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Program Information Document (PID)

Concept Stage | Date Prepared/Updated: 16-Jun-2022 | Report No: PIDC266452

BASIC INFORMATION

A. Basic Program Data

Country	Project ID	Parent Project ID (if any)	Program Name
China	P178907		China Green Agricultural and Rural Revitalization Program - Phase II
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Does this operation have an IPF component?**
EAST ASIA AND PACIFIC	28-Nov-2022	23-Mar-2023	No
Financing Instrument	**Borrower(s)**	**Implementing Agency**	**Practice Area (Lead)**
Program-for-Results Financing	People's Republic of China	Hubei Provincial Rural Revitalization Administration, Hunan Provincial Department of Agriculture and Rural Affairs, National Rural Revitalization Administration	Agriculture and Food

Proposed Program Development Objective(s)

To enhance environmentally sustainable agricultural and rural infrastructure development in selected areas of Hubei and Hunan

COST & FINANCING

SUMMARY (USD Millions)

Government program Cost	3,870.00
Total Operation Cost	350.00
Total Program Cost	350.00
Total Financing	350.00
Financing Gap	0.00

FINANCING (USD Millions)

Total World Bank Group Financing	350.00

World Bank Lending	350.00

Concept Review Decision

The review did authorize the preparation to continue

B. Introduction and Context

Country Context

1. **After 40 years of unprecedented economic growth, China eradicated absolute poverty in 2020; ten years ahead of the United Nations' Sustainable Development Goal (SDG) target of 2030.** According to the last accessible household survey data from 2018, the share of people living below the extreme international poverty line of US$1.90 per day had fallen to below 1 percent. Despite this remarkable achievement economic vulnerabilities remain widespread, especially, although not exclusively, in rural areas.

2. **Nearly one-fifth of China's population remains economically vulnerable; two-thirds of these people live in rural areas.** About 250 million Chinese remain below the US$5.50 per day poverty line recommended for upper middle-income countries (MICs), of which two-thirds reside in rural areas. Approximately 40 percent of China's population (or 570 million people) still live in rural areas; and many of them are vulnerable to falling back into poverty in case of an economic shock or natural disaster, such as floods and droughts.

3. **China's rural economy is challenged by natural and human resource constraints, along with institutional weaknesses that diminish the effectiveness of government support programs.** China has limited natural resource endowments. For example, water availability is only 8 percent of global water resources and arable land is 13 percent of the world total. Small farm sizes (93 percent of farms are less than 1 hectare) and aging farmers (averaging about 54 years) constrain agricultural modernization. Underinvestment in agriculture and rural infrastructure and public services, such as research and development (R&D),[1] extension and advisory services, and storage and cold chains; and in vocational skill development adversely affect labor and land productivity. Given these constraints, rural income continues to significantly lag behind that of urban dwellers despite considerable investments in rural infrastructure, including rural roads, water and sanitation, and irrigation and drainage systems. Limited institutional and governance capacity at the subnational level (e.g., program budgeting and expenditure tracking, targeting of farm support, monitoring and evaluation (M&E), and verification and reporting of results); and weak farmer organizations (e.g., farmer cooperatives, water user associations (WUAs)) continue to hamper the efficient delivery of rural infrastructure and public services, as well as the development of viable agro-food enterprises.

4. **Likewise, China's past rapid agricultural growth has come at the cost of increasing environmental degradation and natural resource degradation.** It is estimated that the cost of environmental degradation and resource degradation in China amounts to about 9 percent of its Gross Domestic Product (GDP), 10 times higher than corresponding levels in Korea and Japan.[2,3] China was ranked 120th out of 180 countries for environmental performance across 24 indicators in

[1] The ratio of agricultural R&D expenditures to agricultural GDP increased from 0.14 in 2002 to 0.46 in 2018, but that is still significantly lower than that of developed countries, which average from 1.0 to 2.0.
[2] World Bank and State Environmental Protection Administration (2007). Cost of pollution in China.
[3] World Bank Group and DRC (2018). "China 2030: Building a Modern, Harmonious and Creative Society." The World Bank and Development Research Center of the State Council, the People's Republic of China.

10 categories: air quality, water and sanitation, heavy metals, biodiversity and habitat, forests, fisheries, climate, energy, water resources, and agriculture. The environmental performance index (EPI) shows that China is lagging behind many other upper MICs, with comparable per capita income, such as Brazil, Mexico, Russia, and Turkey.

5. **To sustainably address the agricultural and rural development challenges, China adopted the Rural Revitalization Program (RRP, 2018–2035) in 2017.** The No. 1 Central Documents in 2018, 2019, 2020, and 2021 all focused on rural revitalization, which is framed around the three rurals: agriculture, rural areas and farmers. The RRP is being implemented through a series of five-year Rural Revitalization Strategic Plans (RRS), which form the basis for the proposed Green Agriculture and Rural Revitalization Program for Results – Phase 2 (GARR II). The program objectives and milestones have been further elaborated in annual policy documents[4] and in the *14th Five-Year Plan (FYP, 2021–2025) for the National Green Development of Agriculture*[5], and the *14th FYP on Municipal Solid Waste Separation and Treatment Facilities Development (2021–2025).*[6] The Rural Revitalization Promotion Law (RRPL) of April 29, 2021, provides the legal framework for implementing the RRS plan.

6. **Despite the greater prominence given to green agricultural development in the RRP, in practice the government's rural revitalization and greening objectives are not fully aligned.** Central and regional/provincial government transfers targeting rural revitalization do not consider green, low-carbon, and sustainable agriculture and rural development as primary objectives. Instead, agricultural support policy measures (e.g., input subsidies, guaranteed purchase schemes, subsidized credit, etc.) have been tied to farmland area, production volumes, and yield, without considering environmental costs and benefits. Moreover, critical funding gaps remain for some rural infrastructure and public services, especially rural wastewater and solid waste management. Thus, there is an urgent need for developing new governance frameworks for mobilizing fiscal resources (and tracking expenditures), which can be transferred to counties to achieve specific targets for the green, low-carbon, and sustainable agriculture and rural development objectives.

7. **The proposed GARR II provides incentives for strengthening institutional delivery mechanisms,** with a sharper focus on delivery of results related to green, low-carbon and sustainable agricultural development and rural infrastructure and public services, while keeping the focus on poor and vulnerable households in Hubei and Hunan. With GDP per capita at about US$11,100 and US$10,300 in 2021, respectively, Hubei and Hunan rank sixteenth and thirteenth out of mainland China's 31 administrative regions. Approximately 37 and 40 percent of population (close to national average)[7] in Hubei and Hunan live in rural areas and agriculture continues to represent a sizable part of their economies.

8. **The National Rural Revitalization Administration (NRRA), established under the Rural Revitalization Promotion Law (RRPL) will be the central agency responsible for providing strategic direction and coordinating implementation of the phased RRS plans.** It will also be responsible for developing the communication strategy and knowledge sharing of the lessons-learned from the Green Agriculture and Rural Revitalization Program for Results – Phase I (GARR I) and GARR II implementation; and mainstreaming and upscaling nation-wide approaches and methodologies developed in Hubei and

[4] The No. 1 Document issued by the Central Committee of the Communist Part of China and the State Council in 2018, 2019, 2020, and 2021 focused on green agricultural development, market reforms and modernization of the rural economy.
[5] A joint notice of the Ministry of Agriculture and Rural Affairs, National Development and Reform Commission, Ministry of Science and Technology, Ministry of Natural Resources, Ministry of Ecology and Environment, and National Forestry and Grassland Administration (Nong Gui Fa [2021] No. 8) issued in August 2021.
[6] Issued jointly by the Ministry of Housing, Urban and Rural Development (MOHURD) and the National Development and Reform Commission (NDRC).
[7] The total population in Hubei and Hunan in 2021 was 57.75 and 66.22 million, respectively. According to the World Bank collection of development indicators the average rural population in China was about 38.57 percent of total population in 2020.

Hunan. The proposed GARR II, which combines rural revitalization with greening of agricultural production at the provincial scale, also provides additional incentives to leverage World Bank financing to enhance the efficiency and impact of the phased RRS, through improvements in governance frameworks, such as the platforms for program-based budgeting and public expenditure tracking, M&E, and verification of results.

Sectoral (or multi-sectoral) and Institutional Context of the Program

9. **Hubei and Hunan, located in the central region of China, are among the major agricultural producers in the country with significant environmental footprints.** As major producers of livestock, poultry and crops (e.g., rice, fruit and vegetables), the two provinces generate large quantities of manure and straws or crop residues, and use substantial amounts of chemical fertilizer and agricultural plastics. In Hubei the Bank is supporting the Sustainable and Smart Agriculture Project (P168061), which is promoting integrated environmentally-friendly and climate-smart agriculture, and improving agri-food quality and safety, in targeted value chains and landscapes. This includes investing in technologies and practices for preventing and mitigating pollution from crop and livestock production systems, heavy metals and agricultural plastics. Similarly, in Hunan, the Bank is supporting the Integrated Management of Agricultural Land Project (P153115), which is demonstrating a risk-based integrated approach to managing heavy metal pollution in agricultural lands for enhancing food quality and safety. Methodologies and approaches successfully developed, and lessons-learned from implementing these ongoing operations, together with similar agro-ecological conditions and dominant agricultural value chains (e.g., pigs, poultry, rice, vegetables and fruits) make Hubei and Hunan well-suited for the GARR II to scale up the greening of agricultural production with rural revitalization at the provincial level.

10. **The adoption of green technologies and practices by farmers and cooperatives, however, is hampered by perverse incentives, commercial risks, and insufficient technical and advisory services.** Farmers face the following challenges: (a) input-oriented subsidies encourage the use of more harmful chemical agricultural inputs, especially fertilizer and pesticide, in crop production than necessary; (b) climate-smart agricultural technologies and practices, including the use of formula fertilizer, fertigation, organic and green manure, and livestock and poultry manure treatment and recycling facilities, require upfront investments; but risk-averse and credit-constrained farmers are reluctant to adopt; (c) farmers need extensive technical training and capacity building to fully master the details of green agricultural technologies and practices, but local institutional capacity to deliver such knowledge is limited; and (d) farmers find it difficult to recoup the costs of producing green agricultural products unless they are certified as green or organic, or registered as geographical indication (GI), and are sold in niche markets, in which consumers are willing to pay premium prices. The proposed GARR II will endeavor to address these underlying constraints.

I. Green Agricultural Development

11. **China's agricultural sector is one of the largest in the world**. In 2021, the country's agricultural GDP amounted to US$1.37 trillion (constant 2010 US$), equivalent to 7.3 percent of the national GDP (of US$17.7 trillion). Over the past 40 years, China's inflation-adjusted average annual growth rate of agricultural output value and agricultural GDP were 5.3 percent and 4.5 percent, respectively; driven mainly by higher total factor productivity (TFP), the introduction of new technologies, and large producer subsidies, mostly for rice, wheat, and maize production. China has now surpassed both the European Union (EU) and United States (U.S.) in terms of its agricultural support, which has also led to an excessive use of chemical fertilizers, resulting in significant pollution and environmental degradation. Despite its limited natural resource endowment, China produces about 18 percent of the world's cereal grains, 29 percent of the world's meat, and 50 percent of the world's vegetables. China also plays an important role in international agricultural trade. The country is the largest importer of soybeans, maize, beef and aquatic products, and is the largest exporter of nitrogen fertilizer. As a

large producer, consumer, and trader, China's agricultural producer support and international trade policies have significant global implications, both in terms of food security and environmental footprint.

12. **China is the largest global emitter of greenhouse gases (GHGs) from agriculture, accounting for 13 percent of the total.**[8] The main sources of China's agricultural GHG emissions are enteric fermentation from ruminant animals (28.7 percent), excessive or improper synthetic fertilizer use (21.8 percent), paddy rice cultivation (16.0 percent), and poor livestock waste (manure, sewage, and urine) management (10.5 percent). Breaking down sector emissions by gas, methane (CH_4) leads the way (46 percent), followed by nitrous oxide (N_2O) (39 percent), and carbon dioxide (CO_2) (15 percent). According to FAO statistics (2021), GHG emissions on agricultural land peaked at 842 Mt CO_2e in 2016. Between then and 2019, they declined by 6 percent, returning approximately to their 2007 levels of about Mt 792 CO_2e. Climate models estimate that, without serious national mitigation efforts, agricultural GHG emissions in China will rise to 1,350 million tons per year by 2050, driven mainly by increased livestock production in response to growing demand (due to increasing incomes) for animal-based protein—especially beef, pork and poultry. In 2018, China's agricultural sector accounted for about 6 percent (and declining by 5 percent) of the country's GHG emissions – the fourth-largest source after energy, industry and transport. Of note, this footprint excludes GHG emissions linked to pre- and post-production activities (i.e., not entire food system), like those relating to fertilizer and pesticide production, as well as on-farm power and energy-related. Going forward, mitigating China's agricultural GHG emissions requires deployment of food-system approach (i.e., reducing emissions along the value chains), and adoption of climate smart agricultural practices, which increase productivity, build resilience to climate change, and reduce GHG emissions.

13. **The excessive use of chemical fertilizer is one of the major non-point sources (NPS) of water pollution in China.** The country is now the largest chemical fertilizer user globally, in both absolute terms and per unit of land.[9] Most of this fertilizer is not taken up by the targeted plants, but instead dispersed through the air, soil, and water. In 2020, Hubei and Hunan used 2.67 million tons (MT) and 2.24 MT of chemical fertilizer respectively; translating into the application intensity was 285.9 Kg/ha and 245.6 Kg/ha, respectively. The current average fertilizer utilization rate is 40.4 percent, while the target for the 14th FYP is 43 percent. About 67 percent of monitored groundwater sites in China are polluted and 32 percent of the major rivers fail to meet basic quality standards required for sources of drinking water supply. Also, about 7 percent of irrigated lands are contaminated with polluted water. The *National Sustainable Agricultural Development Plan (2015–2030)* targets zero growth of fertilizer as part of efforts to combat NPS pollution and to reduce GHG emissions, and, since 2015, the amount of chemical fertilizer use has been declining. Potential still exists for cutting nitrogen applications further by 30–60 percent without reducing yields in China's major grain-producing areas. This can be achieved through soil testing and application of formula fertilizers (e.g., with optimized nitrogen, phosphorus and potassium), use of organic fertilizer and green manure, and improved application methods and technologies (e.g., deep placing and fertigation).

14. **Untreated manure from livestock and poultry farms is also one of the major sources of water pollution in China**. In 2017, pollutants measured in terms of the country's total chemical oxygen demand (COD), total nitrogen (TN), and total phosphorus (TP) were 21.44, 3.04, and 0.32 million tons,[10] respectively. Agricultural sources accounted for 50 percent, 47 percent, and 67 percent of these pollutants, respectively. The livestock subsector is the major contributor of water pollution in China, accounting for 96 percent of COD, 38 percent of TN, and 56 percent of TP from livestock and poultry manure. Since 2016, the government has implemented efforts to increase the treatment rate of animal manure, setting a target of 80 percent in the 14th FYP. With over 42 million and 26 million standing pig population (SPP), Hunan and Hubei

[8] The main agricultural and land use change GHG emissions are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).
[9] The scalar amount of such fertilizer application per unit of arable land is still as high as 445 kg/ha, which greatly exceeds the "safe upper limit" of 225 kg/ha sometimes set by developed countries to prevent chemical fertilizer from harming the environment.
[10] FAO (Food and Agriculture Organization of the United Nations). 2021. FAOSTAT [EB/OL]. http://www.fao.org/faostat/en/#data,2021-07-10.

were second and seventh largest pig producers in China in 2020. Hunan generated 25.18 Mt and 5.92 Mt of pig and poultry manure, respectively. In 2020, the recycling rate of livestock and poultry manure was 75.9 percent. The untreated livestock and poultry manure discharged into water bodies causes a sharp decline in soluble oxygen, leading to eutrophication and algae blooms. As a result, water quality is compromised, and aquatic biodiversity is altered. Untreated manure increases the concentration of nitrates in groundwater due to the leakage of nutrients, and is also a major source of air pollution in the form of hazardous gases (e.g., ammonia and hydrogen Sulphide and GHGs), as well as stench and dust.

15. **The low rate of recycling agricultural plastics is another China's major environmental challenge.** China has the largest agricultural area under plastic film mulch in the world. This is mainly because of its rapid expansion into fruit and vegetable production – a response to dietary diversification locally and abroad. Over the past two decades, the area under plastic film in China grew more than 150 times and surpassed 20 million hectares, using nearly 1.2 million tons of plastic film. In 2020, Hubei and Hunan used about 76,000 Mt and 58,000 Mt of agricultural plastics, respectively. In 2020, the recovery rate of agricultural plastic film in the country was 80 percent. However, the recycling rate of plastic mulch was less than 60 percent (14th FYP target is 85 percent). The environmental impact of this practice is ambiguous. On the one hand, plastic film mulching plays an important role in China's agricultural development due to its ability to keep soil warm, retain moisture, and reduce pesticide residues in soil. Over time, this has significantly increased crop yield (e.g., 20–35 percent in grains and 20–60 percent in cash crops) and hence farm income. On the other hand, the widespread use of plastic film mulching has generated large quantities of plastic waste. Improper collection, treatment, and disposal of agricultural plastics contribute to air, water, and soil pollution, as well as ecosystem degradation. In addition, large quantities of plastic film mulch have ended up in streams, rivers, and ultimately the world's oceans, thus endangering wildlife. Although the policy framework for plastic collection and recycling and the use of micro-thin plastics in agriculture has recently tightened, enforcement in rural areas remains inconsistent at best. In 2019, the government put forth the "*Opinions on accelerating the prevention of agricultural mulch pollution*."[11] The document set several high-level targets, including that: by 2020, the area covered in plastic film will cease to grow, and 80 percent of mulch films will be collected and recycled; and by 2025, nearly all agricultural membranes are to be recovered and plastic film residues in the soil should decline. In 2020, China introduced a roadmap for phasing out the reliance on a variety of short-lived plastics by 2025. Its multiple pronged approach includes measures to reduce and replace plastics with degradable mulch, increasing recycling rates, improving plastics management, and investing in science and technology.[12]

16. **China's agriculture is also highly vulnerable to climate change.** Despite this fact, agriculture is one of the few sectors for which China has not developed an overall strategy on climate adaptation. The increasing severity and frequency of extreme weather events (especially floods and droughts), rising sea levels, destruction of ecosystems, and loss of biodiversity will significantly weaken China's agricultural productive capacity. Global models show that for every 1 degree increase in temperature from the historical level, food production, including rice, maize, and wheat, will decrease by 3 to 10 percent.[13] The central provinces of Hubei and Hunan are exposed to extreme events such as heavy rains and floods, which could damage rural infrastructure; and the increasingly longer dry spells can adversely impact crop production. The intensity and frequency of these climate-induced hazards might increase in the future because of climate change. Thus, the adoption of climate-smart agricultural practices remains critical for sustainably increasing agricultural productivity,

[11] *Opinions of the Ministry of Agriculture and Rural Affairs, the National Development and Reform Commission, the Ministry of Industry and Information Technology, the Ministry of Finance, the Ministry of Ecology and Environment, and the State Administration of Market Supervision and Administration on accelerating the prevention of Agricultural Mulch Pollution*. Release date: July 4, 2019.

[12] NDRC (National Development and Reform Commission). 2020. "About the Ministry of Ecology and Environment of the National Development and Reform Commission."

[13] Challinor, A. J., Watson, J., Lobell, D. B., Howden, S. M., Smith, D. R., & Chhetri, N. 2014. A meta-analysis of crop yield under climate change and adaptation. Nature Climate Change 4 (4): 287–91.

building resilience to climate change, and reducing GHG emissions. In addition, the construction of climate-resilient rural infrastructure will enhance sustainability.

17. **To promote the greening of agricultural value chains under Results Area 2 the proposed GARR II will support China's efforts to reduce the sector's environmental footprint from three major sources**: (i) excessive or improper chemical fertilizer use; (ii) poor livestock and poultry manure management; and (iii) overuse and improper disposal of agricultural plastics. These are the major sources of water (point and NPS), soil, and air pollution in China. The GHG emissions from these activities also contribute to global warming and climate change.

II. Rural Infrastructure

18. **China has invested heavily in infrastructure and public services, but a wide gap still exists between urban and rural areas.** To green rural revitalization China needs to reduce pollution related rural infrastructure. Thus, China's top priority should be to ramp up investments in rural solid waste and wastewater management infrastructure to close the urban-rural gap. These activities will be supported in the context of increasing access to rural solid waste and wastewater services under Results Area 3 (RA3) of the proposed GARR II. Additional investments will also be promoted under RA2 to address the shortage of agricultural processing infrastructure, cold storage, and logistics, which reduce the value added in local food production, and hence income-generating opportunities. Further, despite China's remarkable increase in agricultural productivity, public services such as extension and advisory services, animal health and veterinary services, business development services, and marketing services, including e-commerce, are inadequate. Thus, these activities would be supported in the context of greening agricultural value chains under RA2 of the proposed GARR II.

19. **Addressing the low institutional capacity for local infrastructure planning, and life-cycle operation and maintenance are imperatives to closing the rural infrastructure and public services gap.** Following guidelines issued by the State Council in 2019, the improvement of rural infrastructure at the village level is promoted through the development of Integrated Village Development Plans (IVDPs). Under RA3, the proposed GARR II supports the development of such plans as a key instrument for addressing local needs in a differentiated way, building local capacity, and strengthening accountability to improve the management of infrastructure and public services. The proposed GARR II also draws on prior experience in rural poverty reduction in building stronger IT-based M&E systems for management and operation as well as performance evaluation of rural infrastructure assets.

Rural Solid Waste Management

20. **China's rural solid waste collection, transfer and treatment fall way behind the levels in urban areas.** In 2019, waste generation was estimated at 0.76 kg/capita/day in rural areas. However, up to half of the rural solid waste may not be disposed of safely, thus turning into a major source of environmental pollution.[14] While urban waste collection and treatment is almost universal, in 2017, it was estimated that only 47 percent of rural waste was disposed of according to the existing national standards.[15] In 2018, the Ministry of Agriculture and Rural Affairs (MARA) reported that rural solid waste was not properly managed in at least a quarter of China's administrative villages, where open dumping was normal and littering was ubiquitous.[16] In 2020, Hubei's treatment rate of rural domestic waste was only 20.8 percent, while the 14th FYP target is 35 percent. China is currently piloting the separation of rural solid waste into four categories (organics, recyclables, hazardous, and residual) at source. In rural areas, kitchen (organic) waste is mostly used by households as animal feed and recyclables are partially collected outside the public service (e.g., by informal and private sector due to

[14] Urban and Rural Municipal Solid Waste in China and the Circular Economy, World Bank (2019).
[15] China Association of Urban Environmental Sanitation, the China Municipal Waste Development Report (October 2017).
[16] http://www.xinhuanet.com/gongyi/2018-09/30/c_129964054.htm

low profit margins and long transportation distance). But residual waste and hazardous waste often remain uncollected and are littered into the environment, placed at informal dumpsites, or burned by the population. Separating rural solid waste at the source would also facilitate the collection and recycling of agricultural plastic (e.g., plastic mulch film residues, pesticide containers, and chemical fertilizer packages).

21. **China has put in place several policies and plans for improving rural solid waste management.** The *Opinions on Comprehensive Implementation of Rural Solid Waste Management* issued by the Ministry of Housing, Urban and Rural Development (MOHURD) and ten other ministries in 2015, require localities to establish rural solid waste management systems that follow the management modality of "waste collection by villages, transfer by towns, and treatment by counties." In 2018, the State Council issued a *Three-Year Action Plan for Rural Living Environment Improvement (2018–2020)* promoting the establishment of a comprehensive and diverse rural waste management system centered around waste minimization and recycling. The plan also set a target of 90 percent coverage of solid waste collection facilities in administrative villages nationwide by the end of 2020.[17] However, many provinces report that this target is yet to be achieved and that unauthorized dumping of waste continues at scale. Waste collection facilities (e.g., collection containers and pads) often remain idle due to the unavailable waste flow chain. The latter includes transfer stations, storage facilities, treatment facilities, and financing and institutional capacity that ensure that solid waste is managed holistically from generation to final placement. Recognizing these challenges, the *14th FYP on Municipal Solid Waste Separation and Treatment Facilities Development Plan* ((National Development and Reform Commission (NDRC)/MOHURD, 2021–2025)) envisages rural waste management to gradually integrate with the urban system. In June 2020, MOHURD launched a nationwide program to pilot urban-rural integrated waste management and rural waste separation [18] in 141 demonstration counties. In April 2021, MOHURD issued the *Standards for Rural Municipal Solid Waste Collection, Transfer, and Treatment*, setting up standards and technical specifications for the construction and operation of rural systems of segregated waste collection, transfer, and treatment, while considering diverse local conditions.

22. **Despite the rural solid waste policy framework being tightened over the past five years, enforcement remains a key challenge.** This is mainly because of the fragmented institutional authority over and responsibilities for rural solid waste services. MOHURD is responsible for planning, construction, and operations and maintenance (O&M) of solid waste management facilities; service delivery; and data and information management. The Market and Supply Cooperative (COOP), a nationwide network, handles resource recycling in rural areas. The MARA organizes the treatment of agricultural waste, including agricultural mulch film and plastic packaging materials. Environmental monitoring of and compliance with solid waste management and resource recycling facilities are the responsibility of the Ministry of Ecology and Environment (MEE). Because several institutions have different mandates, an effective institutional coordination framework is needed to better manage rural solid waste in China. The proposed GARR II will help to address coordination challenges and focus on rural solid waste collection and sorting at village level, and transfer to townships' waste-handling facilities. However, the proposed GARR II will not support county-level solid waste treatment because incineration and landfills are activities associated with high environmental risk.

[17] Coverage of waste collection infrastructure (e.g., collection bins and pads) should not be confused with service coverage of the population, assessed to remain far lower.
[18] *http://www.mohurd.gov.cn/wjfb/202006/t20200624_246034.html*

Rural Wastewater Management

23. **Inadequate rural wastewater collection, treatment, and recycling infrastructure and services have increasingly become a major concern in China.** In 2018, China had 2.45 million villages with a total population of 580 million.[19] Simple pit latrines and flush toilets connected to septic tanks are commonly used in rural areas. But many villagers still face poor sanitation and hygiene conditions because of inadequate, outdated, and/or faulty sanitary facilities. The sewage generated in these villages each day is approximately 17.6 million m^3, but daily treatment capacity is only about 494,700 m^3, which means that only 2.8 percent of wastewater is treated.[20] The untreated wastewater discharged into the environment generates all kinds of health risks and NPS water pollution due to higher content of COD, TN, TP, and ammonia nitrogen (NH_3N). The proposed GARR II presents a good opportunity to address these challenges.

24. **China has several policies and programs for improving rural wastewater treatment systems (WTS).** The *Plan for Preventing Water Pollution* published by the State Council (SC) in 2015 requires rural WTS to use a standard design for construction and management. These unified standards have led to over-designed rural wastewater infrastructure with little prospect for recouping investment and meeting the O&M costs. Going forward, rural WTS design standards need to be customized to fit local conditions. The 13th FYP (2016–2020) set a target for rural wastewater treatment rate of more than 60 percent[21] by the end of 2020. However, despite increased subsidies and vigorous promotion from the central government, only about 25 percent of Chinese villages have WTS.[22] Many of these WTS are not fully functional because of unsuitable technology, insufficient financial resources for O&M, ineffective governance structure, weak institutional capacity for enforcing effluent discharge standards, and limited public participation. Because of the scattered villages and difficult terrain in some parts of the country, the logistics of transferring large volumes of wastewater remain challenging.

25. **The proposed GARR II builds on and complements a series of Bank-funded operations aimed at abating solid waste and wastewater in urban and rural areas.** While solid waste, including plastic collection and recycling is improving in cities it is lagging far behind in small towns and rural areas. There are six recently approved IBRD operations focusing on helping the Chinese government to enhance solid waste (including plastics) and wastewater management, including in the rural space. These include: (i) Hubei Smart and Sustainable Agriculture Project (P168061) approved in FY20, which includes preventing and mitigating pollution from heavy metals and plastics; (ii) Plastic Waste Reduction Project (P174267) approved in FY21, supporting improvement of plastic waste management nationally and sub-nationally, and to reduce plastics pollution from municipal solid waste; (iii) Food Safety Improvement Project (P162178) approved in FY21, supporting food safety management at national and targeted subnational levels by reducing food safety risks due to contamination of soil and water, including from micro-plastics; (iv) Yangtze River Protection and Ecological Restoration Program (P171644) approved in FY22, focusing on improving institutional coordination and ecological protection, and reducing water pollution loads, including from uncollected or mishandled rural solid waste and agricultural plastics; (v) Yellow River Basin Ecological Protection and Pollution Control Program (P172806) approved in FY22, aimed at improving institutional coordination and ecological protection, reducing NPS and marine plastics pollution loads by improving collection and treatment of agricultural plastics; and (vi) Green Agricultural and Rural Revitalization Program (P177590) also approved in FY22, supporting green agricultural development; rural solid waste collection, transfer and recycling, including agricultural plastics; and wastewater treatment and recycling.

[19] Ministry of Housing and Urban-Rural Development of the People's Republic of China. 2018. Chinese Urban–Rural Construction Statistical Yearbook (2018). China Planning Press, Beijing (in Chinese).
[20] Ibid.
[21] In 2018, Zhejiang and Jiangsu provinces and Shanghai and Beijing municipalities had more than 70 percent of the villages with WTS.
[22] National Bureau of Statistics of China. 2018. China Statistical Yearbook (2018). China Statistics Press, Beijing.

III. Landscapes and ecosystems

26. **China has a vast territory and diverse natural ecosystems, such as forests, grasslands, wetlands, rivers, and lakes, which have nurtured a wealth of biodiversity and supported tourism industry.** However, progressive degradation of those ecosystems in the past few decades has resulted in the deterioration the country's biodiversity and environment. To curb this continuing degradation, China has been carrying out several large-scale restoration and conservation programs to prevent and control the degradation of ecosystems and landscapes across the country. The protection and restoration of forests, grasslands, wetlands, rivers and lakes have achieved encouraging initial results, and biodiversity has been enhanced. China has developed the "*Master Plan for the National Major Ecosystem Protection and Restoration Project (2021–2035)*", and implementation has begun. Appropriate green efforts continue, but problems such as river dry-off, lake shrinking, and water pollution, for example, are still rampant. Forest coverage is far below the global average. Moderate and severely degraded grasslands account for more than one-third of the total grasslands. The biodiversity index is declining, and some rare and endemic species are critically endangered. The proposed GARR II will support the restoration and protection forests, grasslands, wetlands, rivers, and lakes landscapes and ecosystems under RA4.

Forest Ecosystems

27. **Forests play an extremely important role in maintaining biodiversity, protecting the ecological environment, mitigating natural disasters, and adjusting the global carbon balance and biogeochemistry circulation.** In terrestrial ecosystems, forests are the largest repository of carbon in the world. One of the main causes of the permanent disappearance of forests is conversion of forestland into agricultural and animal husbandry lands.[23] According to the *2015 Global Forest Resources Assessment Report*, China's forest area accounts for 5.51 percent of the world's forest area. The natural forest is the largest area of the forest ecosystem and an important source of wood and non-wood forest products.[24] Compared with plantations, natural forests have higher biodiversity, a more complex community structure, more abundant habitat characteristics, and higher ecosystem stability. Forest vegetation plays a vital role in soil and water conservation. Although China's forest area and stock volume continue to increase, forest quality is not high, and the forest age structure is mainly young. The degradation or loss of forest vegetation changes the original microclimate environment and ultimately affects rainfall and evaporation, which might further aggravate the rate of forest degradation. The degradation of the forest ecosystem also leads to the deterioration of soil physical properties (such as soil texture, structure, porosity, etc.) and chemical properties (soil pH, nutrient elements, etc.), and the loss of soil organic matter (SOM) and nutrients, which is a serious threat to the sustainable development of forests. Also, birds, soil animals, and microorganisms may disappear because of changes in their habitats.

28. **China has the Plan for the Protection and Restoration of Natural Forests (PPRNF) that was issued in 2019.** This plan is supported by a Natural Forest Protection and Restoration System Program (NFPRSP), with a long-term vision until 2050. The NFPRSP, which started in 2021 will continue to play a leading role in restoring the degraded forest ecosystems in China. In parallel, there are some ongoing restoration programs for degraded forest ecosystems, including the Shelterbelt Network Development Program (SNDP), Sloping Land Conversion Program (SLCP), and Wildlife Conservation and Nature Reserve Protection Program (WCNR). The SNDP is a particular form of agroforestry being actively conducted in many of China's croplands and constitute an important agricultural infrastructure change program for carbon sequestration, soil and water conservation, pest prevention and mitigation, protection of biodiversity, improvement of

[23] To date, the global forest area is nearly 4 billion ha, of which China's forest area is 220 million ha, where it is playing a crucial role in ensuring national ecological security, building a "beautiful China," and addressing climate change.
[24] According to China's Forestry and Grassland Statistical Yearbook (2018), as of 2017, China's natural forest area was about 140 million ha, accounting for 43 percent of the total forest area.

soil fertility, improvement of air and water quality and flood mitigation. The restoration measures for forest ecosystems generally include closure management, natural regeneration, enrichment planting, artificial afforestation, and agroforestry.

29. **Agroforestry, therefore, has become an important measure for China's food security and carbon sequestration.** The ecological, social, and economic benefits of including the forestry component in traditional systems are expected to be significant. Efficient, stable, and diverse agroforestry systems can help improved water use efficiency, increase land utilization, protect the environment, and increase carbon sequestration. Many studies have shown that agroforestry systems can positively change microclimates. For example, farmland windbreaks formed by trees and other plants can slow down airflow, reduce water evaporation, improve the distribution and utilization of irrigation water in the system, and increase crop water utilization. Windbreaks have a buffering effect on air temperature changes and help reduce the high-temperature stress of crops or animals in the system. In China's plains and main grain-producing areas, local governments have carried out tree planting and greening in residential areas, field roads, and both sides of channels. These agroforestry systems arguably have significantly increased the carbon sequestration ability of the local farmland and contributed to protecting crop production and improving ecological landscapes.

Grassland Ecosystems

30. **As one of the five major ecosystems in the world, grassland ecosystems are also the largest ecosystem type by area in China**.[25] They have an important ecological function in regulating climate, conserving water, fixing carbon, and preventing sandstorms, and are the traditional animal husbandry base of China. They play an important role in safeguarding national food security and maintaining social harmony and stability. In recent years, changes in land use have led to the grassland ecosystems to be gradually degraded, and their functions being somewhat destroyed. Some 90 percent of grasslands in China have been degraded to different degrees. The main reasons for the degradation of grassland ecosystems include: (i) excessive "reclamation" of grassland for cropping; (ii) overgrazing and grazing of livestock on a large scale led to more sparse vegetation on the surface of the soil and more serious environmental degradation; and (iii) overharvesting of grassland medicinal materials also causing damage to turf. Extreme degradation has led to the desertification of grasslands. The sheer size of the grassland ecosystems means that even small gains per unit area in, say, sequestration of soil organic carbon (SOC) can accumulate to significant decarbonization of the atmosphere. Although the grassland in some areas have been subsequently restored by returning farmland to grassland, surprisingly these ecosystems have not been a strong explicit priority in China's CSA efforts.

31. **Overgrazing has led to the reduced the primary productivity of forage.** Degradation of the grassland ecosystem has decreased grassland productivity and grass quality, negatively impacting the quantity and quality of livestock products from pastoral areas. Following the recent easing of stock numbers, the natural grasslands in China have shown signs of recovery, but it is far from being restored to their former productivity. Theoretical carrying capacity[26], which is an index for evaluating grassland productivity has slightly increased in the last decade, but the overload rate is still more than 20 percent, and consequently, the degradation of natural grassland continues. By the end of 2018, the average livestock overload rate of key natural grasslands in China was 10.2 percent, 1.1 percent lower than that in 2017. These progressive reductions in overstocking constitute slow but steady elements of the urgently needed greening of Chinese agriculture.

32. **Desertification which is mainly caused by wind erosion and overgrazing in arid and semi-arid areas is one of the main forms of grassland ecosystem degradation.** Because of the large-scale desertification due to degradation of

[25] China's grassland area occupies nearly 400 million ha, accounting for nearly 42 percent of the total land area.
[26] This refers to the number of grazing heads that can make livestock grow well and reproduce normally in a certain grassland area.

grassland, soil surface temperatures have increased, further intensifying the desertification and degradation of the grassland. With increased grazing intensity or grassland degradation, the soil texture becomes coarser, the structure is destroyed, the soil is compacted, and air permeability decreases. The decrease in SOC content is extremely detrimental to the growth of grassland plants because they have lower nutrient absorption rates from the soil. In turn, grassland plants reduce their protection from extreme weather conditions. The degradation of the grassland ecosystem in China has led to the deterioration of the ecological environment, and the frequent occurrence of natural disasters has seriously affected the sustainable development of the pastoral society and economy of grassland areas.

Wetland Ecosystems

33. **Wetlands[27] have important functions and value in flood control and disaster reduction, water resource regulation, environmental pollution mitigation, biodiversity protection, and regional ecological environment maintenance.** They underpin a small part of the agricultural sector, which may explain why they are largely ignored in China's CSA efforts. Over the past four decades, wetlands in China have been constantly under serious threat of degradation. During the 13th FYP period (2016–2020), the level of wetland protection and restoration in China improved, with an area of 2,026 km^2 of newly-added wetland and the protection share of wetlands surpassed 50 percent. Because of human agriculture and industry development, untreated wastes are directly discharged into wetland waters, resulting in serious damage to wetland ecosystems. In addition, China's wetlands are frequently polluted by trace metals, organic matter, and microplastics; and the polluted areas include bottom mud, water body, and soil. The decline in wetland areas, the change in hydrological conditions, and the pollution of wetlands affect the habitat of wetland organisms and lead to loss of biodiversity. Fragmentation of species habitats also affect the reproduction and survival of species and the flow of genes in the wetland ecosystem. In the Yangtze River Basin, natural fishery resources have been severely declining.

Aquatic Ecosystems

34. **China has more than 50,000 named rivers with a catchment area of more than 100 km^2, and more than 1,580 rivers that have a catchment area of more than 1,000 km^2.** Rivers have important ecological service value and rich biodiversity. Rivers are corridors for the circulation of water, sand, silt, nutrient elements, and other substances in their basins. The riparian wetlands provide important ecological services and are rich in biodiversity. China is also one of the countries with the largest number of lakes globally; there are 2,573 natural lakes with an individual area of more than 1.0 km2. They have the common characteristics of large area, wide lakeshore width, shallow water, short water exchange cycle, high interference and intensity of human. The degradation of aquatic ecosystems has attracted national attention. Ecological protection and restoration of key ecological areas of the Yangtze and Yellow Rivers have been incorporated into the country's nine major ecological protection and restoration projects. With the rapid development of China's economy river pollution has become more serious because of the direct discharge of sewage and inadequate river protection. The pollution of rivers is usually coupled with the eutrophication of water bodies. The essence of eutrophication is when the increase in nutrients, such as N and P, changes the river from "grass type" to "algae type." The excessive input of nutrients, such as N and P, exceeds the water body's self-purification threshold, and eutrophication is further aggravated. In addition, because of the low-lying terrain of rivers, pollutants, such as trace metals, fertilizers, and pesticides, produced by human activities can enter the water body through surface runoff, groundwater, and other channels, making the river ecosystem a gathering place for these pollutants.

[27] According to the definition of the Ramsar Convention on Wetlands of International Importance, wetlands are areas with marsh or water, whether artificial or naturally occurring, where the water is either flowing or stagnant, either salty or fresh. The area of wetlands in China exceeded 530,000 km^2 in 2020.

Relationship to CAS/CPF

35. **The PforR is aligned with the World Bank's Country Partnership Framework (CPF, FY2020–2025) for China (Report No. 11785-CN)**,[28] which was discussed by the World Bank Board of Directors on December 5, 2019. The CPF focuses on closing the remaining institutional gaps and supporting interventions that generate significant global public goods (GPGs). The proposed GARR II is directly linked to Engagement Area 2 (EA2) of the CPF - Promoting Greener Growth. Under EA2, the World Bank Group aims to support the government's efforts to: (i) reduce air, soil, water, and marine plastics pollution; (ii) demonstrate sustainable agricultural practices and improve agro-food product quality and safety; and (iii) strengthen institutional capacity for sustainable natural resource management, especially the efficient use of scarce arable land and water. The proposed GARR II is also aligned with the World Bank Group's Green, Inclusive, and Resilient Development (GRID) framework and the World Bank Group Climate Change Action Plan (2021–2025). In addition, the proposed GARR II supports the implementation of China's October 2021 updated Nationally Determined Contribution (NDC)[29] and is consistent with a range of recent climate policy commitments made by the country, including the Glasgow Leaders' Declaration on Forests and Land Use and a joint declaration signed by China and the United States in the margin of the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP26) providing, among other things, for incentives and programs to reduce methane emissions from the agricultural sector.

36. **The proposed GARR II is expected to generate significant GPGs through** (i) GHG emission reductions; (ii) agricultural plastics recovery, transfer and recycling; and (iii) biodiversity conservation and protection. The GARR II is expected to generate substantial climate co-benefits through implementation of mitigation and adaptation measures. The climate co-benefits from mitigation measures are expected to be generated in several ways. First, by reducing GHG emissions (e.g., CO_2, CH_4, and N_2O measured in CO_2 equivalent) from crop production systems, through the reduction of chemical fertilizer use, and increasingly use organic fertilizer, such as green manure, treated sludge and compost material as a substitute for chemical fertilizer. Second, by reducing GHG emissions (e.g., removal of COD, CH_4, and NH_3N) from livestock and poultry production systems, through the collection, treatment, and recycling of manure. Third, by increasing energy use efficiency (e.g., in primary production, by using new efficient farm machinery, renewable energy like solar and wind power for irrigation; and in value addition, including conversion of biogas to energy). Fourth, by increasing the collection, transfer, and recycling of agricultural plastics (e.g., mulch film residues, pesticide and chemical fertilizer packages). Fifth, by sequestering carbon through the restoration and protection of landscapes and ecosystems (e.g., afforestation, reforestation, agroforestry, and grasslands and wetlands restoration). Similarly, the climate co-benefits from adaptation measures are expected to be generated through the adoption of (i) climate-smart agricultural practices (e.g., returning of crop straw/residues in the farmland to increase soil carbon, increasing efficiency of irrigation water use, such as through fertigation,[30] and improved water management in paddy rice to reduce CH_4 emissions); (ii) nature-based solutions, such as retention ponds or constructed wetlands to manage floods); and (iii) circular economy practices, including the efficient use of treated wastewater, such as reuse for irrigation to build resilience to droughts. The climate co-benefits will be measured in CO_2 equivalent of GHG emissions reduced from PforR-supported activities.

[28] World Bank Group. 2021. China – Country Partnership Framework for the Period FY2020–2025. (Report No. 117875-CN) World Bank Group, Washington, D.C. https://documents1.worldbank.org/curated/en/902781575573489712/pdf/China-Country-Partnership-Framework-for-the-Period-FY2020-2025.pdf.

[29] China updated its NDC targets to include the following: (i) carbon dioxide emissions will strive to peak by 2030, and strive to achieve carbon neutrality by 2060; (ii) by 2030, China's carbon dioxide emissions per unit of GDP will drop by more than 65 percent compared with 2005; (iii) the proportion of non-fossil energy in primary energy consumption will reach about 25 percent; (iv) the forest volume will increase by 6 billion cubic meters compared with 2005; and (v) the total installed capacity of solar power generation will reach more than 1.2 billion kilowatts.

[30] Fertigation is the injection of fertilizer, used for soil amendments, water amendments, and other water-soluble products, into an irrigation system. Fertigation is related to chemigation, the injection of chemicals into an irrigation system.

37. **The reduction of pollutant loads entering waterways will generate local environmental benefits.** These will mainly arise from the reduction of the point source and NPS water pollution (e.g., COD, TN, and TP) through the reduction and efficient use of chemical fertilizer (e.g., improving application rate and improving timing and precision of application) and increased use of formula and organic fertilizer, and treatment and recycling of livestock and poultry manure as well as rural wastewater. One of the key local environmental benefits would be the improvement of water quality, with associated improved health outcomes such as a decline in waterborne diseases in rural areas.

Rationale for Bank Engagement and Choice of Financing Instrument

38. **The proposed GARR II is a direct response to the Chinese government's request for the Bank support for the phased implementation of its national RRP.** GARR II builds on the GARR I (P177590) approved by the Board in March 2022, and is under implementation in Guizhou and Guangxi. GARR II supports the greening of the RRP in Hubei and Hunan provinces; and the National Rural Revitalization Administration (NRRA) will for provide strategic direction and coordinating implementation of the RRS plans. Similar to GARR I, the GARR II is supporting strengthening institutions capacity for governance, greening of selected value chains, and increasing access to rural solid waste and wastewater services. In addition, the GARR II also supports interventions aimed at restoring and protecting critical ecological systems in selected areas in Hubei and Hunan.

39. **The proposed GARR II draws lessons and experience from Bank-financed agricultural and rural development projects in China.** These include ongoing or recently closed projects supporting sustainable agriculture (Hubei Sustainable and Smart Agriculture Project (P168061) and Climate-Smart Staple Crop Production Project (P144531)); agricultural pollution control (Hunan Integrated Management of Agricultural Land Project (P153115) and Guangdong Agricultural Pollution Control Project (P127775, TF018176)); value chain development (Jiangxi Farm Produce Distribution System Project (P147009); agriculture finance (Henan Green Agriculture Finance Project (P169758)); and food quality and safety (China Food Safety Improvement Project (P162178)). These projects are piloting new sustainable agricultural practices through a combination of technical assistance, public investment, green finance, matching grants to family farms and cooperatives, and output-based or subsidies to agro-enterprises. The GARR II also builds on the long history of Bank involvement in poverty alleviation/reduction (Guangxi Poverty Alleviation Project (P153892), Shaanxi Poor Rural Areas Community Development Project (P153541), Poverty Alleviation in Poor Areas Project (P133326) supporting the International Poverty Reduction Center in China (IPRCC), Sichuan, Gansu, and Guizhou provinces, the Guizhou Rural Development Project (P133261), and the Guangxi Poverty Reduction PforR (P163138)), which have helped to target central and provincial budget transfers to achieve greater impact in poverty reduction, including by pooling funds from various earmarked budget lines locally and introducing the PforR instrument or results-based transfers.

40. **The design of the proposed GARR II is grounded on the recently completed studies undertaken as part of the Bank's Programmatic Advisory Services and Analytics (PASA) on** *Transforming Rural China – Greening of Agricultural Modernization*. The PASA studies completed include: (i) Toward a Greener China – A Review of Recent Agricultural Support Policies and Public Expenditure; (ii) Rural Transformation and Policies in China; (iii) An Overview of Degradation and Restoration of Ecosystems and Landscapes in China; (iv) Agricultural Water Use Efficiency Experience in China; (v) Analysis of Farmland Policy for Greening Agricultural Modernization; (vi) Challenge of Agricultural Pollution in China; and (vii) Promoting a New Agricultural Research and Development Strategy for Greener Development in China.

41. **The proposed GARR II presents an opportunity for the Bank to leverage these experiences to bring poverty reduction and sustainable agricultural practices together in one design,** while helping the government improve the effectiveness and results orientation of its RRS. The value added of the Bank lies in introducing a greater focus on results into the substantial public investments made in rural areas and in helping to improve the coherence of activities across

the multiple agencies involved in implementing the RSS. The PforR instrument is thereby capitalizing on the evolving national and provincial policy frameworks (e.g., eco-compensation)[31] for results-based fiscal transfers to improve a range of environmental outcomes. In leveraging budget resources under the RSS, the PforR instrument provides geographic coverage beyond that possible under the standard Investment Project Financing (IPF) instrument. A key contribution is strengthening institutional capacity and developing governance frameworks (e.g., strategic/management plans, regulations, standards, and guidelines for green development; and program budgeting, expenditure tracking, and M&E and verification of results) for implementing the RRS plan, which can be rolled out throughout the provinces (i.e., beyond the PforR's geographic boundaries of participating counties) or the country—to other provinces. The PforR instrument can also help the government to repurpose its agricultural subsidies toward achieving green and sustainable agricultural development. Hubei and Hunan have requested Bank support based on their positive track record with past projects to help them increase the impact of their substantial RRS-related commitments.

42. **The proposed GARR II builds on and complements other Bank-supported operations in the management of solid waste and water resources prepared under the current CPF (2021-2025).** The China Plastic Waste Reduction Project (P174267) approved in June 2021 builds on the tightened national framework for solid waste management to support plastic waste avoidance, separation, and recycling in two pilot cities, Chongqing and Ningbo. This work is being extended to rural areas under a follow-up operation (P176989), planned for Board presentation in FY23. The GARR II complements this work by focusing on the avoidance and improved collection of plastic waste at the farm and village level. Problems of NPS pollution of waterways are also addressed in the Yangtze River Protection and Ecological Restoration Project (P178338) approved by the Board in December 2021 and the Yellow River Ecological Protection and Environmental Pollution Control Program (P172806) approved by the Board in March 2022. These operations focus on the inter-jurisdictional coordination issues involved in pollution abatement at the river-basin level. The GARR I and now II moves further upstream to work directly with farmers on adopting greener agricultural production practices. The parallel and focused engagement on related issues working at the farm, village, county, province, and river-basin levels provides significant opportunities for knowledge exchange and learning that will facilitate the scaling up of successful experiences nationally.

C. Program Development Objective(s) (PDO) and PDO Level Results Indicators

Program Development Objective(s)

43. To enhance environmentally sustainable agricultural and rural infrastructure development in selected areas of Hubei and Hunan.

PDO Level Results Indicators

44. **The proposed Phase II preliminary PDO level indicators are:**

(i) Nutrient load reduction (Ammonia-Nitrogen (NH3N), Total Phosphorus (TP)) achieved under the PforR in program counties (RA2)

(ii) Chemical Oxygen Demand (COD) pollution load reduction achieved under the PforR in program counties (RA2 and RA3)

[31] Eco-compensation is a system of payments for ecosystem services (PES). It aims at incentivizing local governments, private and state-owned enterprises, and farmers to adopt better environmental management practices to protect ecosystems. The Sloping Land Conversion Program (SLCP), or the "Green for Grain" scheme in China, is one of the largest PES in the developing world, with a total investment of more than US$69 billion. Its initial goal was to decrease soil erosion, deforestation, and flood risk by restoring forest and grasslands. The scheme operates through cash transfers to farmers in return for reforesting marginal agricultural land. Payments are made only after verification that the trees planted have at least an 85 percent survival rate. Additional subsidies are available for specific tree species.

(iii) Greenhouse gas (GHG) emissions reduction achieved under the PforR in the program counties (RA2, RA3 and RA4)

(iv) Beneficiaries reached with assets or public services (disaggregated by gender) under the PforR in program counties (RA1, RA2, RA3 and RA4)

D. Program Description

PforR Program Boundary

45. **Since 2017, the Chinese government has adopted an ambitious national RRP, which is implemented in phases of five-year RRS plans.** The national RRS plan provides the overarching rural development vision and broadly defined actions. The RRS plans are framed around the "Three rurals": agriculture, rural areas, and farmers. The main objectives of the RRS plans are to sustainably increase rural income, increase access to rural infrastructure and public services, and improve the living environment in rural areas. Thus, the national RRS plan phase 1 (2018–2022) focuses on consolidating and sustaining the poverty eradication gains, and has four pillars: (1) green agricultural development, (2) agricultural modernization, (3) rural infrastructure and public services, and (4) rural governance. The national RRS phase 1 overlaps with the transition period (2021–2025),[32] which also coincides with the 14th FYP (2021–2025). The Rural Revitalization Promotion Law (RRPL)[33] provides a legal framework for implementing the phased RRS plans.

46. **The green agricultural development pillar of RRS phase 1 has seven sub-programs, which are further elaborated in the *14th FYP for the National Green Development of Agriculture Plan*[34]**. These include: (i) *strengthening the protection and utilization of agricultural resources* e.g., protecting and improving the quality of farmland, improving the efficiency of agricultural irrigation water use, and protecting agricultural biological resources; (ii) *preventing and controlling agricultural NPS pollution* e.g., promoting the reduction in fertilizer use and increasing the efficiency of fertilizer and pesticide use, promoting the recycling of livestock and poultry manure and crop straw, and strengthening white (agricultural plastics) pollution control; (iii) *strengthening agricultural ecological protection and restoration* e.g., protecting and restoring farmland ecology, protecting and restoring agricultural ecosystems, and strengthening ecological protection in key river basins; (iv) *building green and low-carbon agricultural industry chains* e.g., promoting green agricultural value chains, industrial agglomeration, and circular economy; and promoting pollution-free, green, organic, and geographic indication (GI) agricultural products; (v) *improving the innovation system for green agricultural technology development* e.g., promoting innovations in green agricultural science and technologies, accelerating the adoption of green agricultural practices (GAP), and building green talents and skills; (vi) *improving the governance systems and mechanisms for enhancing green development of agriculture* e.g., improving the legal framework for green agricultural technology development and innovations, creating incentives and strengthening mechanisms for regulating agricultural inputs, and continuing with market reforms; and (vii) *planning and implementing green agricultural development* e.g., strengthening organizational leadership and carrying out performance evaluations.

47. **The rural infrastructure and public services pillar of the RRS plan phase 1 has six sub-programs.** These include: (i) *building an ecologically livable beautiful village* e.g., coordinating the management of landscapes and ecosystems, promoting rural ecological civilization, and building a clean living environment; (ii) *improving rural habitat environment*[35]

[32] Transition from the Poverty Reduction Program (PRP) to the RRP with the first phase of RRS plan (2018–2022) focusing on consolidating and sustaining extreme poverty alleviation gains and tackling pollution and greening the economy.

[33] Adopted by the National People's Congress on April 29, 2021.

[34] A joint notice of the Ministry of Agriculture and Rural Affairs, National Development and Reform Commission, Ministry of Science and Technology, Ministry of Natural Resources, Ministry of Ecology and Environment, and National Forestry and Grassland Administration (Nong Gui Fa [2021] No. 8) issued in August 2021.

[35] Further elaborated in the *14th FYP on Municipal Solid Waste Separation and Treatment Facilities Development (2021–2025).*

e.g., constructing rural solid waste (garbage) and wastewater (sewerage) treatment systems, improving rural domestic waste collection and disposal systems, promoting classification and resource reuse (recycling) of waste, and promoting the "toilet revolution"; (iii) *improving the appearance of the village* e.g., professionally planning the layout of villages, rehabilitating village buildings to preserve original cultural (traditional) architecture, constructing rural and household roads, renovating public space and courtyard environment, promoting rural greening, and enhancing village landscapes; (iv) *improving the rural water infrastructure network* e.g., building a network of rural water conservancy infrastructure for improving water saving, water supply, flood control, and disaster mitigation; improving rural drinking water quality and safety; and constructing, rehabilitating, and modernizing irrigation systems and drainage and pumping stations; (v) *strengthening rural transport infrastructure* e.g., constructing roads connecting rural areas to urban centers; upgrading rural transport logistic facilities; deepening reforms in long-term mechanisms for rural roads operations and maintenance; improving public transportation routes; and providing public transportation; and (vi) *building a modern energy system in rural areas* e.g., optimizing the energy supply structure; developing solar, biomass, water, and wind energy; improving rural energy infrastructure networks; accelerating the upgrading of new rural power grids; and promoting the extension of gas supply facilities to rural areas.

48. **The proposed GARR II will support two out of four pillars of the national RRS plan phase 1 (2018–2022).** These include Pillar 1 - Green agricultural development; and Pillar 3 - Rural infrastructure and public services. Under Pillar 1, the proposed GARR II will support six (out of seven) sub-programs, while under Pillar 3 it will support three (out of six) sub-programs. The proposed GARR II will support the National Rural Revitalization Administration (NRRA) as a central component and two provinces: Hubei and Hunan. The NRRA will be responsible for delivery of RA1.1 and (a) providing strategic direction to the provincial implementing agencies; (b) coordinating with central ministries on policy matters related to phased RRS implementation; (c) developing communication strategy and sharing knowledge and lessons-learned from the GARR II implementation; and (d) mainstreaming and upscaling nation-wide the approaches and methodologies developed in Hubei and Hunan.

49. **Hubei and Hunan will be responsible for delivery of results under RA1.2, RA2, RA3 and RA4.** In Hubei province, the proposed GARR II will support 10 demonstration counties/cities (out of 103 counties), including: Honghu, Chongyang, Xishui, Yangxin, Yunxi, Shishou, Suixian, Xiantao, Danjiangkou, and Xianfeng. Similarly, in Hunan province, the proposed GARR II will support 13 demonstration counties (out of 122 counties), including: Hengyang, Hengdong, Lixian, Linxiang, Yongding, Jiangyong, Taojiang, Cili, Suining, Taojiang, Yueyang, Huayuan, and Liling. These demonstration counties/cities were selected based on agreed criteria, including (a) geographic distribution (i.e., demonstration counties from different municipalities/cities); (b) large user of chemical fertilizer and pesticide (to maximize impacts of NPS pollution control, e.g., reducing CH_4, N_2O, and CO_2 emissions and TN and TP pollutants); (c) large producer of livestock and poultry, to maximize the impacts of better management of manure and other waste (dead animals and by-products), for example, reducing COD, BOD, and ammonia nitrogen; (d) large user of agricultural plastics, to help collect, treat, and recycle mulch film and fertilizer and pesticide packages; (e) lack of/inadequate solid waste management system (e.g., for collecting, sorting, and treating; and converting to organic fertilizer or biogas/energy generation); and (f) lack of/inadequate wastewater management system (e.g., for collecting, treating, and recycling water for irrigation and/or construction of wetlands).

E. Initial Environmental and Social Screening

50. **The government's Program investments to supported by the PforR are not expected to induce any long term or irreversible environmental or social impacts.** The Program outcomes are intended to reduce air, water, and land pollution; increase efficiency of natural resource use (especially land and water); and protect the environment and restore degraded landscapes and ecosystems in the participating provinces; and hence they have net positive impacts. Any

potential activity with significant adverse impacts will be excluded during the PforR preparation. Activities with potentially adverse environmental or social impacts are expected to be limited in scope and be site specific; and specific mitigation measures can be planned for and implemented.

51. **An Environmental and Social System Assessment (ESSA) will be prepared, consulted upon, and disclosed prior to the PforR appraisal mission.** The ESSA will examine the scope, context and potential impacts of the PforR from an environmental and social perspectives. It will entail the review of environmental and social management systems and the implementing capacities of the respective government agencies that will participate in the PforR; and evaluate their consistency with the core principles and attributes specified in the Bank Policy/Directive on Program for Results Financing. It will also include assessment of governments' systems addressing labor and working conditions, community health, access to land and income generation opportunities, cultural heritage, ethnic minorities, and citizen engagement during program design and preparation. Recommendations will be made to address issues that are identified. These will be included in the Program Appraisal Document (PAD). If necessary, PAPs will be included in the PAD to help address gaps identified in the government's system. Activities identified as high risk will be excluded from the PforR.

52. **The content of the ESSA will include, but not be limited to a brief description of:** (i) the PforR , including the development objectives, relationships between government's Program and the Bank-financed PforR; (ii) potential environmental and social risks, impacts and benefits; and including any potential issues related to land acquisition; (iii) assessment of the institutional arrangements and mechanisms for dealing with the potential environmental and social risks (E&S); (iv) gaps in the risks management systems and measures for enhancing the capacity of implementing entities; (v) inclusive consultation held with the key stakeholders; and (vi) inputs to the integrated risk assessment.

53. **During the PforR implementation, all investments will be screened to assess whether they have high E&S risks.** Such investments will be excluded from the GARR II, as stipulated in the Bank Policy/Directive on Program for Results Financing. In addition, during PforR implementation the task team will ensure that planned investments do not cause any significant adverse environmental or social impacts that are sensitive, long-term or irreversible; and that such impacts are site-specific, mostly reversible and can be effectively mitigated with locally and readily available resources. Based on the limited information available at the PCN stage and experience with similar project implementation, the following preliminary list of activities will be excluded from the PforR support: permanent-basic-farmland acquisition; large scale farmland acquisition; interventions that generate adverse impacts on ethnic minority and adverse livelihood impact arising from the restriction of access or transfer of user rights; large scale household relocation; and the closure of enterprises.

54. **The overall E&S risk is rated Substantial considering the diverse activities included in the GARR II.** The program will have significant and broadly positive E&S impacts in the selected areas of Hubei and Hunan. During preparation stage, a thorough E&S screening will be conducted on the proposed GARR II activities; and activities that could potentially cause significant adverse impacts on the environment and/or people will be excluded. The preliminary assessment shows that provincial governments have well-established systems for managing potential risks/impacts of the GARR II activities, which include: (i) temporary small-scale construction-related and site-specific risks/impacts, such as dust, wastewater, noise, solid waste, soil erosion, limited land acquisition or use, and occupational health and safety (OHS) concerns; and (ii) impacts on the local environment and ecosystem resulting from the operation/implementation of GARR II-supported facilities/activities, such as leakage of untreated effluents from rural WWTFs, odor emission from solid waste transfer and manure management facilities, agricultural plastics waste, NPS pollution from chemical fertilizer and pesticide, labor management issues, workers' health and safety, and impacts on farmers' livelihoods, among others. These potential adverse E&S impacts are deemed neither significant nor irreversible; and can be easily identified and readily avoided, minimized, or mitigated through known and demonstrated technologies and good management practices.

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