SECTOR ASSESSMENT (SUMMARY): AGRICULTURE, NATURAL RESOURCES, AND RURAL DEVELOPMENT

A. Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The Yangtze River is the third longest river in the world, flowing through the eastern, central, and western parts of the People’s Republic of China (PRC). The river basin covers more than 2 million square kilometers and accounts for one-fifth of the country geographically. The Yangtze River Economic Belt (YREB) includes nine provinces and two specially administered cities within the Yangtze River Basin; accounts for over 40% of the entire PRC population, and around 40% of the freshwater resources; serves as the drinking water resources for 400 million people; provides 60% of total fisheries production; has 20% of the total wetland area; and contributes about 45% of the country’s economic output. Given its geographic and demographic advantages, the Government of the PRC has earmarked the YREB as one of the three key growth regions to support future national economic development.

2. Although the YREB has delivered impressive economic development and growth since the 1990’s, industrialization and urbanization have caused significant negative impacts on environmental and ecological systems. In the YREB, urban areas have increased by about 39%; while farmland, forests, grasslands, lakes, and wetlands have markedly decreased. The traditional modes of economic development continue to cause degradation, raising concerns about environmental issues and poor management of water resources. The agriculture sector—through intensification of production systems driven by high volumes of inputs such as chemical fertilizers, pesticides, and irrigation water—has generated large volumes of waste materials and excessive discharge of pollutants, which in turn have contributed to soil and water contamination, and environmental degradation. The pressures will be exacerbated by (i) continued population growth and higher levels of per capita consumption requiring more food; (ii) degraded and polluted land and water resources limiting the production potential; (iii) increasing urbanization causing a decline in arable land resources; and (iv) climate change further challenging agricultural production. Greater emphasis is required for the transition to new mechanisms to sustain rural economic growth based on sustainable ecological and green-growth frameworks.

3. Current agricultural practices in the project areas are characterized by traditional smallholder agricultural systems on small plots of land, both on sloping and flat valley land. Major constraints include (i) soil condition being poor, with limited soil conservation and soil improvement techniques; (ii) slope protection not being widely practiced or adequately maintained; (iii) incorrect and excessive use of chemical fertilizers; (iv) slow uptake of improved crop and tree varieties; (v) inappropriate machinery and low levels of mechanization; (vi) poorly developed and fragmented value chains; and (vii) inadequate infrastructure such as limited and poorly developed road networks and irrigation and drainage facilities.

---

1 The YREB includes the nine provinces of Anhui, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan, and Zhejiang; and the two municipalities of Chongqing and Shanghai.
3 The project areas are in the provinces of Guizhou, Hubei, Hunan, Sichuan, and Yunnan; and Chongqing Municipality.
4. **Water resources.** The YREB has an abundance of water resources, with precipitation ranging from 700 to 2,000 millimeters per year, and the water use accounts for only 56% of the available water resources in the project areas. However, precipitation is unevenly distributed over area and time. The rainy season from April to September accounts for more than 75% of average annual precipitation, while the remaining period is relatively dry. This has a significant impact on crop production, requiring water conservation and irrigation during the dry season, and advanced drainage systems during the rainy season to remove excess water and avoid flooding. Water resources need to be managed efficiently, considering the seasonal variations, and require an adequate level of infrastructure.

5. **Land degradation.** Soils in the project areas are diverse but can be characterized as being strongly weathered, with low fertility, and low organic matter content. The inherent nature of these soils makes them easily erodible, and when coupled with poor land management practices and seasonal high-intensity rainfall, soil erosion becomes a main constraint. Soil erosion is estimated to affect about 32% of the total area of the Yangtze River Basin. Remedial long-term solutions include proper field design, irrigation and drainage canals to minimize erosion, and the application of organic matter and fertilizers to improve soil health.

6. **Cropping systems.** Current agricultural practices in the project areas are outdated, with (i) limited soil conservation and soil improvement techniques; (ii) lack of improved varieties; (iii) excessive use of chemical fertilizers and pesticides; (iv) inappropriate machinery and low levels of mechanization; and (v) inadequate agricultural extension services. Farmers and farmer associations do not have access to the necessary financial and technical resources to facilitate re-skilling for the adoption of modern agricultural farming systems. Introducing modern farming practices—which include improving soil health and condition, applying balanced fertilizer practices—inadequate agricultural extension services. Farmers and farmer associations do not have access to the necessary financial and technical resources to facilitate re-skilling for the adoption of modern agricultural farming systems. Introducing modern farming practices—which include improving soil health and condition, applying balanced fertilizer practices—which include improving soil health and condition, applying balanced fertilizer—nadequate agricultural extension services. Farmers and farmer associations do not have access to the necessary financial and technical resources to facilitate re-skilling for the adoption of modern agricultural farming systems. Introducing modern farming practices—which include improving soil health and condition, applying balanced fertilizer practices—which include improving soil health and condition, applying balanced fertilizer regimes, and adopting integrated pest management supported by adequate technical assistance—is necessary for upgrading to sustainable crop systems.

6. **Agricultural infrastructure.** In general, agricultural infrastructure is weak, and resilience to natural disasters is low. The farm roads in most of the cropping areas are natural dirt roads, and often too narrow and unsuited for motorized agricultural traffic. The rainy season often makes them inaccessible, constraining farm work. Irrigation infrastructure is generally old—mostly earthen channels and ditches—and is dilapidated by sedimentation, or in disrepair. Effective irrigation in the dry season and drainage in the wet season are lacking. Electrical and mechanical equipment such as pumps is dilapidated, energy-intensive, and of low efficiency. All of these combined cause a serious waste of water resources and discourage proper operation and maintenance. The sloping land, which is rainfed, does not have an irrigation system, but increasing dry periods call for on-farm water-saving and irrigation equipment.

6. **Nonpoint source pollution.** The agriculture sector has three main sources of nonpoint source pollution that contribute to the deterioration of the environment and water resources: the first one is agricultural runoff that primarily contains fertilizer residues from farmers’ fields because of the inefficient and often excessive fertilizer and pesticide use. Seasonal floods and landslides increase the runoff from agricultural lands, resulting in excessive levels of nutrients, pesticides, and soils entering connected water bodies. Periodically resuspended sediments and stream- and riverbank erosion in lake tributaries are a major secondary cause of nonpoint source pollution. The second source involves waste emissions from concentrated animal-raising operations. The number and size of livestock-raising production systems have increased

---

rapidly. However, these operations lack or have inadequate waste management systems in place to properly deal with livestock manure and wastewater, and instead dispose of it directly into water bodies. The third source of nonpoint source pollution is the direct discharge of untreated domestic wastewater from rural households. The lack of solid and wastewater treatment systems in rural villages leads to improper disposal practices, such as burning or direct disposal into water bodies. Appropriate waste management strategies and practices are required to reduce pollution.

7. **Environmental protection.** Vegetation coverage has also seriously declined. The establishment of ecological forests and farm forestry shelterbelts can have many benefits in that it (i) enhances environmental services, erosion control, soil nutrient cycling and soil fertility improvement, carbon sequestration, and improved biological diversity; (ii) provides fodder for livestock and valuable non-timber forest products; (iii) serves as cash crops for farmers; and (iv) control negative externalities such as climate change. Rehabilitation and reforestation of sloping lands, and inclusion of trees in the cropping landscape can enhance environmental protection.

8. **Institutional capacity.** The opportunities and institutional settings that would allow for cooperation across provinces to support the integrated management of water resources in the Yangtze River Basin are limited. An integrated approach would improve water quality and enhance the overall environmental conditions. Mechanisms for eco-compensation may also act as a financial incentive to promote better watershed management practices. The YREB corridor is in urgent need of cooperation mechanisms and supporting policies to apply integrated watershed and river basin management beyond administrative boundaries.

2. **Government’s Sector Strategy**

9. The government recognized the significant environmental and ecological challenges facing the PRC and made “ecological civilization” one of the most important policy areas in the Third Plenary Session of the 18th Central Committee of the Communist Party Congress. The PRC’s Thirteenth Five-Year Plan, 2016–2020 proposed green development as one of the five key development concepts, emphasizing (i) conservation and high-efficiency utilization of natural resources; (ii) strengthening of management efforts to improve environmental quality as the core purpose; and (iii) prioritization of ecological protection, and restoration and strengthening of water environmental management.

10. Following the State Council’s guidelines in April 2014 to promote sustainable natural resource use and protection, the National Development and Reform Commission prepared the YREB Development Plan, 2016–2030 to promote environmental protection, rehabilitation, and management of water resources to support the strengthening of green development; and to promote the green ecological corridor of the YREB. These joint guidelines of the National Development and Reform Commission and the Ministry of Environmental Protection further targeted the improvement of river water quality and restoration of ecological and aquatic health through improved land use, stronger source protection, and risk prevention and control measures across the YREB corridor.

---

5 Eco-compensation is a payment and incentive system that supports sustainable ecosystems; provides stable financing for conservation; and, when strategically designed, can alleviate livelihood issues for the rural poor.
11. The National Agricultural Sustainable Development Plan, 2015–2030 focused on tackling the major causes of degradation and pollution, and promoting sustainable land and resource use. The measures include (i) protecting the farmland, and upgrading or rehabilitating the irrigation infrastructure; and constructing on-farm infrastructure to strengthen agricultural production capacity; (ii) developing types of agriculture suited to local geographical conditions; (iii) updating and using high-level technology; and (iv) promoting water-saving techniques, use of eco-friendly fertilizers and pesticides, and other pollution-mitigating measures.

B. ADB Sector Experience and Assistance Program

12. The Asian Development Bank (ADB) has a diverse portfolio in agriculture, natural resources, and rural development. It has promoted environmental sustainability and climate resilience through projects supporting sustainable agricultural development; protection of biodiversity and ecosystems; integrated water resource management; irrigation, flood, and wetland management; and environmental protection. ADB’s assistance to the PRC’s agriculture sector has been effective in reducing poverty, decreasing income inequality and regional disparities, and promoting an environmentally sustainable and less carbon-intensive economy.

13. ADB will continue to assist the government in realizing its “ecological civilization” ambitions and identifying innovative interventions that demonstrate better climate resilience and environmental sustainability through more sustainable use and protection of natural resources, particularly in those areas where environmental degradation and climate change have the greatest impact on rural livelihoods. Support will be provided for integrated water resource management and sustainable land management, including strengthening of water security and governance, and pollution control; forestry management; and promoting environmental regulation and compliance as well as innovative eco-compensation mechanisms for environmental protection and pollution control. Interventions are aligned with ADB’s Operational Plan for Agriculture and Natural Resources: Promoting Sustainable Food Security in Asia and the Pacific in 2015–2020 by increasing productivity, and boosting the management and climate resilience of natural resources. ADB’s Environment Operational Directions, 2013–2020 promote (i) shifting to sustainable infrastructure, (ii) investing in natural capital, and (iii) strengthening environmental governance and management capacity. The interventions also support ADB’s Water Operational Plan, 2011–2020, which recognizes the increasing demand for water and its impacts on food production, resulting from rapid economic development, increasing urbanization, and population growth.

14. The proposed project builds on ADB’s experiences and is informed by international best practices in agriculture, environment, and ecosystem improvement. The project design supports (i) an integrated approach to farming systems that focus on efficient use of inputs, conservation of natural resources to improve crop production, and improvement of ecosystem health by reducing pollution; (ii) development for farmers, farmer organizations, and government agencies on new technologies, provision of extension services, and access to markets; and (iii) support to institutional cooperation along the Yangtze River for enhanced river health.

---

9 Released on 20 May 2015 by the ministries of agriculture, environmental protection, finance, land resources, science and technology, and water resources; the National Development and Reform Commission, and the State Forestry Administration.


PROBLEM TREE

YREB core problem:
Economic growth is not reaching its potential in the Yangtze River Economic Belt

Direct effects:

- Slow transformation for green development concepts
- Transportation and logistics connectivity not optimized
- Increasing pollution and pressure on natural resources
- Weak institutional coordination and strategic planning

Increasing environmental degradation of the Yangtze River Basin

Project core problem:
Unsustainable agricultural production systems in the Yangtze River

- Low production and income from agriculture
- Diminished water and soil quality
- Lacking strategic planning and coordination

Land degradation
Nonpoint source pollution

Causes:

Outdated and unsustainable farming practices
- Farmers have poor skills and technical knowledge
- Agricultural systems are labor-intensive and non-mechanized
- Lack of information on physical and chemical soil conditions
- Insufficient vegetative protection of sensitive slopes
- Older fruit tree crops are low-yielding varieties
- Effective on-farm irrigation equipment is unavailable
- Fields do not have an adequate drainage system
- Infrastructure is old, broken, or not in place
- Declining investment and interest in agricultural production systems

Inadequate environmental management
- Farmers use too much fertilizer and pesticides
- Significant increase in livestock numbers, concentrated in larger enterprises without adequate waste management and disposal facilities
- Plastic film used in cropping is not recycled, and often dumped
- Straw and other crop residues are burnt or dumped in waterways
- Soil erosion is prevalent due to lack of protection or poor management
- Policies for sustainable land use are not clearly defined
- Subsidies encourage use of fertilizer and pesticides
- Information on quality of organic and chemical fertilizers are missing

Ineffective and inadequate public environmental infrastructure and ecological systems
- Shortage of trained trainers and extension officers
- Scientific knowledge and laboratory facilities (soil and crop analysis) are not easily available to farmers
- Farmers' organizations and water-user associations have poor skills and low financial resources
- Linkages between enterprises, cooperatives, and farmers are not established
- Poor maintenance for existing infrastructure
- Priorities and policies for environmental protection and agricultural development do not match
- Poor cooperation between agencies for watershed management