense rainfall, drought, erosion and sediment of river channels.

25. More specifically, to achieve its objectives, the project includes three components.

Component 1: Landscape Management Improvement (Total Cost: US$106.66 million, of which IBRD US$86.02 million)

26. **Climate Smart Agricutlure.** Agricultural crop production is the main nonpoint source of pollution in Xin'an River and Qiandao Lake catchments in Chun'an County and Jiande City. To address this issue, the project would promote CSA activities, such as soil nutrient management, integrated pest management (IPM), and conservation agriculture (CA) pilot. Specific activities would include the following:

(a) Soil nutrient management, which would finance the development and dissemination of basic soil nutrient management plans to determine optimum fertilizer application and the use of low-impact measures to improve application and utilization efficiencies of fertilizers to reduce the pollution discharge to watersheds.

(b) Integrated pest management (IPM), which would finance the upgrading of pest monitoring and early warning systems and adopting IPM practices such as biological and physical pest prevention and control measures. This will include the use of insect traps and lights in key cropping systems, and the use of low environmental impact pesticides and related equipment. The IPM practices are expected to improve the resilience of the cropping system to pest pressure, reduce farmer dependence on noxious insecticides and fungicides, and extend the use of natural predators and low impact pest control measures.

(c) Conservation agriculture practice, which would finance low-impact pilot operations to demonstrate the use of low-impact soil tillage and minimum tillage practices for the main crop production in the catchment areas, the aim being to reduce soil erosion, runoff, nutrient loss and carbon releases.

27. More specifically, this subcomponent will finance the use of conservation tillage/soil erosion control measures, including keeping vegetation barriers (such as grasses), setting ecological interception ditches, and limited soil tillage for farming activities; collecting and recycling 90 percent of used agrochemical containers in project areas; banning the use of toxic herbicides and insecticides and applying IPM in crop sites; and encouraging the adoption of organic agricultural practices by using 24,080 tons of slow-release formula fertilizers and 141,300 tons of organic fertilizer for tea gardens, fruit trees, and mulberry trees, as well as agriculture crops. With the joint efforts made under the project, the efficiency

of the use of pesticides and chemical fertilizers will be improved with the use of TN and TP being reduced. In addition, the project would promote Green Labelling whereby farmers could be certified as producers of Green/Organic Agriculture Products. Once certified, farmers could enjoy the financial benefits which come with having access to markets for environmentally friendly produce. The project will also support participating farmers with marketing of their green certified products through the TNC-led pilot.

28. The CSA practice would be promoted by providing: (a) field technical support to project beneficiaries, mainly smallholders, on environmentally friendly crop production practices; (b) incentive payments to eligible village committees to finance a portion of the incremental operating costs (IOCs) for organizing beneficiaries in their villages to carry out project activities; and (c) incentive payments to project participants to encourage them to adopt CSA activities under the project. Throughout project implementation, the financial implications of low-impact cropping practices versus traditional practices would be carefully monitored, as would the attitudes (positive and negative) of farmers to their use. The arrangements for incentive payments acceptable to the Bank and are detailed in the project implementation plan (PIP).

29. The above activities are fully compliant with the principle of CSA, the objectives of which are to increase productivity in an environmentally and socially sustainable manner, strengthen the resilience of cropping systems to climate change, and to minimize the agricultural sector's contribution to climate change by reducing GHG emissions and sequestering soil organic carbon.

30. **Livestock waste management (LWM).** Manure from livestock farms (pigs and poultry) is an important point source of water pollution in Chun'an and Jiande. Although waste treatment in most large livestock farms is adequate, improvement at some sites is still urgently needed. To address this issue as part of integrated watershed management in selected catchments, the project will provide incentive payments to participating farms to improve LWM facilities. Upgraded facilities would provide for the safe collection and treatment of livestock manure in 22 existing small-scale pigs and chicken farms, thereby drastically reducing pollution discharge and methane emissions. To do this, the project will finance small-scale civil works and equipment for manure collection and storage, fermentation facilities, pipes to transfer liquid livestock manure to farmland. Project technical assistance and extension services will be made to help farmers plan and execute these works.

31. **Forestry ecosystem protection.** Under this subcomponent, the ecological functions of pest infested/degraded monoculture plantations and abandoned lands in Qiandao Lake catchment would be improved through enrichment planting and/or replanting with a diversified mix of native species. It would also improve forest fire prevention and control operations. Operations would focus on the area around the lakeshore, between the shoreline and the first ridge, where most degraded and monoculture forests are located and where most fires occur, as well as in the selected key eight catchments as part of integrated landscape pollution control and ecosystem protection practice.

32. Around 20 planting and enrichment forest management models have been developed for use in the project, these being based on both the experience and lessons learned under various Bank-financed forestry programs in China and other countries, as well as on recent research and best practices. It is estimated that around 12,730 ha of degraded and damaged areas would be rehabilitated and replanted, of which, forest rehabilitation comprises around 10,470 ha and replanting around 2,260 ha. A mixture of at least three species of indigenous broadleaves and shrubs would be used in each site, with a total of 40

local tree species available and suitable for use in the project area. Promoting the transition from traditional monoculture forest management toward diversified species and multi-structural forest landscape restoration will bring stable forest ecosystem recovery, which will help reduce runoff and enhance the water storage capacity of soil (which will reduce flood risks), reduce forest fire incidences, and contribute to improved carbon restoration, leading to reduced GHG emissions and improved resilience to climate change impacts.

33. To improve fire prevention and reduce erosion along existing roads, support would be provided to upgrade 21 km of forest road used mainly for access and forest fire control. Support would also include the purchase of fire outbreak detection monitoring facilities and communications equipment (telecommunications, fire towers, and fire detection equipment), with aggressive 'Prevent Forest Fires' campaigns designed to make communities more aware of the risks and consequences of forest fires, and train them on the appropriate actions to take in case of forest fire outbreaks. Such programs would target areas where the frequency of forest fire outbreaks is high, such as in the densely populated areas adjacent to forests in Jiande. Forest fire protection measures under the project will also have the potential to reduce GHG emission through 'emissions avoided'.

34. **Wetland management.** Wetlands can be used to reduce pollution, improve water management, and strengthen biodiversity conservation. To help reduce pollution loads flowing to rivers and to enhance the water storage capacity and flood control of the Qiandao catchment, the project would support piloting small-scale wetland management in a selected watershed in Hangtou Township, Jiande City. This will be used to demonstrate how to restore a wetland and show how it reduces pollution from agricultural land and villages around the wetland and how it contributes to restoring the ecological functions of watersheds. The detailed technical design was developed with the project mainly financing the relevant civil works, equipment, and technical assistance.

Component 2: Water Resources Management Improvement (Total Cost: US$160.09 million, of which IBRD US$54.36 million)

35. **Wastewater management.** This subcomponent will finance the expansion of one existing domestic Waste Water Treatment Plant (WWTP) in rural Jiande to increase its treatment capacity. To make full use of the WWTP's capacity and to improve its operational efficiency, the combined sewer will be replaced by separated sewer systems, and the associated sewer network will be expanded to collect domestic wastewater from underserved areas. The local environmental protection bureau has established a monitoring platform to monitor rural wastewater discharges from all villages and submits its data to the provincial environment monitoring center.

36. **Water course improvement.** As part of the project's integrated pollution and erosion management measures, this subcomponent will support: (a) the improvement of water courses through the rehabilitation of 137 km of river embankments, the dredging of 50 km of river channels, and the rehabilitation of 106 small overflow weirs in the selected key eight watersheds. It will also strengthen around 67 km of river embankments and dredge 98 km of river channels in other areas in Chun'an County; and (b) the repair of 12 field access bridges in selected water courses in townships of Jiande City.

37. Non-engineering practices will be introduced under the project. These include greening and landscaping of riverine areas to increase water infiltration in project watersheds, which will expand water

storage capacity adjacent to rivers to reduce peak runoff, stabilize river banks with natural materials, and lower nonpoint source discharges and suspended solid discharges into Qiandao Lake from drainage channels along river banks in the project area. These interventions will serve to convert part of the water courses into grassed waterways to reduce gully erosion in those areas of concentrated flow, and thereby reduce sediment movement downstream and improve water quality. Those technical designs will also contribute to mitigate the risks of flooding and river sediment. Grassed waterways can also act as filters to remove sediment-attached pollutants and nutrients in runoff.

38. **Potable water supplies in rural areas.** In the project area, 1,017 villages draw water from a single standpipe in each village. This situation is representative of 96 percent of water supply schemes in the project areas, and 64 percent of those extracting water from seasonal streams. The poor quality of water being delivered and the poor management of the water supply system are a major concern. The poor quality of water being delivered is due to the fact that 39 percent of water schemes draw water from unprotected sources, around 57 percent have no reliable treatment facilities, around 35 percent do not use disinfectants, and 100 percent have no system of water quality testing. The poor management of the water supply systems is largely because 73 percent of systems are operated by a single person with no training in water supply management.

39. To address these issues, the project would construct and upgrade the drinking water treatment plants and the associated piped network to provide potable piped water to around 218,000 rural inhabitants in 19 townships in the project area, all of whom presently depend on supplies from antiquated and poorly managed installations. To keep costs at acceptable levels, the project would focus its efforts in village clusters rather than widely dispersed, isolated settlements where costs would be prohibitive. Project activities will include eight new village (clusters) supplies and offtakes together with a water main and water distribution system. In addition, eight villages (clusters) will have their water supply system upgraded and expanded. Water tariffs will be collected by the project entity (which is also the PIU of the project) and these will be used to pay for the operation and maintenance (O&M) of the facilities. The project will aim to make 62,300 new household connections and increase the percentage of inhabitants in the project area having access to potable water from 36 percent to 84 percent. To complement investments in infrastructure, training in water supply management will be also provided to personnel in water supply operations.

40. A least cost option is adopted to minimize energy requirements for water abstraction, treatment and distribution, through the replacement of aged pipe, installation of water meters, use of the gravitational flow for water extraction and distribution. The estimated energy saving potential is around2,625 kwh/day; the seasonal river stream will be replaced by a reliable water source to tackle the seasonal water unviability; and the project will invest in operational efficiency of the water supply system, with the reduction in water losses and water savings of around 3,000 m^3/day, through provision of household water meters and technical interventions, those efforts will contribute to enhancing resilience to climate change and reduce CO_2 emission.

Component 3: Institutional Capacity Building, Monitoring and Project Management (Total Cost: US$10.19 million, of which IBRD US$9.25 million)

41. This component would finance technical assistance, training and extension, research and studies, awareness raising, monitoring and evaluation (M&E), and project management. More specifically, it will

support activities described in the following paragraphs.

42. **Technical assistance and training.** This subcomponent would support the institutional strengthening and capacity building of the Provincial Project Management Office (PPMO), the two County Project Management Offices (CPMOs), and the Project Implementation Unites (PIUs) to ensure that they are adequately prepared to implement, manage and monitor project progress and impacts. The promotion and application of new technologies lies at the heart of the project and a robust technical assistance and training plan has been prepared. The plan will finance workshops and seminars, consulting services, public education campaigns and the training of both project staff and farmers in adopting new technologies such as CSA, best forest management and effective project management, and better project management. In total, around 19,230-person days of domestic training and study tours will be provided at provincial and county levels (around 30 percent women). In addition, around 840-person days of overseas training is included to ensure that project staff are kept abreast with best practice and innovations being developed in countries which face watershed management challenges similar to those of the Qiandao catchment. A technical expert team will also be set up at the provincial level to provide technical support to CPMOs and PIUs during project implementation. The participants rate for the training as good/excellent (%) and feedback collection on the areas that the training need to be improved following each training session is designed. The feedback from the project participants and beneficiaries will be taken into consideration to further improve the quality of technical services and meet their needs during project implementation. The project's technical assistance and training plans were reviewed and are acceptable to the Bank. These are included in the PIP.

43. Given the interprovincial nature of water pollution management in Qiandao Lake and Xin'an River, the project will promote interprovincial collaboration. More specifically, it will promote the dialogue between Anhui and Zhejiang Provinces through (a) training and workshops (once a year from second year of project implementation) to promote an exchange of views on watershed management and pollution control and to facilitate knowledge sharing and lessons learned among involved agencies, including the knowledge sharing with a proposed ADB-financed project implementation agencies, which aims to improve the upstream Xin'an River Basin management in Anhui Province; and (b) regular meetings between the two provincial governments' authorities (twice a year) with the aim of arriving at an agreed strategy for pollution management in the Qiandao Lake catchment.

44. Dissemination. The project will also support dissemination workshops to extend project lessons learned on watershed assessment methodology, integrated watershed management models, long-term natural resources management mechanism and multisector cooperation for pollution management and ecosystem restoration to broader national and international participants both from China and other countries.

45. **Study and research program.** Five study and research programs will be included. Given that the project aims to provide support to the Zhejiang Xin'an River and Qiandao Lake Water Resources and Ecological Protection Plan, the project will finance analytical and advisory work aimed at improving the effectiveness of the Plan. This study will help to gain a better understanding of the implementation status of the Plan, assess its performance and lessons learnt, and provide recommendations to the GoZ on the improvement of the effectiveness of Plan implementation and its next stage planning. In addition, other research programs are included such as analysis on the effectiveness of newly introduced integrated watershed/landscape management activities, including forest management technical models, CSA

practices, ecological approaches to river management, and sustainable/green financing.

46. **Monitoring and Evaluation (M&E) System.** The project M&E system will collect data to help guide project implementation and decision making, as well as to assess the project's performance and impacts. M&E parameters and targets are based on domestic and international best practices, with due attention being given to the project cost-effectiveness approach being taken by the project. Parameters to be monitored include: (a) project implementation progress; (b) the quality and performance of project activities including its technical and institutional support systems; (c) the achievement of the PDO; and (d) the project's environmental and social impacts.

47. The project will also support strengthening the overall Qiandao Lake and Shouchang River water environment monitoring system through the provision of additional monitoring stations, equipment and facilities, and improvements to the systems and methodologies for data collection, storage, and analysis, all of which will strengthen the river basin water resources management and planning.

48. Specific project activities aimed at strengthening monitoring will include: (a) strengthening the existing watershed monitoring network by establishing continuous automatic monitoring stations near the outlets of high-priority watersheds identified by the project and (b) within selected watersheds (near to project treatment sites), carry out surveys and/or sample plot monitoring to determine the most significant sources of different nonpoint sources of pollution and pollution reduction generated by the project interventions. The latter will consist of numbers of locations sampled on a quarterly (seasonal) basis. These locations will be determined based on a geospatial analysis of project land use patterns and locations, as well as on local expert knowledge. As a supplementary tool, the Soil and Water Assessment Tool (SWAT) model will be used to assess pollution reduction associated with land management interventions during the project period, including soils, topographic relief, and land management practices believed to have the greatest influence on downstream water quality. The water quality survey data will serve to evaluate the assumptions underlying the SWAT model. Details of the project M&E plan are included in the PIP.

49. **Cooperation with The Nature Conservancy (TNC) on PES pilot**. In parallel with the Bank-financed operation, TNC will pilot a PES practice in the project areas under the project's overall design and institutional framework and technical support. A water fund will be developed and operated as a platform by cities and conservation practitioners within the 'Payments for Ecosystem Services' concept. As a project partner, TNC will set up and operate the Qiandao Lake Water Fund with the aim of using the funds collected from downstream water users to compensate upstream farmers and communities who adopt environmentally friendly land management practices. The pilot would be implemented in two project watersheds (Shangwu stream in Chun'an and Waling stream in Jiande) and would aim to demonstrate how payments for environmental services can be used to control upstream pollution as a long-term mechanism. The detailed activities to be undertaken under the PES and the operation of the fund will be developed in consultation with participating farmers and communities. With the experience gained from the pilot, the initiative would be rolled out into other catchments. TNC will manage the water fund in accordance with its own fiduciary requirements.

B. Project Cost and Financing

50. Project costs total US$293.46 million over six years, with project closure scheduled for June 30, 2024. Project costs include price and physical contingencies, interest during construction, commitment

fee, and front-end fee. Project operations will be financed by an IBRD loan of US$150.00 million (about 51 percent of total project cost) and local counterpart funding of US$143.46 million from local governments (about 49 percent of total project cost). The IBRD Loan will be a US Dollar denominated, commitment-linked variable spread loan, based on six- month LIBOR plus an additional variable spread loan, with all conversion options, and annuity repayment amortization profile. It will have a repayment period of 25 years, including a grace period of 6 years.

Table 1. Project Cost and Financing Plan

Project Component	Total		IBRD		IBRD Financing
	US$, millions	CNY, millions	US$, millions	CNY, millions	%
A. Landscape Management Improvement	**101.54**	**680.3**	**81.79**	**548.00**	**81**
1. Low Impact Crop Production	31.81	213.12	21.09	141.27	66
2. Livestock Waste Management	1.00	6.7	0.31	2.10	31
3. Plantation Restoration and Rehabilitation, and Forestry Infrastructure	68.29	457.51	60.00	401.97	88
4. Wetland Management	0.44	2.97	0.40	2.66	90
B. Water Resources Management Improvement	**152.41**	**1,021.16**	**51.68**	**346.28**	**34**
1. Wastewater Management	3.67	24.61	0.00	0.00	**0**
2. Water Course Improvement	97.99	656.56	11.76	78.79	**12**
3. Rural Water Supply	50.74	339.99	39.92	267.49	**79**
C. Institutional Capacity Building, Monitoring and Project Management	**9.70**	**64.99**	**8.79**	**58.87**	**91**
1. Technical Assistance and Training	3.32	22.27	3.03	20.30	91
2. Research/Study Program	0.62	4.17	0.53	3.57	86
3. Monitoring Evaluation	5.75	38.55	5.22	35.00	91
Baseline Costs	**263.65**	**1,766.45**	**142.26**	**953.15**	**54**

Project Component	Total		IBRD		IBRD Financing
	US$, millions	CNY, millions	US$, millions	CNY, millions	%
Contingencies	13.30	89.08	7.37	49.36	55
Total Project Cost	**276.94**	**1,855.52**	**149.63**	**1,002.51**	**54**
Interest during implementation	15.43	103.38	0.00	0.00	0
Front-end fee	0.37	2.51	0.37	2.51	100
Commitment fee	0.71	4.78	0.00	0.00	0
Total Financing Required	**293.46**	**1,966.20**	**150.00**	**1,005.02**	**51**

C. Lessons Learned and Reflected in the Project Design

51. In designing the project, the lessons learned and experiences gained from similar operations in China and beyond have been taken into consideration. The most important aspects are as follows:

(a) The main lessons learned from the Bank-financed Jiangxi Poyang Lake Basin and Ecological Zone Small Town Development Project and Xining Flood and Watershed Management Project were: (i) improving low-level institutional capacity and interagency coordination, which were found to be the underlying causes of ineffective planning implementation, is essential to project success, and capacity building at all project stages is also essential to ensure that staff gain an early understanding of the project concept and Bank procedures; and (ii) a mix of engineering and non-engineering measures optimizes the effectiveness of water resources management. Engineering activities need to be complemented by 'soft approaches' based on soil and water conservation techniques.

(b) The experience from the Bank-financed Integrated Forestry Development Project was used to help design the project's forestry interventions, especially with regard to the use of more local species and mixed planting structure to shift monocultures forest to more resilient diversified forest ecosystem and to generate better ecological environmental functions. The importance of embedding project interventions in national policy frameworks and local development strategies has also been taken into consideration, which ensured strong political support throughout project preparation.

(c) The participatory approach is an essential element in most water resources management, forestry, and agriculture projects. The lessons learned from similar projects have been adapted in community consultation processes, which showed that the involvement of communities in the design of watershed management projects is essential to the successful control of nonpoint sources of pollution and landscape restoration. The lessons learned also highlighted the importance of having local communities participate in the project on a voluntary basis with the preferences and concerns of beneficiaries being appropriately addressed during project design and implementation.

(d) International experience in assessing water pollution and soil erosion in watersheds was reviewed, as a result of which the SWAT model was used to identify priority areas for inclusion. In addition, lessons learned from the Bank-financed ITAIPU Dam Project in Brazil were considered in water resources management.

(e) Best practices for sustainable financing model of ecological protection has also been introduced in this project. Despite China's significant expenditure on ecological compensation, the ecological compensation is sourced from public sources, which is going to be inadequate given the scale of environmental challenges and lack of sustainable approaches. The proposed project will demonstrate a successful and innovative ecological compensation mechanism—the PES—using market system through the collaboration with TNC.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

52. Institutional responsibilities for project implementation are summarized in the following paragraphs, details of which can be found in the PIP.

53. **Project Leading Groups (PLGs).** PLGs have been established at provincial and county governments. The PLGs are headed by secretary general/vice-governors and comprise members from key line agencies including the Finance Departments, the Development and Reform Commissions, the Construction Departments, the Agriculture Departments, the Forestry Departments, the Land and Resources Departments, the Water Resources Departments and the Environment Protection Departments. The PLGs would be responsible for setting policy guidance, addressing key issues encountered, and overseeing PMOs work during project implementation, facilitating interagency coordination, and evaluating progress of the project. Given that a number of Government agencies will be involved in project implementation, strong leadership of PLGs is crucial for the effective coordination of sectors and line agencies.

54. **Provincial Project Management Offices (PPMO).** The PPMO was established within the Zhejiang Construction Department by strengthening the existing PPMO, which was established for the previous Bank-financed projects with the adequate numbers of staff. The PPMO will be responsible for the overall coordination of project activities, supervise CPMO and project implementation unit (PIU) work, and centralize all progress, financial, and procurement reporting for the project, and provide technical support to CPMOs and PIUs. More specifically, the PPMO will be responsible for the preparation of consolidated project annual work and budget plans, procurement plans (PPs), financial reports, implementation progress report; the supervision and coordination of project implementation; the organization of trainings, technical assistance, research, and studies at the provincial level; the promotion of cross provinces dialogues; and coordination of the project M&E activities.

55. **County Project Management Offices (CPMOs).** CPMOs were established within the relevant DRCs in Chun'an County and Jiande City. CPMOs will be responsible for the overall project management and provide hands-on support to PIUs on project implementation on the ground. Main responsibilities include the formulation of the annual work and PPs for submission to PPMO; coordination with the county

financial department to provide counterpart funding to PIUs on an annual basis; providing technical support to PIUs implementing the annual PPs and the activities to be implemented in the area, including carrying out technical training and providing technical guidance to PIU staff, contractors, and farmers; supervise the performance of PIUs, including conducting final inspection and acceptance of the works completed for disbursement and outreach consulting services for project impact M&E; and prepare periodic physical progress reports to be submitted to the PPMO for review and consolidation.

56. Expert Support Teams. To cater for the multidisciplinary knowledge/expertise requirements, a technical supporting group/expert team with multidisciplinary expertise will be set at the provincial level to provide the PPMO with the necessary technical support during project implementation. The terms of reference (TOR) for the team have been prepared and members will be hired at project launch. At the county level, the technical supporting teams comprising technical staff from each of the relevant sectors are in place to provide the technical and operational organization support to county PMOs in forestry, agriculture, water resources management, and environmental management.

57. **Project Implementation Units (PIUs).** The state-owned Chun'an Qiandao Lake Construction Group and Jiande Xinshui Construction Co. Ltd. will act as the PIUs, as the end-Bank loan borrowers and will be responsible for organizing project activities under the leadership of the CPMOs and with support from line agencies. The Bank's financial assessment concluded that the two companies are financially sound and are financially capable of servicing the Bank loan and covering the additional O&M for the works needed under the project. In line with terms and conditions set by the Ministry of Finance (MOF), both county governments have pledged to either provide subsidies to the companies, or repay the Bank loans in case the two companies get into financial distress. Details of the project's institutional and operational arrangements are included in the PIP.

58. From an operational point of view, the two PIUs will be responsible for overall project implementation, including fund management, the procurement of goods, civil works, and consulting services. With support from county PMOs and county agriculture bureaus, the PIUs will, through contracts with beneficiaries, be responsible for organizing the management of incentive payments for the adoption of CSA practice and manure management in livestock farms. Details of implementation arrangements are included in the PIP.

59. **River Chief System (RCS).** The GoZ has officially issued an implementation plan for the "River Head System" in Zhejiang Province. The RCS has been established as a long-term sustainable mechanism for integrated, cooperative, and participatory river and lake management system. Key Government leaders of the province, cities, counties, townships, and villages serve as the chiefs of rivers and lakes in their respective territories. The provincial RCS office has been established, with representatives from all relevant Government agencies. The system requires the river chiefs to take the responsibilities of river and lake management. This set administrative system overlaps with the proposed project management system. As such, the river chiefs at each level in the project areas will coordinate with lines of government agencies making joint efforts in project implementation, coordination among various agencies, and overseeing the project quality. The project will further strengthen the coordination between project management entities and the RCS to enhance the capacity and awareness of the RCS in particular regarding the innovative integrated watershed management introduced through this project for pollution protection and ecological restoration. Moreover, the project will ensure active involvement of the RCS in reviewing progress reports and participate in key workshops and discussions about project progress. The

provincial river chief will in particular promote the dialogues between Anhui and Zhejiang provinces for the cross provincial Xin'an River Basin pollution management and ecological restoration.

60. **Project Implementation Plan (PIP).** A PIP has been prepared, dated January 20, 2018 to guide the project agencies and PIUs implementing the project. It includes detailed project technical design and standards, activities under each component, institutional and management arrangements including the aspects of financial management and disbursement, procurement, social and environmental safeguards, and project monitoring and evaluation. All the project activities will be carried out according to the PIP. The PIP is made available to all the staff involved in project implementation.

B. Results Monitoring and Evaluation

61. The M&E system under Component 3 will ensure that sufficient data are generated to facilitate the smooth implementation of project activities and accurate evaluation of its results and impacts. The M&E system is based on the pollution reduction monitoring and verification system established under China's 12th Five-Year Plan for Environmental Protection, while M&E parameters and targets are based on domestic and international best practices. The system will produce key data needed to assess the achievement of the PDOs, to evaluate the effectiveness of specific project activities, to confirm the project's compliance with environmental and social safeguards, and to verify the cost-effectiveness of the project's pollution reduction activities, the latter being of special importance given the cost-effectiveness approach taken by the project.

62. With assistance from institutions specialized in M&E, the PPMO will be responsible for the overall task of monitoring and evaluating project progress and the achievement of the PDO. CPMOs will be specifically responsible for keeping track of all planned and completed activities, planned and actual expenditure, quality control of project activities carried out by contractors, and tracking physical progress. If required, the PPMO will be responsible for providing technical support to the project M&E process.

63. CPMOs will furnish semiannual progress reports to the PPMO on January 31 and July 30 of each year. The PPMO will consolidate county/city semiannual reports into a project semiannual report and furnish it to the Bank by February 28 and August 31 of each year, the first being due on February 28, 2019. These reports will include an updated project monitoring report with a completed project Results Framework (Section VII of the Project Appraisal Document) indicating what progress has been made toward achieving its outputs and intended impacts. In addition to the semiannual reports, the PPMO will furnish the following to the Bank: (a) a project annual work and budget plan for the next calendar year by December 15 of each year; (b) a mid-term review (MTR) report on June 30, 2021; and (c) a project Implementation Completion and Results Report (ICR) on June 30, 2024.

C. Sustainability

64. **Long-term policy aspects**. Given China's strong focus on environmental protection, pollution protection and control, and ecological restorations, there is strong likelihood that projects of this nature will continue to be important. Moreover, the growing demand for better quality water and ecological services, commensurate with China's economic development and evolving needs of its citizens, as well as Zhejiang's dependence on the Qiandao Lake and Xin'an River waters, continued improvement of the quality of the waters and associated ecological services will be needed.

65. **Institutional aspects.** The environmental and water resources policy framework at all levels of government in China provide a firm basis for the continuation of project activities over the long term, with combined strong provincial commitment to the project. They will help ensure that project-related activities are maintained after project closure. County commitment to the project is evidenced by the fact that CPMOs were established at county level early on in preparation and strong leadership at county levels will help ensure that domestic funds are available for project follow-up. The complexity of institutional arrangements is an unavoidable reality, but having successfully implemented several Bank-financed projects in the recent past in Zhejiang, the provincial government has developed the capacity to manage Bank-financed operations. The institutional capacities at county level, in particular the PIUs, will be strengthened through intensive project training and managerial and technical assistance being provided by the Bank team and PPMO during project implementation.

66. **Sustainability of long-term O&M.** The sustainability of the WWTPs and the operation of the project's potable water supply systems will be assured by having adopted the cost-effective technical and operational design, having user tariffs in place, and the commitment of county governments to fund these operations where tariffs do not cover the full O&M costs. The decision to build a shared WWTP for two townships as opposed to one for each will reduce investment and O&M costs for this service and this should prove more cost-efficient and sustainable over the long term. The strong financial position of Chun'an County and Jiande City and their commitment to improving water quality in the Qiandao catchment ensure that improvements made under water course management are maintained for the foreseeable future. The follow-up needs for forestry management, wetland restoration, and the use of CSA practices will be incorporated into the local government's current management and extension program to provide long-term technical support to land owners, farmers, village authorities, and state forest farms and companies. The use of innovative ecological compensation mechanism—PES—to demonstrate sustainable business model for Qianyao lake and Xin'an River water quality improvement and ecological restoration will also contribute to the sustainability of the project in the long run.

67. **Technical sustainability.** The technical approach adopted for most project activities (waste water treatment, LWM, water course management, rural water supplies, and tree planting) is based on precedents where sustainability has been proven. Furthermore, for CSA practice and wetland management, a demonstration approach is being taken, with proposals being based on (a) an understanding of the underlying causes and financial dimensions of water polluting practice; (b) the application of an integrated, participatory, and cost-effective approach to its resolution; (c) a combination of financial support and institutional capacity building to help resolve the issue; and (d) good monitoring data and the cautious introduction of technical and management innovations in the search for a solution. In the case of rural water supplies, the project will expand and improve existing rural water supplies to village clusters instead of building new individual rural water supply systems. This will help reduce investment and O&M costs and strengthen technical sustainability.

68. **Scaling Up**. The project's potential for replication is high. The project will help the GoZ develop and mainstream the technically sound and cost-effective landscape pollution reduction and watershed management approaches elsewhere in the province and national wide. This will be achieved by showcasing cutting-edge watershed assessment methodology, developing cost-effective integrated watershed management models, exploring viable long-term sustainable natural resources management mechanisms, and promoting multisector cooperation for pollution control and ecosystem restoration. It is intended that experience and lessons learned from the project will be disseminated and replicated

outside of the project areas in whole Xin'an River Basin to support the Government program, including the proposed Anhui Yellow Mountain Xin'an River Ecological Protection and Green development Project (FY2020), which will be financed by the Asia Development Bank, as well as to be extended to broader river and lake management in Zhejiang Province and in China. In addition, this project fits into a much larger national watershed management plan and multi-project program on watershed management financed by the Bank and the lessons learned will be extended to other developing countries.

D. Role of Partners

69. TNC will collaborate with the Bank as a partner. It will set up the Qiandao Water Fund which will be designed to demonstrate the viability of long-term payments for environmental services in two pilot watersheds within project area (Shangwu stream in Chun'an and Waling stream in Jiande). TNC is leading this pilot operation in parallel to the Bank financed operation under the overall project design framework and institutional arrangements. The Qiandao Water Fund will have its own funding source and modus operandi. It will be designed as a sustainable, long-term mechanism for nonpoint pollution prevention and control through the PES model. Its aim is to reduce pollution by providing market-based incentives to farmers and householders who adopt sustainable land management practices. Successful experiences gained from the pilot will be expanded, as part of the project integrated landscape pollution and watershed management models, to reduce pollution throughout critical water catchments, such as those in the Xin'an River and beyond. Currently, the initial funding has been mobilized by TNC from the private sector in the downstream areas to launch this pilot.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

70. The overall risk rating for the Project is Moderate. The GoZ is highly committed to the project because it sees the control of pollution in Qiandao Lake and Xin'an River Basin as vital to economic growth, public welfare, and future prosperity in the province. It also sees the Qiandao Lake as the main driver of sustainable development in Chun'an and Jiande. Their resolve to reducing pollution in Qiandao Lake can be seen in the effort they have expended to prepare a master plan for the Xin'an River and Qiandao Lake catchments, the partnership arrangement they have entered into with the neighboring Anhui Province to reduce pollution, their commitment to piloting innovative watershed management models, and the efforts they have made to provide counterpart funds, strengthen institutional capacity, and improve cross-sector coordination. Further evidence of their commitment is provided by the fact that a PPMO and CPMOs have been established, with the PPMO and Jiande PMO having the previous Bank project experience. To build up the adequate institutional capacity for the project implementation, training and technical assistance will be provided through the project. Consequently, for the project overall, a risk rating of Moderate is considered appropriate. A summary of risk ratings and possible risks are shown in the Datasheet.

71. The main project risks and risk mitigation measures are as follows:

(a) Project agencies have limited experience in integrated watershed management. The project will mitigate this risk by hiring an expert team at the provincial level with multidisciplinary expertise to provide full-time technical support to local PMOs and PIUs during project

implementation. In addition, the Bank team will take the 'implementation support' approach, rather than focusing only on a review of progress and the identification of issues. This will involve hands-on support to project staff through frequent, short missions and the provision of staff training during project implementation.

(b) Project interventions will include river management, LWM, low-impact crop production, water supplies, forestry, and wetland rehabilitation. For this, the project needs to have effective cross-sector cooperation and coordination between environmental protection, agriculture, forestry, water resource management, water supplies, and urban and rural construction sectors. To mitigate the risk of poor institutional coordination, PLGs have been established at provincial and county levels. Each PLG will be led by a vice-governor at provincial level and vice-mayor or equivalent at county level, and comprise of the head of each Government department involved in the project. The PMOs worked closely with line agencies at the time of project preparation and this close working relationship will continue during implementation. The Bank preparation team noted that collaboration between line agencies is very good.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

72. **Project's development impact.** The proposed project would generate a broad range of benefits for sustainable economic development, environment protection, health improvement and tourism. Specifically, the project interventions would demonstrate effective integrated approaches to improving water resources management and ecological environment protection in Qiandao Lake and its catchment, so as to reduce pollution load discharge into the Lake; it would also contribute to the improvement of public health and living conditions in the selected project areas. The project investments in pollution control and ecological environmental protection are therefore judged to be the best and most cost effective and long-term solutions to protect the environment and human health.

73. **Rationale for public sector financing.** Public sector financing is justified on account of the expected positive externalities. The Qiandao Lake is of immense economic importance as a source of hydro-electricity, drinking water and tourism. As such, a reduction in discharged pollutants and improvement to the ecological environment in the lake basin will generate significant external benefits, including, but not limited to: (a) sustainable economic development in the catchment; (b) enhanced drinking water quality for public health; and (c) improved eco-system protection. Notwithstanding that China has set up the "polluter pays principle", it has been very hard to apply this to non-point pollution in agriculture production. Furthermore, the private sector is unlikely to invest in public services, environmental awareness and community participation, which is essential to the success and sustainability of environmental management projects.

74. **Cost Effectiveness Analysis.** The preferred methodology for the economic evaluation of all project components is 'cost effectiveness.' The rationale for adopting a cost-effectiveness methodology is that for landscape based integrated management practices, benefits are difficult to quantify in a reasonably reliable manner, especially those pertaining to public health and the environment (see section on project development impact). The key objective of a cost effectiveness analysis is to demonstrate that the

proposed investments have a sound strategic rationale with regard to the overall project objectives and that these objectives are met in the most cost-effective way (based on evaluated lifecycle costs and compared on a Net Present Value per unit incremental cost basis). As a result of the lack of robust quantitative estimates of project benefits, no economic internal rate of returns could be calculated.

75. **Financial analysis.** Most assets (such as ecological forestry and water course improvement) developed under the project will not generate any cash flow. As such, a financial analysis is not applicable. For rural water supplies, a financial analysis was conducted to set the tariff levels necessary to recover the O&M costs. Where Government-sanctioned tariffs cannot cover O&M costs, the fiscal subsidies needs have been estimated. Wastewater treatment costs are covered by a surcharge embedded in the water tariffs following the national and provincial decrees. As such, the WWTPs are financially supported by local budget allocations through contractual arrangements.

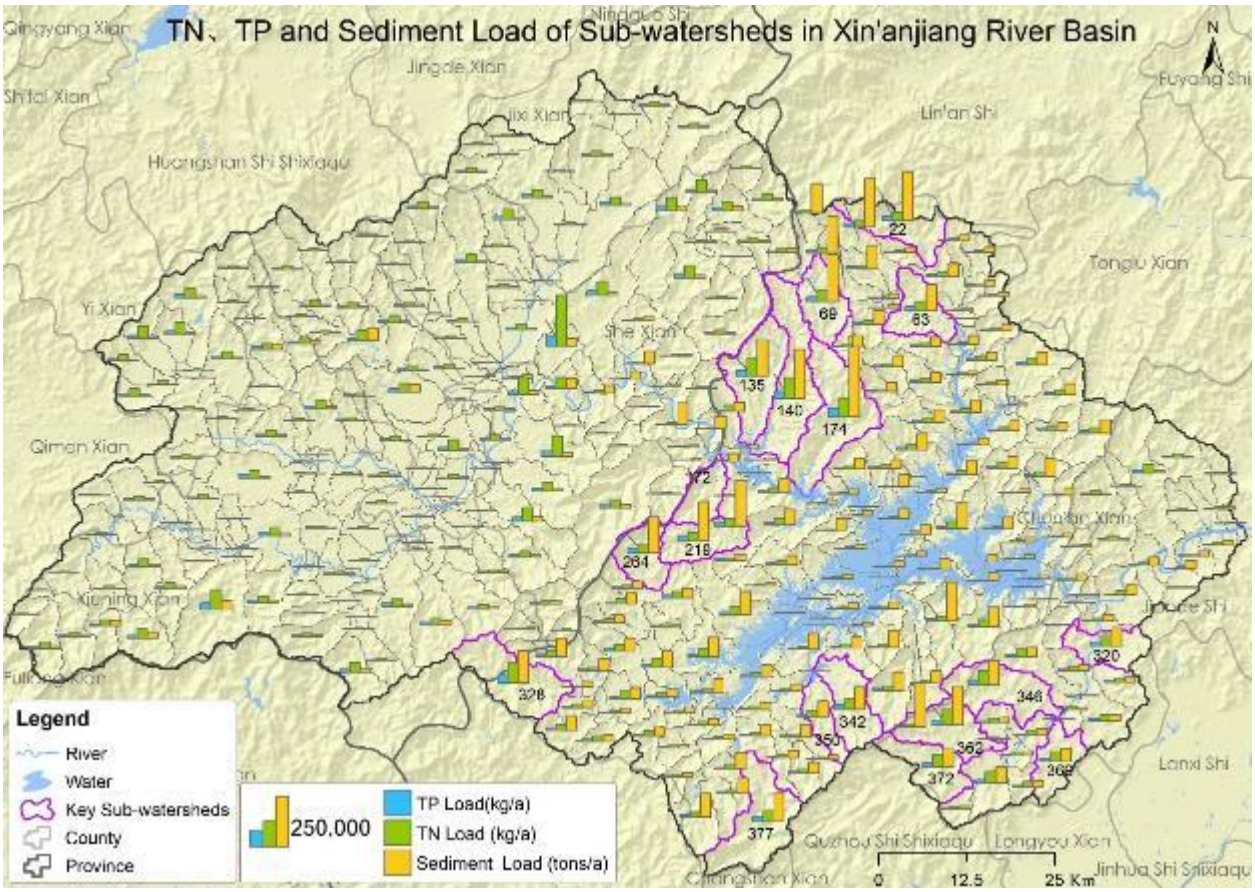
76. **Fiscal impact analysis.** Counterpart funds have been fully committed by both Chun'an County and Jiande City governments from their fiscal revenues. Two state-owned enterprises (SOEs), Chun'an Qiandao Lake Construction Group and Jiande Xinshui Construction Co. Ltd. have been designated by the Government as the PIUs. A financial assessment carried out by the Bank confirmed that the two companies are viable and capable of servicing the Bank loan and capable of covering additional O&M costs for civil works built under the project. Furthermore, in line with terms and conditions set by the MOF, both Chun'an County and Jiande City governments have pledged to provide any additional funding to the companies should project activities need it, or repay the Bank loans if the companies are unable to do so.

B. Technical

77. An integrated landscape management approach provides the basis for project technical design. A basin-wide assessment was conducted in the Xin'an catchment to identify pollution sources, analyze pollution status, and prioritize areas in most need of water pollution reduction. The SWAT model and geographic information system technologies were used to model hydrological processes and simulate the temporal and spatial distribution pattern of pollution in the Qiandao Lake and Xin'an River Basin. Essentially, the SWAT is a semi-distributed model which can be used to simulate and predict the impact of land management measures and land use types on surface runoff, sediment load, and nutrient loss at watershed level over long periods. Following this approach, the priority catchments in Chun'an County and Jiande City were identified. Even though these watersheds account for less than 20 percent of the total watershed area in the Zhejiang portion of the larger lake watershed (see Figure 1 from Pollution Pattern Assessment on Xin'an River and Qiandao Lake Basin), they contribute more than 35 percent of the total nitrogen and phosphorous load and 60 percent of the total sediment load.

78. Based on levels of pollution in individual catchments, five candidate catchments were identified in Chun'an County, namely the tributaries of Wuqiang, Shangwu, Zitong, Yuchuan, and Liudu, and three candidate catchments were identified in Jiande City, namely the Wulongxi, Datongxi, and Tongjiaxi catchments, as key areas for integrated watershed management demonstration. These catchments were therefore chosen to demonstrate how integrated watershed management can be used to reduce water pollution in the Qiandao Lake catchment. However, given that most degraded and pest-damaged plantations are located around the lakeshore, between the lakeshore and the first ridge, and that most fire outbreaks occur in the same area, the lakeshore will also be included in the project areas.

Figure 1. TN, TP, and Sediment Load of Sub-watersheds in Xin'an River Basin

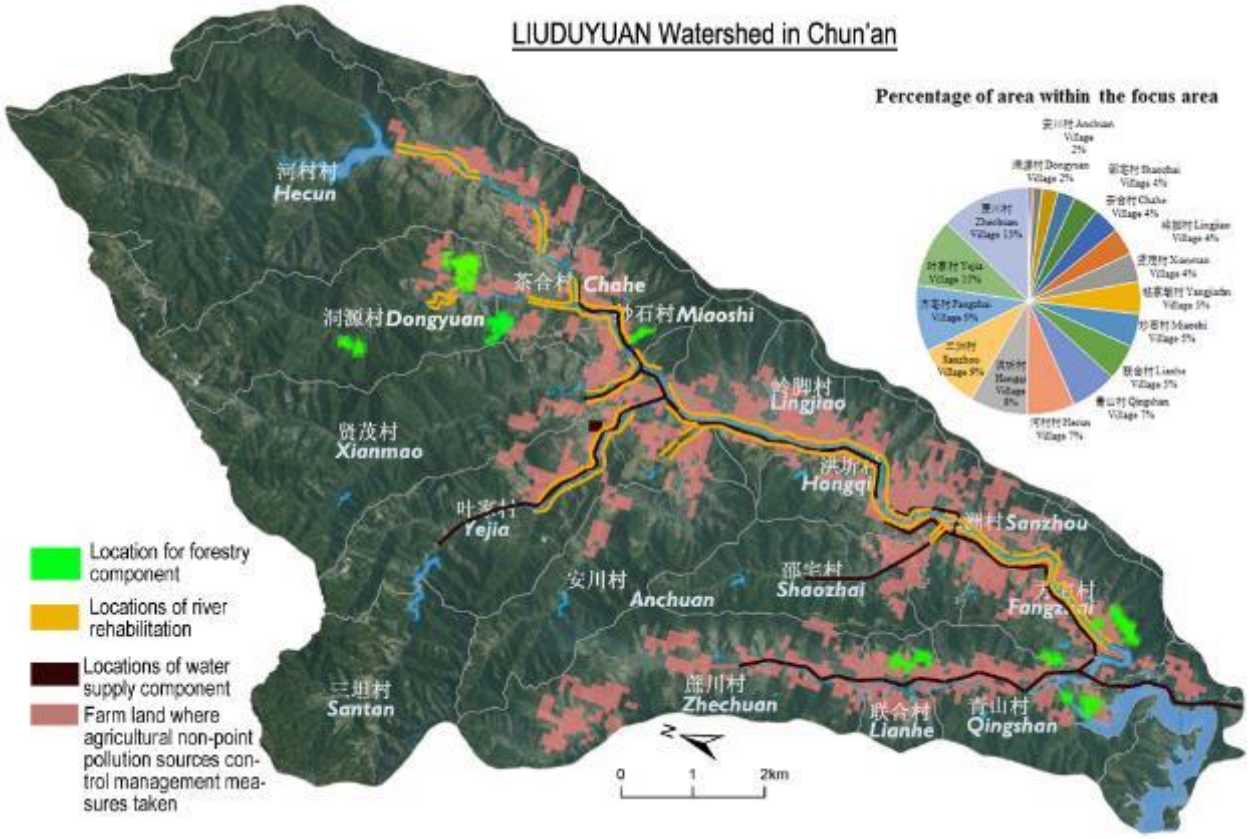


79. The assessment identified pollution sources, catchment area locations, and the land management practices responsible for pollution. It also showed trends in the temporal variation and spatial distribution of nonpoint source pollution under current land management types. With more data information from Zhejiang Authority, it revealed that even though farmland accounts for only 17 percent of the total land area, it contributes around 60–70 percent to the total nitrogen (TN), total phosphorous (TP), and sediment loads in those areas in Zhejiang. It also showed that land without vegetative cover or land with highly degraded forests experienced serious soil erosion and nutrient loss, and that bare lands had the highest erosion rates and TN intensity; paddy fields were found to be relatively high in TN intensity, moderate in TP intensity but with low sediment intensity, and dry lands had the highest TN and TP intensities and relatively higher sediment intensities.

80. The detailed assessment of project selected watershed units provided the basis for the specific integrated technical design for each unit, aimed at improving watershed management, in prioritizing the sites that need to be treated, addressing the root causes of water pollution, and the need to improve the ecological environment. More specifically, the integrated watershed management design was developed for each of the selected key watershed units (see Figure 2 as a sample watershed unit integrated intervention from Chun'an County Project FSR). Based on the above evaluation, project interventions (see Components 1 and 2) were designed around the specific needs of each watershed unit. The project's

detailed activities and technical design have been reviewed and included in the PIP.

Figure 2. Liuduyuan Watershed in Chun'an



81. ***Considering the Impact of Climate Change in the Project Design.*** The watershed ecosystem including water supply is vulnerable to climate change, particularly extreme rainfall events, extreme temperatures, drought, and increased flooding. Extreme rainfall causes seasonal flooding, which damages farming crops and infrastructure, and soil erosion with large pollutants running-off to the river and lake; extreme drought causes the reduction of river water for irrigation, drink water supply and other uses, damages crops and plants, and it also provides favorable environment for forest pest and disease breaking out and fire incidence. To tackle the climate risks, the impacts of the climate change have been taken into consideration in the project design, which are different from the traditional program design.

82. More specifically, an ecosystem-based adaptation approach has been adopted to build resilience to extreme weather events, which include: (a) bringing mixed forest structure to increase the resilience of the forest ecosystems to heavy rain, hail, snow, wind and drought, the growth of trees will increase carbon sequestration and more intense forest fire control will reduce carbon emissions through the emissions avoided principle; (b) adopting CSA and IPM in crop production to reduce fertilizer and pesticide use and thereby reduce carbon emissions, minimum tillage will also reduce erosion of soil and pollution discharge and increase carbon stock; (c) improving energy efficiency for the abstraction, storage, treatment and delivery of potable water to lower electricity consumption, which will reduce carbon

emissions, and improving the efficiency of water usage (replacing leaking pipes, the installation of water meters, the use of gravitational delivery, and public education) to reduce energy demand which will, in turn, reduce carbon emissions; (d) adopting ecological water course management approaches, such as the use of greening and landscaping to increase water infiltration in project watersheds, expand water storage capacity, reduce peak runoff and flood, lower nonpoint sources of pollution discharges, stabilize river banks, resulting in the mitigation of the combined risks of flooding, soil erosion and river sedimentation, and pollution discharge into rivers and Qiandao Lake; and (e) improving the monitoring system (such as setting additional monitoring stations and better data collection and processing) to improve the GoZ's capacity to better target watershed management planning and interventions, it will also help to put in place contingency plans to mitigate extreme weather events.

83. Greenhouse Gas (GHG) Accounting Assessment. Based on the results of a GHG accounting assessment to the Project relevant activities, the net emissions of the project are estimated to be -4,166,930 tCO_2-eq over the life of the project, while the gross emissions are estimated to be -2,235,316 tCO_2-eq. On average, it is estimated that the project will generate net emissions of -208,347 tCO_2-eq annually. The breakdowns of net CO_2 emission and reduction by various project interventions are estimated as Climate Smart Crop Production -623,096 tCO_2-eq, Forestry Eco-System Restoration -3,525,593 tCO_2-eq; Wastewater Management 8,370 tCO_2-eq, and Potable Water Supplies in Rural Areas -26,625 tCO_2-eq. For detailed assessment, a special annex on GHG accounting is prepared and available in the project files upon request.

84. Climate Co-Benefits. As indicated above, climate patterns affect watershed landscape management and restoration, as well as water availability. The project will promote climate resilience practices by adopting ecosystem-based adaptation design approaches.

C. Financial Management

Financial Management (FM)

85. The Bank loan proceeds, including oversight of the designated account (DA), will be managed by Zhejiang Provincial Finance Bureau (ZPFB). Similarly to the previous Bank-financed operations in Zhejiang, the existing PPMO in Zhejiang Provincial Construction Department will be responsible for project management and cooperation. CPMOs have been established in the DRCs in Chun'an County and Jiande City. Chun'an Qiandao Lake Construction Group and Jiande Xinshui Construction Co. Ltd. have been designated as PIUs for the project implementation, including project financial management.

86. The FM capacity assessment identified the following major risks: (a) some components are beyond the general operational scope of the PIUs and this limits their implementation capacities; and (b) both PIUs have limited knowledge of the Bank's fiduciary requirement and procedures, which might result in the misuse or inefficient use of project funds. To mitigate these risks, the following actions have been taken: (a) the PIUs have been strengthened with the addition of experienced and qualified staff assigned by various Government agencies; (b) the Bank loan proceeds will be disbursed to the County Finance Bureau and disbursement arrangements will be streamlined to improve efficiency; (c) a project Financial Management Manual (FMM) prepared by the PMO, which has been reviewed and accepted by the Bank team, will standardize project FM and disbursement procedures; and (d) the PPMO and ZPFB will closely monitor and guide PIUs in project implementation, especially in the early stages. With the implementation

of the proposed actions, the project's FM arrangements will satisfy the Bank's requirements under the Bank Policy/Directive on Investment Project Financing.

87. Funding sources for the project include the Bank loan and counterpart funds. The Bank Loan Agreement will be signed by the Bank and the Ministry of Finance (MOF), and the on-lending agreement will be entered into by the MOF and Zhejiang Provincial Government, who will delegate the ZPFB to on-lend the Bank loan to Chun'an County and Jiande City governments. Chun'an and Jiande governments will further on-lend funds to the two PIUs who will be the final borrowers/debtors by signing subsidiary agreements. Counterpart funds will comprise of national subsidies and funds provided by county governments. Counterpart funding has already been committed by local governments.

88. **Budgeting.** Each PIU and CPMO will prepare an annual work and financing plan (including both counterpart funds and projected Bank loan disbursements) based on the PIP. The plan will be reflected in the annual work plan and budget allocation and will be approved by county governments. Overall budget preparation and execution will form part of the Government system. Counterpart funds will be released to the project against actual construction progress. Budget execution will be closely monitored throughout the year and necessary adjustments will be made to address budget variances.

89. **Fund flows.** A designated account (DA) for the Bank loan will be opened and managed by the ZPFB. To improve disbursement efficiency, the Bank loan proceeds of no more than US$6 million and US$2 million will be further advanced to the operating accounts maintained by Chun'an Finance Bureau (CFB) and Jiande Finance Bureau (JFB), respectively. Disbursement applications will be submitted from the PIUs to respective CPMOs and then to County Finance Bureaus. The Bank loan proceeds will be paid from County Finance Bureaus to the PIUs or the contractors, and the related payment statements will be provided to the PIUs for accounting and debt management. For the first year of operations, disbursement will be made by the CFB and the JFB after their applications have been reviewed by the Zhejiang PMO and ZPFB. For the following years, PPMO and ZPFB will not conduct the pre-review for each withdrawal application, but County Finance Bureaus will report on fund usage in the operating accounts to the ZPFB through the PPMO at least every quarter or more often as needed to get replenishment. The detailed disbursement application/request and funds flow arrangements are described in the project FMM.

90. **Accounting and financial reporting**. The project's administration, accounting, and reporting system will be established in accordance with Circular No. 13 'Accounting Regulations for the Bank-financed Projects' issued by the MOF in January 2000. The PIUs will set up individual profiles in their existing computerized accounting systems to manage, monitor, and maintain project accounting records for project activities for which they are responsible. The unaudited semiannual project financial reports will be prepared by the PIUs and CPMOs; after having been consolidated by the PPMO, they will be submitted to the Bank as part of the semiannual progress reports. The deadline for submission is no later than 60 days following each semester.

91. **Internal controls**. The MOF has established an accounting policy. Together with procedures and regulations governing project internal control, the FMM will align FM and disbursement requirements in implementing agencies accordingly.

92. The key internal controls relating to incentive payments from the Bank loan funds for agriculture activities in Component 1 include (a) CSA practice (formula/slow-release fertilizers application, organic

fertilizer application, unified professional IPM services, soil erosion control measures/limited soil tillage and vegetation retained, fertigation delivery, high-quality pesticide application equipment, and collection of used agrochemical containers); and (b) livestock waste treatment facilities (such as liquid biogas fertilizer storage facilities and distribution pipelines). These will make use of the following customized controls designed for the project:

(a) PIUs will sign an implementing agreement with a project village/farmer cooperative. The substantive content of this agreement will include (i) activities to be implemented, (ii) technical requirements/procedures for carrying out such activities, (iii) the predetermined subsidy or incentive payment, (iv) the responsibility of related entities, and (v) amount of the incentive payment to the villages/farmer cooperatives.

(b) The village/cooperative will organize farmers to implement project activities in line with the technical requirements/procedures in the agreement. The CPMO and PIU will provide the required technical support and training to the parties involved.

(c) Once project activities are complete, the CPMO will verify compliance with the requirements stipulated in the agreement. A certificate will be issued by the CPMO if the completed activities are acceptable. Thereafter, an output-based payment will be processed according to the agreed subsidy standard for each specific activity, which was reviewed by the Bank and detailed in the PIP; the latter may be revised from time to time with the prior written agreement of the Bank during project implementation.

93. **Audit.** The Zhejiang Provincial Audit Office has been identified as the auditor for the project. The annual audit report on project financial statements will be issued by this office and will be submitted to the Bank within six months after the end of each calendar year (that is, by June 30 of each year). The audit report and audited financial statements will be publicly available on the websites of the Bank and the Zhejiang Provincial Audit Office.

94. **Disbursements arrangements.** Four disbursement methods are available to the project: (a) advance; (b) reimbursement; (c) direct payment; and (d) special commitment. To efficiently facilitate disbursements and improve disbursement efficiency, advances can be released by the ZPFB to the U.S. dollar operating accounts maintained by the CFB and JFB.

95. Bank loan proceeds and counterpart funds will co-finance different activities and contracts in each component. All the Bank-financed contracts and non-contracted activities will be included in the annual work and budget plan submitted by the PPMO and approved by the Bank. Besides the front-end fee, the Bank loan proceeds will finance 100 percent of civil works, goods, consulting services, non-consulting service, training and workshops, IOCs, and output-based incentive payments for climate smart agricultural and livestock waste management activities. This is shown in Table 2.

Table 2. Eligible Bank Loan Expenditures and Disbursement

Category	Amount of the Loan Allocated(US$)	Percent of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, IOCs, and training and workshops for the project	128,795,000	100
(2) Output-based incentive payments	20,830,000	100% of amounts disbursed
(3) Front-end fee	375,000	Amount payable pursuant to Section 2.03 of the Loan Agreement in accordance with Section 2.07 (b) of the General Conditions
(4) Interest Rate Cap or Interest Rate Collar premium	0	Amount due pursuant to Section 4.05 (c) of the General Conditions
TOTAL AMOUNT	150,000,000	

96. **Retroactive financing.** Retroactive financing will be applied for this project, which is up to US$5 million of the Bank loan that will be available for payments made by the PIUs after March 1, 2018, for all eligible expenditures specified in the Loan Agreement.

D. Procurement

97. **Procurement.** Procurement for the project will be carried out in accordance with the World Bank's Procurement Regulations for IPF Borrowers, dated July 2016 and revised November 2017 as required by the provisions of the Loan Agreement. Also, applicable to the project will be the World Bank's Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, dated October 2006, and thereafter revised in January 2011 and July 1, 2016.

98. **Institutional arrangements.** The existing PPMO in the Zhejiang Provincial Construction Department will have overall responsibility for procurement and contract management and for ensuring that the procurement procedures at PIU levels fully comply with Bank procurement rules and procedures. Each county PMO will comprise officials from the relevant line agencies to provide administrative and technical support and coordination in various areas. In each county, an existing SOE has been designated as a PIU for project implementation, including procurement and contract management.

99. **Procurement risk assessment and mitigation measures.** An assessment on project agencies' procurement capacity was conducted and it noted that the PPMO has successfully undertaken four Bank- and Asian Development Bank-funded environment protection and water management projects in recent years and that it has a team of competent and qualified procurement and contract management staff with adequate procurement knowledge and experiences in Bank-funded investment projects. The Jiande City PMO participated in the implementation of the Bank-financed Zhejiang Qiantang Lake Water Management Project and is therefore well-placed to manage the project, but the Chun'an County PMO has no recent the Bank-financed project experience. Even though each PIU is equipped and staffed to carry out local procurement and contact management, most procurement staff in the PIUs lack experience in working with international financial institution projects. However, domestic laws and regulations for domestic procurement procedures are quite similar to the Bank procurement requirements. The assessment concluded that the main procurement risks for the proposed project are the following: (a)

delays and noncompliance with the Regulations, either due to unfamiliarity with specific Bank procurement rules and procedures, or a preference to comply with local procedures when local regulations conflict with the Bank procurement guidelines and where procurement is to be conducted at domestic Government public resources transaction centers; (b) a lack of familiarity of PIU procurement staff; and (c) delays in payments, cost overruns, and a failure to meet completion dates due to weak contract management capacity.

100. To mitigate these risks, the following actions will be taken during project implementation: (a) a procurement agent or a project management consulting firm with experience in Bank procurement and contract management procedures will be recruited early on to help the PPMO and PIUs; (b) the PPMO will provide regular training to PIU procurement staff on Bank procurement policies, methods, and procedures, as well as on the use of standard procurement documents and evaluation principles; (c) a procurement manual, which was reviewed by the Bank, has been prepared as part of the PIP to guide project implementers; (d) procurement support has been and will continue to be provided to the project agencies by the Bank's procurement specialist in the early stages of project implementation; (e) annual procurement supervision missions will be conducted to review the progress of procurement; and (f) the PPMO/CPMOs/PIUs and the Bank team will be in close contact to identify and address any issues that may arise in the bidding process and management of contracts.

101. In addition to the above, the following specific procurement-related procedures will be observed. Project procurement and contract management will be carried out by PIUs with the support of a professional procurement agent and procurement management specialists of PPMO and CPMOs, who have experience in Bank-financed projects. All key procurement documents will be prepared by the procurement agent and subject to the review by a project management consulting firm under the leadership of the PPMO; the procurement process will also be closely supervised by the relevant Government supervisory departments such as the local finance bureaus, the development reform commissions, and other administrative supervisory departments. Procurement agents will assist the PIUs to organize the procurement of each contract, including publishing procurement notices, issuing bidding documents, providing clarifications, assisting with bid opening, preparing bid evaluation reports, advertising bid evaluation results, issuing contracts to winning bidders, and preparing draft contracts. Project design and technical specifications preparation will be carried out by different design institutes selected by each PIU before project implementation. The TORs for consulting services will be prepared by the PIUs based on the specific requirements of each consulting services contract. The management of goods and works contracts and consulting services and non-consulting services contracts at county level will be undertaken by the PIUs with support from the CPMOs and procurement agencies. The consulting services procurement at provincial level will be undertaken by the PPMO and the PPMO will be responsible for overall coordination and communication with the Bank, including obtaining the necessary Bank approvals.

102. **Major procurement envisaged under the project.** Most Bank loan proceeds will be used for the procurement of works, goods, consulting services, and non-consulting services; all works, goods, non-consulting services will be procured through national competitive procurement, but selected consulting services contracts may be procured through Quality- and Cost-Based Selection (QCBS)/Least-Cost Selection (LCS)/Selection under a Fixed Budget (FBS), or Selection Based on the Consultants' Qualifications (CQS). Following the above procurement procedures, together with the accompanying mitigation measures, the PIUs should be able to satisfactorily manage the project procurement, and as such, the

overall procurement risk for the project is assessed as Moderate with the implementation of the aforesaid proposed mitigation measures.

103. **Project Procurement Strategy for Development (PPSD) and Procurement Plan (PP).** Based on paragraphs 4.1–4.5 of the Procurement Regulations, a PPSD and an accompanying project PP have been prepared by the borrower in close consultation with the Bank, and the PPSD and PP have been finalized and agreed upon with the Bank. The PPSD states how procurement activities will help the project achieve its development objective and deliver best value for money using the fit-for-purpose procurement and risk-managed approach, giving due consideration to specific country needs and to the country's operational and market context. Decisions for the selection methods and market approaches to be adopted in the PP are justified in the PPSD. This information will be made available in the project's database, on the Bank's external website, and at the project implementing agency's office. The PP will need to be updated annually with the agreement of the Bank, or in a way which reflects actual project implementation needs and institutional capacity. The PPSD and PP may need to be updated during project implementation.

104. **Procurement methods and World Bank oversight.** The thresholds of individual procurement methods and the requirements for the Bank's prior review are shown in Table 4. These will need to be followed for project procurement activities, which have been agreed upon based on the specific Bank procurement requirements, as well as the justifications provided in the PPSD. Specific procurement requirements will be included in the PP; however, any changes to procurement thresholds needed during project implementation will need to be justified in the updated PPSD and reflected in the updated PP. In addition to prior review supervision carried out from the Bank offices, the Bank procurement supervision missions will visit the field at least once a year to carry out procurement supervision or post-review of procurement activities. The post-review sampling ratio of contracts will be one-in-ten.

Table 3. Thresholds for Procurement Methods and Prior Review

Expenditure Category	Contract Value Threshold (US$)	Procurement Method	Prior Review Threshold (US$)
1. Civil works	≥40,000,000	ICB	All
	<40,000,000	NCB	≥15 million
	<500,000	Request for Quotations	
	Any value	Direct Selection	≥15 million
2. Goods/Non-consulting services	≥10,000,000	ICB	All
	<10,000,000	NCB	≥4 million
	<500,000	Request for Quotations	
	Any value	Direct Selection	≥4 million
3. Consultant services	≥300,000	QCBS/QBS/LCS/FBS	≥2 million
	<300,000	CQS	
		Direct Selection	≥1 million
		Selection of Individual Consultant	≥400,000

Notes: IC: Individual Consultant Selection Procedure; ICB = International Competitive Bidding; NCB = National Competitive Bidding; QBS = Quality-Based Selection.

105. **Contract management.** During project preparation, the Bank team screened the proposed project

procurement contracts with focus on the potential high risk or high-value contracts, for which the PIUs need to develop key performance indicators for such contracts and closely monitor their implementation. However, no such contracts have been identified.

106. **Use of Systematic Tracking of Exchanges in Procurement (STEP).** It is mandatory for all procurement transactions for post and prior contract review under the project to be respectively recorded in, or processed through the Bank's planning and tracking system, STEP. This ensures that comprehensive information on procurement and implementation of all contracts for goods, works, non-consulting services, and consulting services awarded under the whole project are automatically available. This tool will be used to manage the exchange of information (such as bidding documents, bid evaluation reports, no objections, and so on) between the implementing agencies and the Bank. The Bank team has provided training to the borrower on how to establish its account and use the STEP.

E. Social (including Safeguards)

107. The project will generate significant social benefits for farmers and rural workers located in Xin'an River Basin and for rural and urban residents living around Qiandao Lake, as well as millions of tourists visiting the area each year.

108. **Social assessment (SA).** A comprehensive SA was carried out during project preparation by a very experienced social expert team. Project public consultations covered 79 villages in six townships, and disseminated 900 questionnaires, 88 percent of which were completed and returned. Local government agencies responsible for forestry, water resources management, land management, agriculture, construction, companies, township leaders, heads of villages, farmers, and workers in farming companies were all consulted. Those involved were invited to express the concerns on the project design and implementation, including making recommendations on project activities and design, and the assessment took full account of project stakeholders' concerns and recommendations.

109. The assessment also included a social diagnosis and sample surveys to identify low- or middle-income people and vulnerable groups who have the potential to be included as project beneficiaries. There were 43 interviews with focus groups and 15 public meetings were undertaken. Stakeholders and beneficiary groups in villages were also invited to express their views on the project's resettlement proposals, propose mitigation measures, land compensation rates, and budgets being made available for these activities in each city/county. Public consultations, including consulting meetings and interviews, were also held with elderly people and other residents who have special needs to incorporate their requirements. The results of the SA were incorporated into the locally prepared project feasibility study, especially the need to develop eco-agriculture and tourism as long-term development vehicles for social advancement. The expert team and local government agencies also took into consideration the SA findings when preparing the two Resettlement Action Plans (RAPs). As a result, the resettlement and rehabilitation measures being planned under RAPs have been accepted by those affected. The SA confirmed that there are no social barriers preventing anyone from participating in project activities. In fact, the SA observed that the project is designed to encourage behavioral changes for farming and natural resources management, which will strengthen social inclusion and citizen engagement. Local citizens realized that the project could lead to improvements in the landscape, eco-agriculture, clean drinking water, better village facilities, and the growth of village-based tourism.

110. **Gender.** During project preparation, both men and women were consulted in the SA, and more than 40 percent of the people consulted were women. The project ensures that women beneficiaries and those impacted will be treated and compensated equally. Ways of mainstreaming gender considerations into project design were discussed and it was concluded that gender concerns have been adequately covered during project preparation and the necessary arrangements have been put in place in project design and implementation plan. However, to draw the attention of project agencies on gender issues during project implementation, the main points on gender have been highlighted in separate paragraphs/sections in project design documents; for example, women's participation in the community consultation process and technical training should be at least around 30 percent of all participating farmers. In addition, the relevant monitoring arrangements are specified in the overall project monitoring plan and the monitoring results will be included in the project's semiannual progress reports and ICR. In addition, CPMO will closely work with impacted villages to ensure that women receive the same compensation as men, that women participate in public consultations and project activities, and that at least 30 percent of people being trained are women.

111. **Involuntary Resettlement (OP4.12).** Small-scale land acquisition and resettlement operations (see below) are anticipated under the project, therefore OP4.12 is triggered. Two RAPs have been prepared to cater to this by Chun'an County and Jiande City, respectively, together with a RAP summary to highlight the main issues requiring attention under each of RAPs. A Resettlement Policy Framework (RPF) was also prepared to guide mitigating the negative impacts of potential resettlement needs, which may come up in project implementation (if project design needs to be adjusted during project implementation period, the RPF will provide the guidance for any additional resettlement arrangements). The RAPs provide details on resettlement policy procedures that must be followed during project implementation, including compensation rates, mitigation measures to restore livelihoods, and institutional and monitoring arrangements. The RAPs were disclosed through the Bank's external website on February 5, 2018. The RPF was disclosed on the Bank's external website on February 6, 2018.

112. Project water supplies and forest road improvements will require some permanent land acquisition and the installation of pipelines will require temporary land use. Careful project designs were undertaken and the negative impacts were analyzed. As a result, no demolition of either houses or buildings will be needed, but land acquisition will involve the permanent use of 15.9 ha of land in 22 villages. Temporary land use will involve the short-term use of 199.9 ha of collective land in 51 villages. The project will therefore affect 468 persons through permanent land acquisition and 11,966 persons through temporary land use. During project preparation, project information was disseminated to the affected families and their opinions were used to refine project design, activities, and locations. To complement this, Hohai University was contracted to carry out public consultation processes in the affected project areas, prepare a census and social survey of affected communities, and undertake a social impact analysis of project proposals. The results of this work contributed significantly to the preparation of the RAPs which have ensured that resettlement needs and social disruption are kept to an absolute minimum.

113. To ensure the mitigation or avoidance of possible negative impacts that may emerge, the social impacts of project activities will be monitored and the living standards of the project-affected people will be evaluated over the course of project implementation. Monitoring results will be reported to PMOs twice a year by PIUs and, if needed, remedial actions will be taken. A detailed monitoring plan with budget arrangements has been prepared and this has been incorporated into the overall project monitoring plan.

The monitoring report on the implementation of RAPs is part of the project monitoring report and it will be submitted to the Bank for review on a semiannual basis.

114. **Indigenous Peoples (OP4.10).** The screening on ethnic minority status included interviews with the project county municipal department in charge of minority affairs, townships, and villages were undertaken during the project preparation by both Bank team and project SA expert team. It confirmed that no ethnic minorities are present in the project area, and that no indigenous peoples, as defined by the Bank will be affected by the project. Therefore, OP4.10 is not triggered.

F. Environment (including Safeguards)

115. The project has been assigned a Category B rating because any adverse impacts of proposed investments are not deemed to be significant and irreversible, with most being associated with construction activities. However, the small-scale and dispersed nature of subprojects proposed under the project triggered six environmental safeguards policies. These are summarized in the following paragraphs.

116. **Environmental Assessment (OP4.01).** An Environmental Assessment (EA) was conducted for the project in accordance with applicable Chinese laws and regulations and the Bank's safeguards policies. The project is designed to address the existing environmental problems in the Qiandao Lake/Xin'an River Basin area and will result in overall environmental and social benefits. The anticipated adverse impacts resulting from the project mainly include (a) general construction nuisance caused by construction activities (for example, dust, noise, wastewater, solid waste, soil erosion, and traffic disturbance); (b) sediment dredging (for example, temporary disturbance to water quality) for the selected secondary and smaller tributaries of Qiandao Lake/Xin'an River, and the disposal of sediment (approximately 109,700m^3 in total, classified as Grade I/II[4] soil quality according to the sediment monitoring results); and (c) the operation of Shouchang WWTP, waste management system for livestock and poultry farms (odor and end products) and constructed wetlands (water quality and waste management). Accordingly, the needed preventive and mitigation measures were included in the project's design including the Environmental Impact Assessment(EIA) and Environmental and Social Management Plan (ESMP), to reduce anticipated adverse impacts to an acceptable level, or eliminate them entirely. More specifically, there are (a) three Environmental Codes of Practice prepared, one for small-scale civil works, one for river rehabilitation works, and the other for road subprojects, to address the general construction nuisances which might arise. The mitigation measures will also be included in the relevant bidding documents and contracts; (b) the sediment dredging and the disposal of dredged material have been designed in an environmentally sound manner to ensure that sediments are properly disposed at nearby designated disposal sites after dewatering based on the characterization of the material; and (c) adequate mitigation measures specific to different subprojects have been integrated into the Environmental and Social Management Plan (ESMP) to ensure that subprojects are environmentally sustainable during operation.

117. **Natural Habitats (OP4.04).** This policy is triggered because the project will finance the ecological protection and conservation of selected rivers and forests in the water catchments. The EA confirmed that no critical natural habitats would be involved and it is not expected that the project would have the

[4] Based on the national standard of 'Soil Environmental Quality Standard' (GB15618-1995), Grade I/II is not expected to bring any hazard and pollution to plants and the environment, which means the sediments of such quality could be disposed as general solid waste and available for comprehensive utilization.

potential to cause significant conversion or degradation of natural habitats. Rather, the project would reduce the discharge of pollutants into the lake/rivers and support the ecological improvement in the basin. Adequate mitigation measures have been incorporated in the EIA and ESMP to manage the limited ecological impacts expected during project implementation to ensure compliance.

118. **Forests (OP4.36).** The rehabilitation of degraded forests and enrichment planting amounting to 12,730 ha in two project counties will have significant positive impacts on the health and quality of the forests. The proposed activities will be undertaken in ecological protection forests and the proposed project activities will not affect the rights and welfare of local communities and their level of dependence upon forests. Possible negative environmental impacts would be limited to site preparation and forest tending practice, which are site-specific and temporary. Separate Environmental Protection Guidelines for Plantation were developed as part of the project ESMP to further enhance the ecological and environmental benefits of the forest plantation/rehabilitation subprojects, as well as to avoid any potential negative impacts.

119. **Pest Management (OP4.09).** The proposed agricultural nonpoint source pollution control, forest restoration, and rehabilitation activities involve the use of pesticides; therefore, OP 4.09 is triggered. Pest Management Plans (PMPs) have been prepared according to policy requirements on how to promote a safe, effective, and environmentally sound pest management approach. Because the requirements of agriculture and forestry are different, two separate PMPs, one for agricultural and one for forest plantation activities, have been developed to better suit them to project activities.

120. **Physical Cultural Resources (OP4.11).** There are 13 rural households' graves in the project area and these will need to be relocated during project implementation; this relates to local traditions and therefore triggers OP4.11. All compensation and relocation measures have been formally planned and integrated in the RAP based on detailed surveys and consultations with the owners of the graves.

121. **Safety of Dams (OP4.37).** The project will not finance the construction or rehabilitation of dams, however, this policy is triggered because inadequate dam management and maintenance in the river/lake basin might pose a risk to the Bank's investments. Fifty-seven dams were identified as linked to the project and these were assessed according to the Bank policy requirements. A detailed action plan has been developed and integrated in the EIA and ESMP for implementation, including maintaining a dam safety expert to monitor the plan implementation.

122. During the preparation of the EIA/ESMP, key stakeholders were identified to ensure that consultations were well-targeted and meaningful. Two rounds of public consultation were conducted with the participations from the public and key stakeholders. The first round took place during January–July 2017, and the second round was carried out after the draft EA report was completed during August–November 2017. Project information was disclosed to project-affected communities and on Government websites before each round of consultation. The EA and ESMP incorporated countermeasures to address the concerns of consulted people.

123. **Safeguard Documents Disclosure.** In accordance with the Bank safeguards policies, before project appraisal, the latest safeguards documents, including the EA report, ESMP, SA report, RAPs, and RPFs were made available on February 6, 2018 at the PPMO and CPMOs of participating counties, and the PIUs. In addition, the documents were disclosed on the website of Zhejiang Housing and Urban-Rural

Development Department, as well as the county government websites at the same time. The project RAPs were also disclosed at the Bank's external website on February 5, 2018, and RPFs, EIA, ESMP which includes the PMP were disclosed on the Bank's external website on February 6, 2018.

G. Other Safeguard Policies (if applicable)

124. No other safeguards policies are triggered for the project.

H. World Bank Grievance Redress

125. Communities and individuals who believe that they are adversely affected by the Bank supported project may submit complaints to existing project-level grievance redress mechanisms or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of the Bank non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the Bank's attentions, and Bank Management has been given an opportunity for respond. For information on how to submit complaints to the Bank's corporate Grievance Redress Service (GRS), please visit *http://www.worldbank.org/GRS*. For information on how to submit complaints to the World Bank Inspection Panel, please visit *http://www.inspectionpanel .org.*

RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY : China

Zhejiang Qiandao Lake and Xin'an River Basin Water Resources and Ecological Environment Protection Project

Project Development Objectives

To strengthen integrated pollution and watershed management and increase access to improved water supply in selected landscapes in support of Zhejiang's program for the protection of Qiandao Lake and Xin'an River Basin.

Project Development Objective Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Nitrogen load reduction achieved under the project (%)		Percentage	0.00	25.00	Annual	Surveys	PMOs
Description: The absolute value of baseline will be determined at the first year of project implementation through field survey.							
Name: Phosphorus load reduction achieved under the project (%)		Percentage	0.00	30.00	Annual	Surveys	PMOs

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Description: The absolute value of baseline will be determined at the first year of project implementation through field survey.							
Name: Decrease of soil erosion (% of soil loss)		Percentage	0.00	20.00	Annual	Surveys	PMOs
Description: The absolute value of baseline will be determined at the first year of project implementation through field survey.							
Name: People provided with access to improved water sources (No.)	✓	Number	0.00	218100.00	Annual	Surveys	PMOs
Description: This indicator measures the cumulative number of people who benefited from improved water supply services that have been constructed through operations supported by the World Bank.							

Intermediate Results Indicators

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Component 1: Landscape Managment Improvement (LMI) - Reduction in pesticide consumption in project areas (Tongs/year)		Tones/year	0.00	92.00	Semi-annual	Project Reporting	PMOs

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Description:							
Name: Component 1: LMI - Reduction of Phosphorus consumption in project areas (Tones/year)		Tones/year	0.00	1380.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 1: LMI- Reduction of Nitrogen consumption in project areas (Tones/year)		Tones/year	0.00	3080.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 1: LMI- Areas of degraded monoculture plantations converted to mixed stands with multiple species (Ha)		Hectare(Ha)	0.00	10470.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 1: LMI- Areas of denuded forest land		Hectare(Ha)	0.00	2260.00	Semi-annual	Project Reporting	PMOs

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
fully planted with multiple tree and shrub species (Ha)							
Description:							
Name: Component 1: LMI-Number of tree species introduced by the project to diversify forests ecosystem (No.)		Number	9.00	40.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 1: LMI-Decrease of pest incidence in project areas (%)		Percentage	30.00	10.00	Annual	Surveys	PMOs
Description:							
Name: Component 2: Water Resources Management Imporvement (WRMI) - Length of river bank rehabilitated (Km)		Kilometers	0.00	204.00	Semi-annual	Project Reporting	PMOs
Description:							

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Component 2: WRMI -Number of overflow weir dams upgraded and rehabilited (No.)		Number	0.00	85.00	Sumi-annual	Project Reporting	PMOs
Description:							
Name: Component 2: WRMI- Increase in delivery capacity of safe water supply (Cubic Merter/day)		Cubic Meter(m3)	0.00	38400.00	Sumi-annual	Project Reporting	PMOs
Description:							
Name: Component 2: WRMI - New piped household water connections under the project (No.)		Number	0.00	62300.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 3: ICB, MPM - Number of research and study program (by topic) conducted (No.)		Number	0.00	5.00	Semi-annual	Project Reporting	PMOs
Description:							

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Name: Component 3: ICB, MPM - Number of workshops orgnized (No.)		Number	0.00	6.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 3: ICB, MPM -Project staff and beneficiaries trained (person.day)		Days	0.00	19300.00	Semi-annual	Project Reporting	PMOs
Number of beneficiaries trained --Female (person.day)		Days	0.00	5790.00	Semi-annual	Project Reporting	PMOs
Number of project management staff trained (person.day)		Days	0.00	2100.00	Semi-annual	Project Reporting	PMOs
Description:							
Name: Component 3:ICB, MPM- Project monitoring system established and put into operation (Y/N)		Yes/No	N	Y	Semi-annually	Project reporting	PMOs

Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source/Methodology	Responsibility for Data Collection
Description:							

Target Values

Project Development Objective Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Nitrogen load reduction achieved under the project (%)	0.00	2.00	7.00	13.00	18.00	22.00	25.00
Phosphorus load reduction achieved under the project (%)	0.00	2.00	9.00	16.00	21.00	26.00	30.00
Decrease of soil erosion (% of soil loss)	0.00	0.00	0.00	10.00	15.00	18.00	20.00
People provided with access to improved water sources (No.)	0.00	0.00	63278.00	86310.00	161019.00	200181.00	218100.00

Intermediate Results Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Component 1: Landscape Managment Improvement (LMI) - Reduction in pesticide consumption in project areas (Tones/year)	0.00	37.00	48.00	59.00	70.00	81.00	92.00
Component 1: LMI -Reduction of Phosphorus consumption in project areas (Tones/year)	0.00	42.00	166.00	546.00	825.00	1104.00	1380.00
Component 1: LMI-Reduction of Nitrogen	0.00	209.00	714.00	1307.00	1091.00	2493.00	3080.00

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
consumption in project areas (Tones/year)							
Component 1: LMI-Areas of degraded monoculture plantations converted to mixed stands with multiple species (Ha.)	0.00	1254.00	2788.00	4535.00	6891.00	8219.00	10470.00
Component 1: LMI-Areas of denuded forests fully planted with multiple tree and shrub species (Ha.)	0.00	456.00	547.00	1107.00	1921.00	1921.00	2260.00
Component 1: LMI-Number of tree species introduced by the project to diversify forests ecosystem (No.)	9.00	15.00	25.00	35.00	40.00	40.00	40.00
Component 1: LMI-Decrease of pest incidence in project areas (%)	30.00	29.00	28.00	26.00	24.00	18.00	10.00
Component 2: Water Resources Management Imporvement -Length of river bank rehabilitated (Km)	0.00	29.00	82.00	121.00	170.00	204.00	204.00
Component 2: WRMI -Number of overflow weir dams upgraded and rehabilited (No.)	0.00	6.00	38.00	80.00	85.00	85.00	85.00
Component 2: WRMI-Increase in delivery capacity of safe water supply (Cubic Merter/day)	0.00	0.00	10969.00	15160.00	28556.00	35403.00	38400.00
Component 2: WRMI - New piped household water connections under the	0.00	0.00	18079.00	24660.00	46005.00	57194.00	62300.00

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
project (No.)							
Component 3: ICB, MPM - Number of research and study program (by topic) conducted (No.)	0.00	0.00	0.00	1.00	1.00	2.00	5.00
Component 3: ICB, MPM - Number of workshops orgnized (No.)	0.00	1.00	2.00	3.00	4.00	5.00	6.00
Component 3: ICB, MPM -Project staff and beneficiaries trained (person.day)	0.00	3668.00	5811.00	9949.00	13322.00	16335.00	19300.00
Number of beneficiaries trained --Female (person.day)	0.00	839.00	1468.00	2100.00	2785.00	3394.00	5790.00
Number of project management staff trained (person.day)	0.00	1050.00	1260.00	1480.00	2100.00	2100.00	2100.00
Component 3:ICB, MPM- Project monitoring system established and put into operation (Y/N)	N	N	N	N	N	Y	Y

MAP: CHN43466