

Significant public and private infrastructure investments have resulted in improved water quality in the Yangtze River Basin; however, further improvements will require institutional measures.

<sup>3</sup> Floods in 2020, for example, affected 63 million people and caused estimated economic costs of US\$26 billion.

The law

calls for local governments to establish water quality baselines, prepare total phosphorus pollution control plans, reduce pollutant discharge through investments in wastewater treatment facilities and piped networks, and control agricultural NPS pollution, including through the promotion of organic fertilizers and control of agricultural plastic film.



#### The PforR instrument

leverages significant resources under existing Government programs, providing for impact beyond traditional Investment Project Financing (IPF). The PforR focuses on a subset of activities where the Government wants to enhance efficiency, effectiveness, and impact of expenditure by linking the disbursement of funds to the achievement of specific results.

Early support in the water sector focused on infrastructure and rural development.

The YRPERI will build on China's now considerable capacity for infrastructure development by focusing on contemporary challenges of inter-jurisdictional cooperation and cross-sectoral coordination.



To support the Dongting Lake

Basin Plan, the implementation plan<sup>7</sup> includes specific targets, including that by 2025: (a) 95 percent of rivers and waterbodies will reach water quality of Grade III, and the level of total phosphorous will be reduced by 10 percent relative to 2018; (b) the utilization rate of animal manure will remain at least 75 percent, and fertilizer consumption will remain at zero growth relative to 2020; (c) the coverage rate of rural wastewater treatment facilities will reach 90 percent, and the coverage rate of rural solid waste collection and treatment will reach 100 percent; and, (d) the area of wetland restoration will reach 1 million mu (66,000 ha).

The Program contributes to a long-term vision of an economically productive, ecologically sustainable, and climate resilient Yangtze River Basin (Figure 3).











infrastructure investment recommendations.

These plans will incorporate climate considerations (for example, flood risks) in their







The engagement of public institutes

established practice in World Bank financed projects in China, including in the GEF Mainstreaming Integrated Water and Environment Management Project (P145897), Economic Transformation and Institutional Capacity Building Project (P144270), Building a Modern Fiscal System Technical Assistance Project (P154694), Yunnan Highway Asset Management Project (P132621), and Guangdong Compulsory Education Project (P154621).



Both Jiangxi and Hunan Provinces have indicated that they would like to apply for a 25 percent advance payment (US\$49.0625 million for Jiangxi Province and EUR 42.125 million for Hunan Province) under the PforR.





Article 47 requires county governments to make plans for the construction of centralized sewage treatment facilities and supporting sewer networks, to improve sewage collection and treatment capacities, and also emphasizes the need to clarify responsibilities and implement unified management.

The World

Bank has been investing in the countries of the region for more than 20 years under a shared vision to cooperatively and jointly develop shared water resources. Regional norms and processes have been established to share information and conduct joint modelling to inform the prioritization, planning, and implementation of investment projects across the basin.

The Chinese experience in complementing

infrastructure-led water sector development with inter-jurisdictional institutions for sustainable water management will be valuable for World Bank clients looking to make a similar transition as their development needs evolve.

An

estimated CNY 14 billion (US\$2 billion) has been invested through the RBECP from 2016 to 2020 (averaging around US\$4 million annually), including approximately US\$1.4 billion from the central government through the National Key Ecological Zone Program (NKEZP) supplemented through general provincial budget allocations and county contributions. These funds increased substantially from 2016 to 2018 and stabilized in 2019 and 2020, despite the impacts of tax cuts and COVID-19 on fiscal revenues. According to the Jiangxi Provincial Department of Finance, the RBECP funds will reach CNY 3,275 million (US\$500 million) in 2021 and will be maintained at least at this level during the 14th FYP period and beyond, based on which it is estimated that the RBECP funds for 2022 to 2026 will amount to CNY 16,375 million (US\$2,519 million). ■

The total funding

increased significantly from CNY 4.3 billion in 2018 to CNY 4.8 billion in 2019 and CNY 4.9 billion in 2020. This indicates that the source of funds for the Government program in Hunan Province is stable and guaranteed. ■

Provincial commitments toward implementation of the Government program under the 14th FYP (2021 to 2025) amount to CNY 37.12 billion (US\$5.73 billion), of which CNY 7.41 billion (US\$1.14 billion) is allocated toward investments in water supply protection, CNY 21.99 billion (US\$3.40 billion) invested in water pollution prevention and treatment, and CNY 7.72 billion (US\$1.19 billion) invested in water ecological protection and restoration, providing an adequate basis for this PforR.

While the economic downturn in the wake of the COVID-19 pandemic negatively impacted Government finances, revenues are estimated to have recovered alongside economic activity in 2021.

These studies utilize the contingent valuation method<sup>9</sup> (CVM) to capture the broad range of benefits (both use and non-use economic values) that are expected. Benefit estimates are incorporated into a simple benefit-cost analysis (BCA), applied at the sub-basin level for Poyang Lake and Dongting Lake Basins.

A 15-year period of analysis was used, with benefits starting in Year 5 of and increasing to their full value within two years. Across scenarios, the program is economically robust at both 6 and 12 percent discount rates.

Economic Rate of Return (ERR) and Net Present Value (NPV) by Basin

	ERR (%)	NPV @ 6% (US\$, millions)
Poyang Lake Basin	15.7	1,957
Dongting Lake Basin	18.3	3,684

#### GHG Emissions Mitigation

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This could be achieved by (a) providing training on chemical fertilizer use and agricultural waste management to farmers; (b) establishing a sustainable incentive mechanism to increase collection rate, in which the existing jobholders should be appropriately considered, for example, the village cleaners; (c) enhancing the OHS management of the enterprises involved in the Program activities; and (d) establishing a social impacts and risks screening public participation, monitoring, and reporting mechanism.













































































(93.87 percent) will be funded by the Government and US\$400 million (6.13 percent) will be financed by IBRD loan (see Section II.C). An expected US\$6,126 million

The amounts grew substantially from 2016 to 2018 and stabilized in 2019 and 2020, despite the negative impacts of tax cuts and COVID-19 on fiscal revenue. According to officials from the Jiangxi PDF, the RBECP funds will reach CNY 3,275 million in 2021 and at least maintain this level during the 14th FYP period and beyond.

The total funding increased significantly from CNY 4.3

billion in 2018 to CNY 4.9 billion in 2020. This suggests that the source of funds for the Government program in Hunan Province is relatively stable and guaranteed.

Provincial commitments toward implementation of the Government program under the 14th FYP (2021 to 2025) amount to CNY 37.12 billion (US\$5.74 billion), of which CNY 7.41 billion (US\$1.14 billion) is allocated toward investments in water supply protection, CNY 21.99 billion (US\$3.40 billion) invested in water pollution prevention and treatment, and CNY 7.72 billion (US\$1.19 billion) invested in water ecological protection and restoration, providing an adequate basis for this PforR.

Program expenditure efficiency focuses on whether the Program expenditures can achieve the desired targets and realize value for money.

Therefore, the funding allocation rule provides a strong incentive for the counties to achieve the desirable objectives set by the provincial government and helps ensure value for money.

According to self-reviewed reports from 76 counties in 9 municipalities in Jiangxi Province in 2018, the amount of the RBECP allocated to each county (cities, districts) has a significant negative correlation with its economic development level and with the level of local government financial resources (see Figure 3.2). The less developed the local economy is, and the less its fiscal revenues are, the greater the amount of RBECP allocated.









China has invested substantially in its wastewater infrastructure systems since 1996 and achieved nearly universal coverage.

Actions include: (1) Development of integrated wastewater management strategy in demonstration counties, including financial sustainability, integrated O&M, employment equity, workforce roadmap for women and climate resilience and low-carbon technologies; (2) Increased COD reduction (influent COD minus discharged COD) at township-level wastewater treatment plants; and (3) Integrated institution agreements: one entity responsible for O&M of sewer network and wastewater treatment plants.

The two main challenges are to provide adequate financial incentives to farmers for collection, and to establish financially sustainable channels for recycling.

The 14th Five-Year Period calls for (a) further increasing the resource utilization rate to 85 percent; (b) establishing a system of animal waste treatment, processing, and returning to the field as fertilizer; and (c) attracting private financing through innovative modes, including public-private partnership and other mechanisms.







Public sector financing is justified by expected positive externalities in line with the Program's focus on public goods.

Specific  
private sector actors do not capture the economic benefits of most Program outcomes, limiting the possibility for private financing for many activities (that is, benefits are diffuse and public).

The PforR will provide value-add by focusing on a subset of activities where the Government wants to enhance efficiency, effectiveness, and impact of expenditure.

This economic assessment uses a simple BCA based on benefit transfer, applied at the sub-basin level for Poyang Lake and Dongting Lake Basins.

These studies utilize the contingent valuation method<sup>12c</sup> (CVM) to capture the broad range of benefits (both use and non-use economic values) that are expected.

The lower identified estimate was used for a conservative approximation (0.55 percent of household income) of the values Jiangxi and Huanan residents place on improving water quality in these two basins.

Net economic benefits are positive under a range of discount rates based on conservative assumptions. Overall program benefits have been projected with the assumptions that (a) investment will be completed within 5 years; (b) benefits will accrue starting from year 5 for a total of 15 years, with full benefits being reached from year 7 onward; (c) operating and maintenance costs of infrastructure and other recurrent costs will be 10 percent of the total program investment cost; and (d) discount rates are 6 and 12 percent.<sup>121</sup> (Table 3.10).

ERR and NPV of Water and Ecology Improvements in Program Sub-basins Based on Benefit-Transfer (US\$, millions)

	ERR (%)	NPV @ 6%	NPV @ 12%
Poyang Lake Basin (lower estimate)	15.7	1,957	1,590
Dongting Lake Basin (lower estimate)	18.3	3,684	752

<sup>121</sup> Day, B. and Mourato, S. (1998).

This calculation represents the net present value (at lower and upper bound prices) of the quantified emissions mitigation at a 6 percent discount rate, over 15 years consistent with the economic analysis.



TBL focuses on construction related works, goods, and consulting services, while GPL focuses on fiscal budget funds financed purchasing activities carried out by government departments, institutions, and organizations.

Multiple-year program budgeting should be prepared to ensure program funds could be secured and county government could prioritize its investment to enhance the efficiency of its scarce financing resources.









(b) Hunan provincial (and county) agriculture and rural affairs bureau should establish a sustainable incentive mechanism to increase the collection rate of agricultural plastics, in which the existing jobholders should be appropriately considered, for example, the village cleaners.





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established practice in World Bank-financed projects in China, including in the GEF Mainstreaming Integrated Water and Environment Management Project (P145897), Economic Transformation and Institutional Capacity Building Project (P144270), Building a Modern Fiscal System Technical Assistance Project (P154694), Yunnan Highway Asset Management Project (P132621), and Guangdong Compulsory Education Project (P154621).





The Central Basin IPF

is not anticipated to support any physical activities, directly draft policies or regulations, or support feasibility studies/technical designs for future investment projects.

For example, there could be construction/operation nuisance and community health and safety risks from civil works of physical investment projects following the TA recommendations, such as wastewater and solid waste collection and treatment facilities, sampling and monitoring stations, ecological remediation and river/lake connection works, and so on.





The Basin IPF would finance TA, goods and non-consulting services, and incremental operating expenses.











