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Report No: PAD3582

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF EURO 136.5 MILLION
(US\$150.0 MILLION EQUIVALENT)

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

HUBEI SMART AND SUSTAINABLE AGRICULTURE PROJECT

APRIL 30, 2020

Agriculture And Food Global Practice
East Asia And Pacific Region

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CURRENCY EQUIVALENTS

(Exchange Rate Effective {March 31, 2020})

Currency Unit =	CNY
CNY 7.10 =	US\$1
US\$ 1.36 =	SDR 1

FISCAL YEAR
January 1 - December 31

Regional Vice President: Victoria Kwakwa

Country Director: Martin Raiser

Regional Director: Benoit Bosquet

Practice Manager: Dina Umali-Deininger

Task Team Leader(s): William R. Sutton, Sitaramachandra Machiraju

ABBREVIATIONS AND ACRONYMS

3S	Smart, Sustainable, Safe
APA	Alternate Procurement Arrangements
ASF	African Swine Fever
BP	Bank Procedure
CA	Conservation Agriculture
CAT	Circular Agriculture Technologies
CCERs	China Certified Emissions Reductions
CERC	Contingent Emergency Response Component
CH ₄	Methane
COD	Chemical Oxygen Demand
CO ₂ e	Carbon Dioxide Equivalent
COVID-19	Coronavirus disease 2019
CPF	Country Partnership Framework
CPMO	County Project Management Offices
CQS	Consultant's Qualifications Based Selection
CSA	Climate Smart Agriculture
DARA	Department of Agriculture and Rural Affairs Department
DLI	Disbursement Linked Indicator
ECOP	Environmental Code of Practice
EHSGs	Environmental, Health, and Safety Guidelines
EIA	Environmental Impact Assessment
EIRR	Estimation of Economic Internal Rate of Return
EMP	Environmental Management Plan
ESMF	Environmental and Social Management Framework
ETS	Emissions Trading Scheme
EX-ACT	Ex-Ante Carbon-balance Tool
FAO	Food and Agriculture Organization
FI	Financial Intermediaries
FM	Financial Management
FMM	FM Manual
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEF	Global Environment Facility (GEF)
GEF FOLUR IP	The Food Systems, Land Use, and Restoration Impact Program
GEFSEC	Secretariat of the Global Environment Facility
GHGs	Greenhouse Gases
GRM	Grievance Redress Mechanisms
GRS	Grievance Redress Service
HACCP	Hazard Analysis and Critical Control Point
IBRD	International Bank for Reconstruction and Development (IBRD)
IDA	International Development Association
IFAD	International Fund for Agricultural Development

ILM	Integrated Landscape Management
IPF	Investment Project Financing
IPM	Integrated Pest Management
MARA	Ministry of Agriculture and Rural Affairs
M&E	Monitoring and Evaluation
MIS	Management Information System
MPA	Multiphase Programmatic Approach
MRV	Monitoring, Reporting and Verification
N ₂ O	Nitrous Oxide
NDCs	Nationally Determined Contributions
NDRC	National Development and Reform Commission
NH ₃ -N	Ammonia Nitrogen
OP	Operational Policy
PDO	Project Development Objective
PMP	Pest Management Plan
PMO	Project Management Offices
POM	Project Operations Manual
PPMO	Provincial Project Management Offices
PPSD	Project Procurement Strategy for Development
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SCD	Systematic Country Diagnostics
SDGs	Sustainable Development Goals
SIA	Social Impact Assessment
SOC	Soil Organic Carbon
SOP	Series of Projects
SORT	Systematic Operations Risk-Rating Tool
SSADP	Hubei Province Shiyan Smallholder Agribusiness Development Project
STEP	Systematic Tracking of Exchanges in Procurement
TFP	Total Factor Productivity
3S	Smart, Sustainable, Safe
TORs	Terms of References
UNFCCC	UN Framework Convention on Climate Change
WB	World Bank



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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
China	HUBEI SMART AND SUSTAINABLE AGRICULTURE PROJECT	
Project ID	Financing Instrument	Environmental Assessment Category
P168061	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

<input type="checkbox"/> Multiphase Programmatic Approach (MPA)	<input type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Fragile State(s)
<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input type="checkbox"/> Small State(s)
<input type="checkbox"/> Financial Intermediaries (FI)	<input type="checkbox"/> Fragile within a non-fragile Country
<input type="checkbox"/> Project-Based Guarantee	<input type="checkbox"/> Conflict
<input type="checkbox"/> Deferred Drawdown	<input type="checkbox"/> Responding to Natural or Man-made Disaster
<input type="checkbox"/> Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
21-May-2020	31-Dec-2025

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The PDO is to promote integrated environmentally sustainable and climate-smart agriculture, and agri-food quality and safety, in targeted value chains and landscapes in Hubei Province.

**Components**

Component Name	Cost (US\$, millions)
Agricultural Risk Assessment, Management, and Communications	34.10
Demonstration and Replication of Smart and Sustainable Agricultural Practices	264.35
Project and Knowledge Management	38.21

Organizations

Borrower:	People's Republic of China
Implementing Agency:	Hubei Provincial Department of Agriculture and Rural Affairs

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	351.97
Total Financing	345.69
of which IBRD/IDA	150.00
Financing Gap	6.28

DETAILS**World Bank Group Financing**

International Bank for Reconstruction and Development (IBRD)	150.00
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Non-World Bank Group Financing

Counterpart Funding	195.69
Borrower/Recipient	195.69

Expected Disbursements (in US\$, Millions)

WB Fiscal Year	2020	2021	2022	2023	2024	2025	2026
Annual	0.50	15.00	20.00	25.00	35.00	35.00	19.50



Cumulative	0.50	15.50	35.50	60.50	95.50	130.50	150.00
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INSTITUTIONAL DATA

Practice Area (Lead)

Agriculture and Food

Contributing Practice Areas

Climate Change and Disaster Screening

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

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category

Rating

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

COMPLIANCE

Policy

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

[] Yes [✓] No



Does the project require any waivers of Bank policies?

☐ Yes ☒ No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11		✓
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Institutional Arrangements (Section I.A.1 of the Schedule to the Project Agreement):

The Project Implementing Entity shall maintain, and cause to be maintained, the following entities with composition, powers, functions, staffing, facilities and other resources satisfactory to the Bank: (a) at the provincial level: (i) the Provincial Project Leading Group responsible for providing overall policy, financial, and institutional guidance on Project implementation and facilitating coordination among different implementing agencies within its jurisdiction; (ii) the Provincial Project Management Office responsible for overall implementation, coordination, reporting, management, and monitoring and evaluation of the activities under the Project, including the preparation of the consolidated Annual Work Plans, semi-annual progress and financial reports; and (iii) a technical expert group responsible for providing technical support to the Provincial Project Management Office to enhance quality in the design of Project activities and facilitate Project implementation; and (b) at the county level: (i) a Project leading group in each of the Project Counties, responsible for providing overall policy, financial and institutional guidance on Project implementation and facilitating coordination among different implementing agencies within its respective jurisdiction; (ii) a county Project management office in each of the Project Counties, responsible for implementation of the Project at the county level, and coordinating day-to-day activities with the Provincial Project Management Office and other agencies, monitoring Project implementation within the county concerned and preparing Project annual work plans and semi-annual progress and financial reports for submission to the Provincial Project Management Office for consolidation and onward submission to the Borrower and the Bank; (iii) a technical expert group in each Project Counties, responsible for providing technical support to the



respective Project management office to enhance quality in the design of Project activities and facilitate Project implementation at the county level; and (iv) any other implementation structures at the township or village level responsible for the implementation of activities under Parts 2.2 and 2.3 of the Project, as may be agreed from time to time with the Bank and set out in the Project Operations Manual.

Sections and Description

Annual Work Plans (Section I.B.1 of the Schedule to the Project Agreement)

The Project Implementing Entity shall: (a) prepare and furnish to the Bank by October 31 in each year, beginning in 2020, a draft Annual Work Plan for review and comment, summarizing the implementation progress of the Project for the said year and the Project activities to be undertaken in the following calendar year, including the proposed annual budget for the Project; (b) taking into account the Bank's comments, finalize and furnish to the Bank no later than December 31 in each year, beginning in 2020, the Annual Work Plan, satisfactory to the Bank; and (c) thereafter ensure the implementation of the Project during the following calendar year in accordance with the Annual Work Plan agreed with the Bank and in a manner satisfactory to the Bank. The Project Implementing Entity shall not amend, suspend, abrogate, or waive said Annual Work Plans or any provision thereof without the prior written agreement of the Bank.

Sections and Description

Project Operations Manual (Section I.B.2 of the Schedule to the Project Agreement)

The Project Implementing Entity, shall and shall cause the Project Counties to apply, the Project Operations Manual in a timely and efficient manner satisfactory to the Bank.

Sections and Description

Safeguards (Section I.C of the Schedule to the Project Agreement)

The Project Implementing Entity shall, and shall cause the Project Counties to:

- (1) (a) take all necessary actions to minimize to the extent possible any involuntary loss by persons of shelter, productive assets or access to productive assets or income or means of livelihood, temporarily or permanently, and the displacement of said people in the carrying out of the Project or any part thereof; (b) where the acquisition of land or assets or the displacement of people is unavoidable, before initiating the implementation of any works which would result in such acquisition or displacement, make available to such people compensation and, as applicable, relocate and rehabilitate the Displaced Persons in accordance with the RAPs and in a manner satisfactory to the Bank; and (c) whenever required in terms of the ESMF or the RPF, and prior to the commencement of any works, proceed to have an EMP or EMPs, and a RAP or RAPs, respectively: (i) prepared in form and substance satisfactory to the Bank; (ii) except as otherwise agreed with the Bank, submitted to the Bank for review and approval; (iii) thereafter, adopted and publicly disclosed; and (iv) thereafter, implemented, or cause to be implemented, in accordance with their terms and in a manner acceptable to the Bank.
- (2) implement the Safeguards Instruments in a manner and substance satisfactory to the Bank.
- (3) ensure that all studies and technical assistance to be supported under the Project are carried out under terms of reference satisfactory to the Bank, and that such terms of reference are consistent with, and pay due attention to, the Bank's Safeguards Policies.
- (4) maintain policies and procedures adequate to enable them to monitor and evaluate, in accordance with guidelines acceptable to the Bank, the implementation of the Safeguards Instruments.



(5) Take all measures necessary on their part to regularly collect, compile, and submit to the Bank, as part of the Project Reports, and promptly in a separate report whenever the circumstances warrant, information on the status of compliance with the Safeguards Instruments.

Sections and Description

Financing Arrangements (Section I.D of the Schedule to the Project Agreement)

The Project Implementing Entity shall make available the proceeds of the Loan to the Project Counties, under terms and conditions satisfactory to the Bank.

Sections and Description

Sub-projects (Section I.E of the Schedule to the Project Agreement)

1. For the purpose of carrying out certain activities under Part 2 of the Project, the Project Implementing Entity, through the Project Counties shall: (a) select and approve Eligible Beneficiaries in accordance with the eligibility criteria and the procedures set forth in the Project Operations Manual; (b) appraise, review, approve, and supervise the Sub-projects in accordance with the criteria, conditions and procedures set out in the Project Operations Manual; (d) except as otherwise agreed with the Bank, submit to the Bank for review and approval the proposed Sub-projects; and (e) make Matching grants to Eligible Beneficiaries in accordance with eligibility criteria and procedures acceptable to the Bank as set out in the Project Operations Manual, and shall only make the proceeds of the Matching Grants available to such Eligible Beneficiaries after the respective Project County has entered into an Implementation Agreement with the Eligible Beneficiaries on terms and conditions acceptable to the Bank.

2. The Project Implementing Entity, through the Project Counties, shall: (a) exercise its rights under each Implementation Agreement in such manner as to protect the interests of the Borrower, the Bank and the Project Implementing Entity and to accomplish the purposes of the Loan; and (b) maintain, throughout the period of implementation of the Project, a grievance redress mechanism acceptable to the Bank and set out in the Project Operations Manual, to address any complaints associated with the Matching Grants.

Sections and Description

Mid-term Review (Section II.2 of the Schedule to the Project Agreement)

The Project Implementing Entity shall prepare, under terms of reference satisfactory to the Bank, and furnish to the Bank no later than May 1, 2023, a consolidated mid-term review report for the Project, summarizing the results of the monitoring and evaluation activities carried out from the inception of the Project, and setting out the measures recommended to ensure the efficient completion of the Project and to further the objectives thereof.

Conditions





I. STRATEGIC CONTEXT

A. Country Context

- 1. The Chinese economy has been severely affected by the COVID-19 outbreak.** According to official statistics, GDP declined by 6.8 percent in the first quarter, reflecting the impact of the measures taken to bring the epidemic under control. Although reported new infections have sharply declined, including in Hubei province which was at the center of the original outbreak, the risk of secondary outbreaks remains high. Most enterprises have resumed production and shops and restaurants are gradually re-opening, although economic activity so far remains below capacity and a substantial decline in growth is expected for 2020. The proposed project was prepared prior to COVID-19. Because of its focus on supporting agricultural producers, who have been among the most affected by the temporary lockdown imposed on the province, the authorities have requested to proceed with the project to support the rural economy's recovery while at the same time accelerating the necessary process of shifting towards a smarter and more sustainable model of agricultural production.
- 2. China's agricultural sector has grown rapidly in recent decades, contributing to poverty reduction and food security.** Growth in agricultural output was first achieved through institutional and market reforms, such as the introduction of the Household Responsibility System and the subsequent lifting of food price and procurement regulations. Later, growth was achieved through agricultural intensification and technological progress. Agricultural production has grown by nearly 5% per year since the late 1970s, and total factor productivity growth has accounted for around half of this expansion. China's food security, as measured both by the aggregate availability of food and by the access of vulnerable individuals and households to food, has improved dramatically over the past 30 years. Food security problems at the level of households and individuals—the problem of subsistence and vulnerability—have been substantially reduced. Consumption patterns have diversified, and nutritional status has improved. Market integration has addressed the problem of regional food insecurity resulting from unequal spatial distribution of resources.
- 3. While past agriculture policies in China have been driven by the quest for grain self-sufficiency, future food systems will be shaped by urbanization and income growth.** China has already seen a rapid decline of its rural population since around 1995, due to massive rural–urban migration (about 200 million people). It is expected that China will reach an urbanization rate of 70 percent by 2030 up from 55 percent now. Urbanization will increase aggregate demand for food as changing dietary patterns and increased income levels of the urban population lead to increased demand for higher-value products, especially meat, dairy, horticulture products, and processed food. The consumption growth projections by the World Bank show that China will be consuming 14 percent more pork, 10 percent more milk, and 97 percent more high-value dairy products by 2030. On the other hand, China's increasingly affluent urban consumers are demanding safer, healthier, and greener food.
- 4. Meeting the challenge of changing consumption patterns could impose great strains on Chinese food production systems against the background of a legacy of pollution and increasing natural capital constraints.** China's already limited arable land and water resources are dwindling rapidly due to urbanization and are increasingly degraded due to industrial pollution. Moreover, the intensive use of natural resources and chemical inputs has increased environmental and ecological fragility, worsened land degradation, proliferated food safety risks, and increased the carbon footprint from agriculture. Today, China has one of the highest fertilizer application rates, with an average of 400 kg per hectare. Evidence shows that China's nitrogen fertilizer use in grain production exceeds the recommended amount by 20-60%, and the efficiency rate has been roughly 25%, compared to 50% for the rest of the world. Three quarters of the nitrogen nutrients run off into water sources or enter the air, with polluting effects. The current per



hectare use of pesticides in China is twice the world average. The release of animal manure and waste water from the intensive livestock sector has also created serious environmental stress, especially on water quality, while the intensification of animal rearing practices has exacerbated the risk of emerging infectious diseases (EIDs).

5. **China's agricultural practices and their negative environmental impacts have global implications, given the size of the country.** The extensive use of plastic micro-film to retain soil moisture and the practice of mulching the film into the soil during plowing is an important source of plastics pollution, an issue of growing global concern (see Box 1). Chinese agriculture is a major source of Chemical Oxygen Demand (COD) and ammonia nitrogen (NH₃-N), which pollute water bodies, drinking water supplies, and food, causing harm to human health and biodiversity. China also has among the world's highest rates of soil erosion. It is the world's biggest emitter of GHGs from agriculture, accounting for about 14% of the total global agricultural emissions. According to China's third National Communication to the UNFCCC in December 2018, the agriculture sector emits an estimated 828 million tons of CO₂ equivalent (CO₂e), contributing about 8% of the country's total emissions. The main sources of those emissions are agricultural soils (34%), enteric fermentation from livestock (26%), rice cultivation (22%), and livestock manure management (17%). Climate models estimate that agricultural emissions in China will rise to 1,350 million tons by 2050 without serious national mitigation efforts. Climate change also represents a significant risk to Chinese agriculture, with the potential to reduce yields, raise pest and disease pressures, make crops more vulnerable to mycotoxins, and reduce the nutrient value of food.

Box 1: Opportunities for addressing marine plastics pollution through improved management of agriculture plastics

China is the world's largest producer, consumer, importer, and exporter of plastics. It is estimated that 17.2 million tons per year of China's plastic waste is mismanaged, leading to 1.32–3.53 million tons of plastic marine debris a year. The Yangtze River (of which Hubei is one of the provinces in its basin) is reported to contribute 1.5 million tons of plastic waste deposited into the ocean. The estimated economic loss on account of marine plastic waste is more than US\$500 million annually to China's marine fisheries sector alone. China has about 20 million ha of agricultural land under plastic mulch using nearly 1.2 million tons of plastic film, the largest in the world. Plastic mulching has played a key role in increasing the grain yields by 20–35% and cash crop yields by 20–60% contributing to improved dryland agricultural production and crop water use efficiency. However, it has also been found to contribute to reduced soil fertility and soil pollution from film residues. Moreover, film residues over time flow into the rivers, contributing significantly to marine microplastics pollution. Possible technical solutions include recycling plastic film, or using biodegradable cover, which impose additional costs and hence require regulatory and potentially financial incentives to increase adoption rates.

The Ministry of Ecology and Environment and the National Development and Reform Commission (NDRC) recently laid out a plan to ban most single-use plastics by 2025 through (i) strengthening source governance along the plastic value chain (including agriculture plastic such as plastic mulch) through standards, regulations, and supervision of the use of single-use plastics, (ii) technology and business model innovations for promoting bio-degradable and environment-friendly substitute products and viable solutions for reduce-reuse-recycle of plastics in an organized and accountable manner, (iii) enhancing stakeholder participation and engaging local governments, enterprises, industry associations, and the public. The Chinese Academy of Agricultural Science (CAAS) is exploring the use of biodegradable films for mulching as an alternative to polyethylene films and piloted their use in potato and tobacco crops in Hubei province showing positive results saving a consumption of nearly 2,100 tons of plastic mulch film. Similarly, private initiatives are also underway to develop business models for retrieving plastic mulch from the farmlands and getting them recycled.

6. **Cognizant of these challenges, the government of China is undertaking several agri-food policy reforms to make the sector more ecologically friendly, environmentally sustainable, and climate-smart.** The 2014 No. 1 Document¹

¹ The No. 1 Document refers to the annual setting of priorities for Agriculture. Since the early 1980s, it has traditionally numbered first to reflect the importance of agriculture to China's reform efforts.



proposed establishing a long-term framework of sustainable agricultural development. The framework included developing eco-friendly agriculture through implementation of pilot projects. In 2015, the State Council authorized the Ministry of Agriculture and Rural Affairs (MARA) and other government agencies to issue the Agricultural Sustainable Development Plan (2015-2030), which sets the goals and paths of sustainable agricultural development. In the same year, MARA issued the Action Plan for Zero Growth of Chemical Fertilizer Use and the Action Plan for Zero Growth of Pesticide Use, which were the first efforts to seriously curb the overuse of chemical fertilizers and pesticides in China. Subsequently MARA issued the 2017 Notice of Five Actions for Green Development of Agriculture; these include improving management of livestock manure, replacing chemical fertilizers with organic fertilizers, encouraging straw treatment, recycling agricultural plastic, and aquatic biodiversity protection.

7. The potential of climate-smart agriculture (CSA) to reduce emissions, improve soil productivity, promote adaptation, and improve the resilience of the agriculture sector to growing climate change risk has been acknowledged at national and provincial levels. Recognizing the importance of market mechanisms to address climate change risks, in 2011 China's National Development and Reform Commission (NDRC) initiated a carbon emissions trading pilot that identified seven regional emissions trading pilots. It also issued the Interim Measures for the Management of Voluntary GHG Emission Reduction Transactions that allowed for the issuance of domestically produced offsets known as China Certified Emission Reductions (CCER) to be accepted as offset credits. The regional emissions trading scheme (ETS) pilots, which began in 2014-15 and which also included Hubei Province, helped to generate early experience in addressing GHG emissions through a market mechanism supported by regulation. Based on these experiences, the Chinese government recommended the establishment of a national carbon market to scale up climate mitigation actions, and prioritized development of a national ETS, with an expectation to operationalize it post-2020.

8. Despite the above policy commitments, in practice, progress towards a smart and sustainable agricultural sector has remained limited and serious concerns over food quality and safety persist. Key constraints include: (i) the fragmentation of agricultural production, with multiple small-scale units, often farmed by elderly or part-time farmers²; (ii) the limited access to green financing tools for agriculture, which puts green farming at a disadvantage relative to traditional commercial farming; (iii) the bias in public support to the agricultural sector which remains mostly input based and fails to incentivize a shift towards improved agricultural practices; and (iv) the lack of coordination of policies across government agencies responsible for agricultural environmental sustainability, food quality and safety, and food security, which means that synergies in the application of technologies and practices remain insufficiently exploited. For instance, reduced chemical applications in food production can improve food quality and safety, reduce water pollution, improve soil structure and cut green-house gas emissions. There is therefore an urgent need to overcome information, financing and coordination constraints to demonstrate the viability of a new smart, sustainable and safer (3S) farming concept in China and thereby accelerate the necessary transition in the sector in line with China's policy goals and international commitments.

B. Sectoral and Institutional Context

9. Hubei Province is a key agricultural producer. Located in the middle branch of the Yangtze River, with the fertile Yangtze-Han River Plain, Hubei is one of China's leading agricultural producers. Hubei is in the subtropical region where the monsoon prevails. Apart from the mountainous area, Hubei is characterized with wet climate, long periods free of

² Older or absentee farmers opt to apply large amounts of fertilizers all at once instead of distributing smaller amounts over the entire crop cycle due to a lack of labor; such farmers also tend to overuse pesticides, or use banned and highly toxic substances, raising the level of hazards in the food supply; and have inadequate financial incentive to adopt new and more sustainable technologies and management practices.



frost, and rich precipitation. Agriculture (including cropping, forestry, animal husbandry and fisheries) accounts for a fifth of of the total provincial GDP and provides livelihoods or employment for some 15% of the province's population. Hubei is home to 59 million people, covering a total land area of 185,900 km². According to the latest available information at the provincial level, for 2018, the incidence of poverty in Hubei was 2.4 percent, higher than the national average (1.7 percent), and the number of people below the official poverty line was 0.9 million. This represents 5 percent of the total poor in China. The annual per capita expenditure (income) was 19,538 yuan (25,815 yuan) in 2018, which is slightly lower than the national average. However, Hubei's rural economy is considerably poorer. Among Hubei's 38 rural counties, 26 were classified as poor in 2018. In late 2019, Hubei's capital city Wuhan became the epicenter of the COVID-19 outbreak, which has since developed into a global pandemic. The province is expected to suffer a deep negative economic shock as a result, including its farmers who have lacked access to critical inputs and have been cut off from markets (see Box 2).

Box 2: Hubei Province has been the epicenter of the new Coronavirus epidemic (COVID-19)

On December 30, 2019, a cluster of cases of pneumonia of unknown origin in Wuhan, Hubei Province was reported to the China National Health Commission. The disease was first diagnosed in people exposed to the Huanan Seafood market, which was also selling live terrestrial animals, including wildlife, and their products (such markets are sometimes referred to as "wet markets"), suggesting animal-to-person contagion. Over time, a growing number of patients, who reportedly did not have exposure to wet markets, also tested positive for the disease, indicating person-to-person spread. The new coronavirus, or COVID-19 as it is now officially called, is one of many Emerging Infectious Diseases (EIDs) originating in animals and transmitted to humans.

Hubei Province has been the epicenter of COVID-19 in China. While health officials were alerted to the risks of human-to-human transmission of the virus in early January, provincial authorities delayed action until several hundred people had tested positive and around 30 fatalities had been reported (the underlying rate of infection was probably far higher). As of April 27, 2020, Hubei had 68,128 confirmed infections and 4,512 deaths caused by the virus. After a sustained lockdown in Wuhan since January 23, 2020 and large parts of Hubei under quarantine, the province gradually opened up again since the beginning of April. On April 18, 2020 all cities in Hubei, including Wuhan, were classified as low-risk areas. The delay in taking action and the lack of transparency at the start of the epidemic have led to the replacement of Hubei Province's leadership. The COVID-19 outbreak has resulted in significant economic losses for the province. It also resulted in disruptions of agri-food systems which could adversely affect consumer trust.

This project was prepared before the outbreak, and addressing the complex set of human health, animal health, and environmental challenges related to COVID-19 is beyond its scope. However, the project supports rural producers to adopt safer agricultural practices in key value chains, thereby reducing associated health risks. Moreover, the project responds to the economic impact of COVID-19 by providing grant resources to rural producers in the province most affected by the outbreak in China, supporting their recovery while directing investments towards sustainable, safe and smart practices.

10. Hubei's agriculture has a significant environmental footprint in the province as well as in the country. With over 650 large scale pig farms with more than 10,000 pigs each—ranking first in the country—Hubei contributes a sizable share to the nation's emissions. In 2015, the Chemical Oxygen Demand (COD) from agriculture sources in Hubei was 448,100 tons and that of ammonia nitrogen was 43,800 tons. Hubei's average fertilizer application rate of 400 kg per hectare is 74 kg more than the national average and third ranked in the country. Over the past three decades, the total amount of fertilizers applied in Hubei has increased by 55%. Due to the overuse of fertilizer, nearly 30 million mu of soil is acidified. A review of soil sample surveys found that 20-30% of Hubei's agricultural land is contaminated with heavy metals, ranking near the top of provinces with the highest such incidence. While industrial pollution is a leading source of heavy metal contamination of soil and water, the overuse of pesticides is also a contributor. An estimated one million square kilometers of farmland have experienced soil contamination, including excessive levels of heavy metals, due to



pesticide overuse. Heavy use of pesticides has been especially common in rice, vegetable, and tea production. The province's straw production totaled 38 million tons, but more than 20% was wasted. For livestock manure, the utilization rate is less than 50%. Together, these represent important opportunities for circular agriculture that have not been realized. By some estimates, the Yangtze River, which flows through Hubei (see Map 1, Annex 2), is one of the biggest carriers of plastic pollution to the ocean in the world. Food packaging and plastic mulch from agriculture are important sources of this pollution. The high levels of agricultural and rural environmental pollution in Hubei have directly affected the quality and safety of agri-food products.

11. Climate change is projected to have significant medium- to long-term adverse effects on the agriculture sector in Hubei. Based on the statistics of 71 meteorological stations, Hubei's annual average temperature has been steadily increasing since 1961. Moreover, extreme weather events like heavy precipitation have been increasing in terms of both the frequency and the intensity. Drought events have also been spreading from the north of Hubei to the east and south. The potential impacts of climate change include damage to crops and livestock; accelerated decomposition of organic elements in the soil; increased areas affected by crop pests and diseases; and increased risk of livestock epidemics, all contributing to reduced crop and livestock production.

12. China has been repeatedly affected by infectious disease outbreaks, often of zoonotic origin. In the past two decades, China has witnessed the emergence of SARS, HPAI (H5N1 and H7N9), the current COVID-19 outbreak, re-emergence of Schistosomiasis in southern provinces and Brucellosis in northern provinces. China has also been adversely affected by African Swine Fever (ASF) since it was first detected there in 2018. It is estimated that the virus, which is harmless to humans but deadly to pigs, has wiped out more than one third of the country's pig population. The high risk of emerging infectious diseases in China results from the combination of high population density, intensive animal husbandry, high levels of biodiversity, and inadequate integrated disease surveillance and control systems, in particular at the intersection of animal and human health. Improved animal husbandry practices can make an important contribution to reducing the risk of emerging infectious diseases resulting from weaknesses in the rearing, handling and trading of animals and meat.

13. Gender Impacts of Agriculture: Gender gaps are prevalent in the agriculture sector that employs about 40% of the country's women, compared to less than 30% of men. Women generally outnumber men in workplaces where exposure to toxic chemicals is most common—intensive agricultural production systems, such as pig farming and agro-processing industries. More women are thus exposed to environmental hazards and emissions from the agriculture sector. Women farmers are also often the least likely to be aware of the environmental dangers in their workplace. Studies also show that gender is the single most important determining factor for income disparities in China. On average, Chinese women earn just 64% of their male counterparts.³ This gender gap in income earnings is even wider in the central part of the country, which includes Hubei, and for those in rural areas, where men earn nearly twice that of women.

14. Improved food quality and safety can have disproportionately positive impacts on women. Women often carry significant responsibility for buying, processing, and preparing food. If food or markets are contaminated, it increases women's exposure to food-related diseases and pollutants compared to men. This can have consequences for women's health. Anemia during pregnancy is a major public health issue in China. In the absence of high-quality and safe high protein/iron foods, pregnant women from all income categories still tend to rely more on safer but less nutritious staple foods. Food quality and safety risks (such as food-borne diseases) also reduce women's labor productivity, thereby worsening income gaps. Women are also generally the principal decision-makers in the dietary choices of household

³ Inequality of Opportunity in China's Labor Earnings: The Gender Dimension, *China & World Economy*, 2019



members. This makes them both victims of and responsible for food quality and safety incidents. When food quality and safety are improved, women and their families both tend to benefit.

15. **Hubei has ambitious goals for agricultural development.** As articulated in provincial development plans, including the Hubei 2018-2020 Specialty Agricultural Produce Development Plan, Hubei Province aspires to take advantage of an unmet national demand for high-quality food products from an increasingly urbanizing consumer base. In 2015, Hubei promoted the application of soil testing and formula fertilization for an area of 6.6 million hectares. The province aims to become a national leader in agricultural sustainability and climate change mitigation and adaptation. According to national government GHG emission reduction plans, by 2020 the CO₂ emissions per unit of national GDP should be decreased by 18% compared to that of 2015, while the goal for Hubei province is an even more ambitious 19.5% reduction.

16. **Hubei Province established a regional ETS pilot in April 2014.** It was designed to address industrial emissions from power generation, cement, chemicals, metallurgy, manufacturing, and food and beverage industries, and enabled trading of emissions allowances. The allowances were traded in a range of CNY 10 to 30/ton CO₂e with an average price of CNY 22/ton CO₂e. The Hubei ETS allows companies in the covered industries to use voluntary offset projects that are verified as China Certified Emissions Reductions (CCERs) to cover up to 10% of their targets. In the pilot phase, CCER projects from renewable energy and forest carbon sinks were allowed. However, offsets from agriculture were not allowed. As the ETS is scaled up, establishing the preconditions for the inclusion of climate-smart agriculture investments as a candidate for offsets would create powerful incentives to the private sector.

17. **Hubei needs to improve policy coordination across agencies, overcome information and financing constraints at the producer level, and improve the capacity of the provincial and county governments to collect and assess information so that public interventions can be better targeted to address the main risks and support the move to a 3S production system.** There are important institutional constraints on Hubei's ability to implement the new agenda. This is not primarily a matter of resources, as public support to agriculture is high. Hubei's total ag-sector transfer payments were approximately RMB15.5 billion (US\$2.2 billion) in 2018, covering a plethora of programs. But currently, the lack of knowledge and monitoring capacity, and poorly designed subsidy schemes, create perverse incentives along agri-food value chains, leading to contaminated food, environmental degradation, and high greenhouse gas emissions, and delaying the necessary transition to a 3S agri-food system.

18. **The proposed project is targeted at the main constraints limiting the effectiveness of the current policy framework.** At the provincial level it will enhance capacity to assess and monitor the quality and safety of agri-food products and environmental risks; it will establish provincial level green and sustainable agriculture standards to help mainstream climate smart and green agricultural practices; it will create the institutional basis for including agricultural offsets in the provincial emissions trading system; and it will pilot new approaches to providing agricultural support that can feed into policy changes. In project counties and at the producer level it will provide financial incentives to pilot and scale up 3S interventions and monitor impacts so that demonstration projects can be replicated throughout the province and the remainder of the country.

C. Relevance to Higher Level Objectives

19. **The proposed project is fully aligned with the WBG Country Partnership Framework (CPF) for China (FY2020–2025) (Report No. 117875-CN), which was discussed by the WBG Board of Executive Directors on December 5, 2019.** The proposed project falls under engagement area two of the CPF to promote greener growth and responds in particular



to CPF Objective 2.3 to demonstrate sustainable agriculture practices and improving food system quality and safety. The project is in line with several of the CPF's selectivity criteria, namely strengthening policies and institutions, addressing regional and global public goods, and strategic piloting of approaches that address development priorities (see Box 3).

Box 3: Alignment of the Hubei Smart and Sustainable Agriculture Project with the selectivity criteria of the China CPF (FY20-25)

- (a) **Promote the development of institutions for sustainable and climate-smart agriculture.** The project will develop institutional capacity, both in public and private sectors, to identify and manage sustainable agriculture investments. Such institutional capacity building would include:
- Enhancing the capacity of provincial authorities for agricultural risk mapping, management, and communications to complement the investments in agriculture product quality and safety inspection equipment and facilities;
 - Establishing provincial level standards and protocols, including for mainstreaming climate-smart agriculture and Hubei 3S good agricultural practices for multiple commodities;
 - Developing technical protocols and capacity to implement offsets, and the inclusion of Hubei agriculture as an offset investment option under China's Emissions Trading Scheme (ETS); and
 - Development of monitoring and evaluation capacity for agricultural support mechanisms, including development of methodologies and a system for monitoring GHG emissions from agriculture, allowing new tools to be scaled up.
- (b) **Deliver regional and global public goods.** Globally, agriculture is the biggest source of anthropogenic non-CO₂ emissions, being responsible for around 40% of total methane (CH₄) emissions, 60% of nitrous oxide (N₂O) emissions and around 10-12% of total anthropogenic GHG emissions. China is the world's biggest emitter from agriculture, accounting for 14% of global agricultural GHG emissions. Two of the biggest sources are livestock waste and synthetic fertilizers. Those are also two of the biggest sources of nutrient water pollution in China, which adversely affects international water bodies in the region. The proposed project will address these issues by financing efforts to improve livestock waste management, improve nutrient management, reduce the over-use of synthetic fertilizers, and improve water management in rice production, thereby mitigating GHG emissions. On the adaptation front, the project will strengthen overall resilience, with a focus on soil and water resources management, and disaster reduction and management. Together, these efforts will generate high climate co-benefits (it is expected that about half of project investments will contribute to climate co-benefits) and contribute to the achievement of China's agriculture-related Nationally Determined Commitments (NDCs). In addition, the project will pilot approaches to reduce the use of plastic mulch in agriculture which will contribute to reduced marine plastics pollution. Given the substantial global environmental public goods to be generated under the project, it is also proposed to receive a grant from the Global Environment Facility (see details below).
- (c) **Strategic piloting of approaches that address development priorities, especially in areas relevant to other developing countries.** The 3S approach developed for this project is something new for both China and other countries, being the first project to combine innovative interventions on quality and safety of production and sustainable and climate smart agriculture in an integrated way. The project will provide incentives for the application of innovative institutional and technical solutions to emerging challenges that can provide lessons for other provinces in China and for other developing countries. The project will support the dissemination of experiences in structuring, executing and financing 3S agriculture practices and investments through project activities under Component 3, which is designed to regularly convene leaders and public and private stakeholders to exchange knowledge and lessons learned on the 3S approach to development of the agri-food system.

20. The proposed project also contributes to the government's strategic objective to promote green development in agriculture by directly financing demonstration and scaling-up of 3S investments, and by promoting institutional innovations and capacity building to scale up project results province and nationwide. It contributes to enhanced



economic opportunities in rural areas, addressing environmental pollution and climate change under the CPF pillar of promoting more inclusive development.

21. **Climate change.** The proposed project will bring about significant climate change co-benefits. Today China is the world's biggest GHG emitter from agriculture, accounting for 14% of global agricultural GHG emissions. With above 10% of China's GHG emissions, agriculture is the third largest source of GHG emissions after energy and industry. The proposed project will address the impacts of climate change through both mitigation and adaptation measures in Hubei province. On the mitigation front, the proposed project will contribute to improved livestock waste management, improved nutrient management, reduced the over-use of synthetic fertilizers and increased use of slow release fertilizers, and improved water management in rice production (for instance, alternate wetting and drying paddy production), among others. Moreover, the project will strengthen overall resilience, with a focus on soil and water resources management, disaster reduction and management, integrated pest management (IPM), soil nutrients management, deep tillage and no tillage technologies, thereby contributing to climate change adaptation. Climate change will likely pose important challenges to agriculture in Hubei and China in general. The project therefore finances several activities that are expected to generate large climate co-benefits that are preliminarily assessed at 43% (the final assessment is expected to be higher).

22. **Gender.** The project is expected to contribute to narrowing gender gaps in agriculture by: (i) enhancing women's skills and awareness of environmental, climate, and food quality and safety risks with trainings and capacity building activities; (ii) enhancing investment opportunities for cooperatives and enterprises that are women-owned or women-led; and (iii) creating employment opportunities for women in agriculture and livestock production and along the food value chain.

23. In addition, the public investments in this project are expected to have a catalyzing impact and mobilize private investments into smart and sustainable agricultural technologies and practices. Private cooperatives and enterprises have committed to providing substantial self-financing under Component 2, which is expected to total USD 124 million. The project will also create incentives to encourage private CSA investments in agriculture by promoting agriculture's inclusion as an offset option under the China ETS.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

The PDO is to promote integrated environmentally sustainable and climate-smart agriculture, and agri-food quality and safety, in targeted value chains and landscapes in Hubei Province.

PDO Level Indicators

24. The key PDO-level results indicators include the following:
- Sustainability and Resilience: Area under 3S Good Agricultural Practices (GAP) (area of landscapes under improved practices) (hectares);
 - Climate Smart Agriculture: Greenhouse gas (GHG) emissions from agriculture mitigated (metric tons of CO₂ equivalent);



- c. Food Quality and Safety: Reduced pesticide and veterinary drug residue levels in the select value chains (percent).

B. Project Components

25. The project design is organized around three distinct elements: (i) the systems for defining, detecting, and monitoring agro-environmental hazards and food quality and safety risks; (ii) demonstration and scaling up of applications of improved farming practices and other investments which impact product quality, environmental sustainability, and climate-smartness in selected value chains; and (iii) effective project monitoring, oversight, and knowledge management. Accordingly, the project will have three components to support activities and investments contributing to the above PDO. Component 1 will primarily support provincial-level institutional, capacity, standards, and incentives development for promoting and monitoring 3S practices in the Hubei agri-food system. Component 2 will support the demonstration of key 3S practices at the level of select farms and processors in the targeted value chains and landscapes of four Hubei counties, and the scaling-up of those practices more broadly through demonstration activities. It will also strengthen farmer cooperatives to allow members to fully benefit from project-supported investments. Component 3 will ensure that there is adequate capacity at the level of the provincial and county PMOs to implement the project, and will also promote sharing of the knowledge generated by the project beyond the project counties, beyond Hubei, and even beyond China. Detailed descriptions of the components follow.

Component 1: Agricultural Risk Assessment, Management, and Communications (IBRD: USD 11.1 million; GEF: USD 1.9 million)

26. This component centers on the development of environmentally sustainable, climate-smart, and safe production and processing standards that contribute to improved food quality, the establishment of integrated landscape management (ILM) mechanisms, the strengthening of the evidence base for improved environmental, climatic, and food safety risk management, the strengthening of institutional capacity for developing and effectively utilizing this evidence base, the promotion of market-oriented incentive mechanisms, and the development of an improved dialogue with consumers regarding food quality and safety hazards and risks. The component will be implemented at the provincial level and will support public goods and services that make the most sense at the provincial—rather than the county—level, including investments in environmental public goods that have broader benefits.

27. *Sub-component 1.1: Risk Assessment (IBRD: USD 5.1 million; GEF: USD 0.7 million).* The project will strengthen Hubei's agriculture and food risk assessment system by systematically defining the 3S risks, remodeling the risk assessment framework and procedures and protocols, and upgrading institutional capacities. The project will finance:

- (i) **agro-environmental risk assessments:** spatial mapping of Hubei's agricultural soils and water resources for the incidence and severity of heavy metals and plastics pollution; mapping of agricultural pollutions, including both non-point pollution from cropping and point source pollution from livestock sector; mapping of existing soil, water, and agro-biodiversity resources, and assessment of resource degradation risks; improving agro-environmental detection and early warning systems for climate hazards, crop disease and pest surveillance, while leveraging remote sensing and high-resolution real-time weather data surveillance.
- (ii) **climate risk assessments:** conducting studies to assess current and future climate change impacts on major agricultural value chains, such as paddy rice and pig/pork; assessment of meteorological early warning and mitigation systems; the establishment of baseline data and the development of methodologies for monitoring agricultural carbon sinks and GHG emissions and removals; and the development of capacity to



model climate change impacts on local agriculture and improve agro-environmental early warning systems. The specific investments include, systems for data capture; development and application of methodologies to estimate GHG emissions and removals, and to manage GHG emissions and removals in agricultural value chains; and technical assistance and trainings to implement GHG measurement and monitoring in different agricultural value chains.

- (iii) **food quality and safety risk assessments:** definition of the main 3S risks affecting the Hubei agri-food system in an integrated fashion across the three main elements; regular and periodic assessment of quality and safety risks in selected agri-food value chains, including risks of heavy metal contamination and pesticide and veterinary drug residues; assessment of quality and food safety risk surveillance techniques and procedures, including highly contagious animal disease surveillance such as Avian Influenza and ASF; upgrading laboratory capacity and accreditation of laboratories and redefining investigative capacity with a greater hierarchy of laboratory capabilities (reference labs, regional labs and town level surveillance stations); and assessment of risk monitoring and evaluation systems. These assessments will lay a foundation for setting up of Hubei specific quality and safety standards, remodeling the risk assessment framework and strengthening institutional capacities. Project financed infrastructure for product quality and food safety, including all the laboratories, will be designed to be climate resilient and with energy efficiency considerations.

28. *Sub-component 1.2: Risk Management (IBRD: USD 6.0 million; GEF: USD 1.2 million).* The project will support

- (i) **standards development:** development of a tailor-made set of Hubei provincial 3S good agricultural practice (GAP) standards, policies, protocols and capacity building to mainstream agri-food quality and safety, and sustainable and climate-smart agriculture for key value chains.⁴ This could include the financing of applied research where Hubei-specific information is currently lacking. In so doing, the project will harmonize local standards with global standards such as GLOBALG.A.P./HACCP/Codex, including pesticide safety interval period, hazard residue limit and risk sampling protocols. Through the project's demonstration and knowledge management activities, it will also promote the adoption of these standards across the province.
- (ii) **big-data analytics and provincial traceability platform:** develop integrated IT platforms with big-data capabilities, including business intelligence, analytics, and data visualization, and build reporting tools to facilitate reporting for official purposes and to inform consumers. It will be used by farmers to share information on production risks, including pests, crop and animal diseases, and environmental and climate threats. It will also create provincial/county traceability platforms linking up with enterprise/production base level food quality and safety traceability systems along the value chain. Project investments in the big data center and all traceability platforms will ensure climate resilient design and energy efficiency improvements, which will enhance climatic risk adaptation and mitigation.
- (iii) **institutional systems:** development of provincial level land-use collaboration mechanisms; incremental investments and capacity building to improve ecological services, such as establishing mechanisms to provide payments for ecological services, strengthening institutions and policies to support the greening of agriculture, implementing, agricultural landscape planning and the development of actionable plans and policies to improve agricultural landscapes, agricultural biodiversity and land restoration, reduce pollution

⁴ The abbreviation GAP is commonly used in agriculture to denote standards of good agricultural practices. Regional examples include EUREPGAP and ASEAN GAP.



from fertilizers, pesticides, livestock waste, and plastics, and promote climate change mitigation and adaptation; establishment of monitoring systems and organization of institutional arrangements to assess the implementation of mitigation actions targeting GHG emissions and land degradation; agricultural quality standards, monitoring and inspection; and regulatory systems. The ILM mechanism, for instance, is expected to reduce land degradation and increase carbon sequestration through restoration of degraded lands with agro-forestry (including citrus and tea plantations); and

- (iv) **incentives:** in relation to the carbon offset protocol and carbon market mechanism for major agricultural value chains, the project proposes to operationalize the *Action Plan for Establishment of Market Based and Ecological Conservation Compensation Mechanisms* communicated by the central government to provincial governments in January 2019 to promote voluntary carbon offsets to harness ecological and economic benefits, attract private sector investment, and enable markets to play a catalytic role in climate change mitigation and ecological conservation. In this context, the project will assist the Hubei provincial government to (a) develop a policy and institutional framework in support of agricultural carbon offsets eligible for trade in the post-2020 emission trading scheme, including by establishing protocols for monitoring, reporting and verification (MRV) of GHG emissions and removals in agriculture, with a focus on major value chains; and to (b) design systems and develop the capacity to generate carbon offsets eligible for emissions trading at provincial and national levels, and promote a market mechanism for agricultural carbon offsets involving public and private stakeholders through technical support and training. In addition, the project will also pilot mechanisms to support payment for ecological services with the support of the GEF grant in the context of agricultural landscape planning and improving agro-forestry biodiversity.

29. *Sub-component 1.3: Risk Communications (GEF: USD 0.1 million).* This sub-component aims to increase public confidence in the quality and safety of agri-food products through establishment of a Public Participation in Risk Communications and Science Popularization program. Interventions would support communication capacity building of stakeholders across the value chain, and strengthen opportunities for them to raise concerns. The sub-component will also support improved public communications on agricultural landscape planning, agro-biodiversity, ecological protection, plastic pollution in the agri-food system, and CSA, including effective communications of early warning information and responses for climate hazards to farmers. Communications and knowledge products targeting agricultural extension staff and farmers of Hubei province will be prepared and disseminated to enhance awareness of 3S GAP in promoting climate change mitigation and adaptation through agricultural value chains, and of the role of the market mechanism for carbon offsets in providing incentives for and scaling up the adoption of GAP in agricultural value chains.

30. *Under this component, a GEF grant will support public goods and services primarily at the provincial level to ensure that the knowledge, institutions, incentives, and capacity are in-place to allow for the mainstreaming of environmental sustainability in the future development of Hubei's agri-food system.* The GEF grant will support activities under all three sub-components: risk assessment, risk management, and risk communications. GEF support would focus on: (i) incremental investments to benefit the global environment and facilitate the achievement of the provincial and national sustainable development goals (SDGs), such as development of methodologies and a system for monitoring GHG emissions from agriculture, establishment of the protocols for offsets under the ETS, reduced nutrient runoff into waterways, and reduced use of harmful pesticides; (ii) incremental environmental actions that make the most sense at the provincial—rather than county or enterprise—level, such as development of a Hubei Codes of Good Agricultural Practices for selected agricultural commodities, including paddy rice, tea, oranges, and pigs; (iii) incremental investments to improve ecological services, such as the establishment of provincial level ILM mechanism, baseline investigation of agricultural biodiversity, agricultural landscape planning and the development of actionable plans and



policies to improve agricultural landscapes, agricultural biodiversity and land restoration; (iv) institutional capacity building on improving agricultural landscape planning and management, public communications on climate smart agriculture and ecological protection; and (v) monitoring and evaluation (M&E) on carbon sequestration above and below ground, GHG emissions reduction, and biodiversity. Baseline investigations and monitoring and evaluation activities funded by GEF grant would include paddy rice, tea, fruits, and biodiversity in selected project areas. The expected outputs under this component are: (i) provincial or county-level ILM and land restoration plans developed and implemented in a participatory process bringing together public and private sector and supporting cross-sectoral planning and scaling up, ensuring participation of women; (ii) analysis of agro-PES mechanisms conducted and provincial policy reform on payment for agriculture supported, in order to strengthen biodiversity in agro-production system and sustainability of land and soil resources; (iii) gender-sensitive capacity building implemented for decision makers and technical staff of the local governments on biodiversity conservation, sustainable integrated land and water resources management and restoration, and climate-smart agriculture (CSA); (iv) monitoring systems for sustainable food systems and land use established (or existing systems improved) and implemented by leveraging the IBRD loan and government counterpart financing; and (v) development of innovative policies to support sustainable food systems and land use.

Component 2: Demonstration and Replication of Smart and Sustainable Agricultural Practices (IBRD: USD 137.0 million; GEF: USD 3.4 million)

31. This component will leverage private sector involvement to support the demonstration of smart and sustainable practices in the agri-food system using innovative solutions, and the scaling-up of the adoption of 3S practices to reduce the vulnerability of agriculture and its own adverse impacts on human health, the environment, and the climate, and to improve food quality and safety. This would involve three sub-components, implemented initially across four counties/districts/cities of Hubei Province, namely Honghu City, Tongcheng County, Nanzhang County and Jingshan City (see Map 1, Annex 2). The four counties represent upland and lowland landscapes with a diversity of agricultural production systems along the critical Yangtze River watershed—one of the most polluted and environmentally vulnerable in the world. There are 36 poor villages in the initially proposed project counties, with 10,702 poor households and a poor population of 42,808. Tongcheng County is a provincial-level poverty county.

32. Most of the financing will be provided in the form of *matching grants to farmer cooperatives/enterprises* to support about 50-55 innovative solutions tailored to the principles of 3S agriculture systems. The matching grants will be implemented using a framework approach (see Annex 2 for more details) which involves identification of innovative 3S solutions through a transparent, competitive selection and appraisal process, applying agreed criteria. The proposals will include demonstrations of innovative 3S technologies in the cooperative's/enterprises own production base, creation of shared infrastructure and services, technology and extension services for scaling-up good practices outside their own production base and strengthening of farmer cooperatives. Each proposal will identify investments that allow for drawing a distinction between commercial and public goods. The size of the matching grants will be calibrated using detailed economic analysis to compensate participating farmer cooperatives/enterprises for delivering public goods like demonstrations, knowledge-in-implementation, evidence-building research, etc. The project-financed matching grants will cover civil works, goods and equipment, and complementary services for training and technical assistance. Beneficiaries will be required to provide substantial counterpart financing. In addition, the project will also use public agencies at the township and village level as “implementing agencies” for activities, particularly those relating to scaling up sustainable production practices and strengthening farmer cooperatives.

33. *Sub-component 2.1: Demonstrations of Innovative Sustainable Production Practices (IBRD: USD 110.1 million).* This subcomponent supports investments in productive infrastructure, equipment, and knowledge needed for a diverse range of schemes to demonstrate the Hubei 3S GAP and associated policies and monitoring methodologies developed



under Component 1 for key Hubei agri-food value chains, including: rice, vegetables, tree crops (primarily tea and citrus), and livestock and aquaculture (and possibly others later if deemed appropriate). These value chains were selected due to a combination of factors, including their prominence in the Hubei agri-food system, and their relevance to the 3S challenges. The majority of the project financing will go to this sub-component. The investments will be implemented through farmer cooperatives, often in collaboration with agri-food enterprises.

34. Under this sub-component, the project will finance the implementation on the ground of Hubei 3S GAP and integrated landscape management plans with the potential to make positive contributions to all the 3Ss, and at a scale sufficient to provide proof of concept. The big gap between China and other countries in agricultural carbon footprints is mainly due to different farming practices, which are mostly related to management technologies. The agricultural production practices in China have substantial space for optimization. Project activities under this subcomponent include high-quality and safe food production and climate-smart agriculture (CSA) practices that will promote carbon sequestration and emissions reduction; reduce the use of synthetic inputs such as fertilizers and pesticides; demonstrate effective water management; decrease agricultural pollution from both crop and livestock sectors; reduce plastics pollution in the agri-food system and their runoff into waterways; and optimize the agricultural environment. Other activities to be financed include species selection technologies to increase productivity and biodiversity conservation and to decrease GHG emissions from agricultural production and value chains. The project will finance climate-smart and ecologically sound crop and livestock production systems as well as waste management and circular agriculture technologies (CATs). The specific CATs include the use of residuals of agricultural biomass, such as straw and livestock waste, as a substitute to chemical fertilizers and application of precision fertigation systems, and also to avoid the traditional burning of crop residues. By increasing the level of organic soil matter, circular agriculture helps to absorb and contain CO₂ (and other GHGs) while it also increases crop resilience—hence having both mitigation and adaptation benefits. To this end, the Hubei 3S GAP financed by the project will contribute to the project objectives through:

- **Resource use efficiency:** Lowering production costs through reduced inputs for energy, labor, machinery, fertilizers, water and pesticides;
- **Productivity enhancement:** Providing similar or even higher yields by improving agronomic practices such as conservation tillage improves soil structure, organic matter, and soil productivity on a long-term basis;
- **GHG emissions reduction:** Mitigating GHG emissions through reducing nitrous oxide (N₂O) emissions (through improved nutrient management based on soil testing, and organic and synthetic fertilizer use efficiency); and reducing methane (CH₄) emissions (through manure management in livestock production systems involving pigs and poultry, improved management of crop residues, and improved water management in rice); and energy efficiency improvements to reduce emissions of fossil fuels (through optimizing agronomic practices to reduce use of fossil fuels in crop production practices, improved post-harvest value chain improvements that reduce or avoid fossil fuel use through energy efficiency measures, and biochar production from straw and rice husks as biomass-based power generation to replace fossil fuels);
- **Carbon sequestration:** The improved crop production practices of 3S GAP implemented in different agricultural value chains is expected to contribute to on-farm carbon sequestration in soils (through crop rotation, green manure, cover crops and conservation tillage); and above-ground biomass carbon sequestration in tree crops (e.g., orange, loquat, and tea production systems).
- **Pollution reduction:** Promoting stress tolerant varieties/species, IPM, biopesticide use and reducing fertilizer consumption (use of controlled release fertilizer, deep application of fertilizer, fertigation systems), reduction of plastic film use, use of biodegradable plastic mulch, livestock waste management, etc.



- **Soil and water management:** Reducing runoff and erosion through better soil aggregate stability and improved water infiltration, and protective cover of the soil by crops and/or crop/pruning residues; diminishing off-site damage of infrastructures and pollution of water bodies through less runoff with a much-reduced sediment load;
- **Bio-diversity conservation:** Maintaining and promoting the diversity of rural landscape through enhanced crop and species diversity and cover crops; maintaining in-field and off-site biodiversity through the absence of destructive soil disturbance, protective soil shelter, and less off-site transport of contaminants; and
- **Animal health management:** Enhancing feed and veterinary drug management to enhance food quality and safety for selected poultry and pig/pork value chains; improving animal disease prevention and control interventions, especially strengthening on-farm biosecurity measures for highly contagious diseases such as Avian Influenza and ASF; and promoting animal welfare practices.

35. The project will finance the cost of on-farm demonstrations of 3S technologies and practices, small scale productive infrastructure, agriculture machinery, small equipment and tools, inputs, value chain investments for improvements in processing, GAP/HACCP protocol compliance, digital agriculture devices and equipment (such as on farm sensors, precision controls, traceability systems, drones preferably with capabilities for smart monitoring and action), rapid testing devices and on-site laboratories for product quality and food safety, digital reporting through GEMS (Geo-enabled Monitoring and Supervision) and monitoring and learning for systematic scaling up. A contingency provision in the form of *smart response fund* will also be provided in each pilot that allows project participants to be agile and smart in responding to extreme climate events, pest attacks, pollution incidents, incidents affecting the quality and safety of food production, etc. Wherever appropriate and cost-effective, the project will promote the use of the latest ICT and digital innovations in the Hubei agri-food system. (More details on the implementation arrangements for this sub-component are provided in Section III.A, and in Annex 2.)

36. *Sub-component 2.2: Scaling-up Sustainable Production Practices⁵ (IBRD: USD 25.2 million; GEF: USD 3.4 million).* The activities under this subcomponent carried out by farmer cooperatives/enterprises and select public agencies will strengthen service delivery systems for the supply of green agriculture inputs to farmers, provide additional support services, farmer training, innovation and extension systems (for example, demonstration plots, farmers' field schools, local resource persons) and infrastructure to enable scaling-up of GAP and climate smart applications by farmers and cooperative members beyond demonstration areas. The project activities include support to developing improved technical guidelines for GAP for sustainable cropping systems of the project targeted value chain crops; implementation and replication of sustainable production practices supported through farmer training, extension and field activities, contributing to biodiversity, soil and water conservation, reduced chemical use, climate change resilience, GHG emission reduction and increased production, and livelihood diversification to help increase resilience to climate risks.

37. *Sub-component 2.3: Strengthening Farmer Cooperatives (IBRD: USD 1.7 million).* Under this subcomponent, the project supports training and technical assistance carried out by farmer cooperatives/enterprises and select public agencies to strengthen cooperatives in their technical, financial and commercial management. The support focuses on strengthening the governance of cooperatives, including entry-exit norms for membership, dilution of investors equity in favor of smallholder and farmer equity, and equitable benefit sharing. The project also finances investments by the

⁵ These sustainable production practices include all the innovative and green 3S practices that are piloted in Component 2.1. These sustainable practices include conservation agriculture (minimum or no soil disturbance, permanent soil cover with residues, crop rotations); stress tolerant varieties/species, IPM, biopesticide use; use of controlled release fertilizer, deep application of fertilizer, fertigation systems, promotion of energy efficient machinery, reduction of plastic film use, use of biodegradable plastic mulch, livestock waste management, among others.



cooperatives in green marketing infrastructure (with climate-smart and energy-efficient design considerations) and certification, where this is necessary to realize the commercial benefits from improved farming practices and therefore strengthen the incentives for farmer adoption. The project will also provide technical assistance to potential participant cooperatives to prepare high-quality, 3S investment proposals for the first sub-component.

38. *Under this component, the GEF grant will support activities to strengthen private sector farmers' cooperatives through capacity building and training for replication of the demonstrated GAP beyond the demonstration and scale-up sites in the project counties. It will also support the introduction of biodiversity enabling practices and sound land management that contribute to emission reduction, reduced chemical use, increased resilience and increased production/improved livelihoods. The GEF grant will also help to improve the ecological services payments mechanisms, and pilot biodiversity enabling practices and sound land management that contribute to emission reduction, land restoration and landscapes under improved practices. Scaling up of land restoration and management of landscapes under improved practices will require extensive counterpart financing and will be implemented in the entire jurisdiction of the project counties, and potentially expand to other counties of Hubei Province that meet project criteria. Areas of land restoration and landscapes under improved practices can be financed by county/city government co-financing alone, covered by 3S GAP standards, farmer training, land restoration plans, ILMs, and policy improvements. Outputs of this component will be: (i) Improved technical guidelines/GAP developed for sustainable rice cropping systems, agricultural biodiversity, and sustainable production practices; and (ii) implementation and replication of sustainable rice, tea and fruit production systems supported through farmer training, extension and field activities, contributing to reduced chemical use, emission reduction, increased carbon sinks, and increased production/improved livelihoods.*

Component 3: Project and Knowledge Management (IBRD: USD 1.6 Million; GEF: USD 0.9 million)

39. In addition to conventional project management and M&E functions, this component would include activities in knowledge management, to gather and share the experiences and lessons learned from the project (such as the new 3S approach, integrated landscape management, agricultural offsets for the ETS, big data for the agri-food system, farm/processor-level technical innovations, rates of return of different agricultural practices on different scales, and cost effectiveness of different regulatory oversight activities), both in relation to risk assessment and monitoring and to the demonstration and scaling-up of successful CSA and GAP practices. Hubei officials have also agreed that the project will play an important role in piloting new approaches to public support for agriculture, which will help to increase institutional capacity, so that support can be more focused on public good investments that promote the 3S. The knowledge generated through the project experiences in supporting 3S practices under Component 2 will be shared with counties outside of the four project participants and with the provincial government—and even at the national level through the GEF FOLUR IP program—to provide lessons for the substantial domestic support programs.

40. *With support from the GEF grant, the project will regularly convene leaders and public and private stakeholders to exchange knowledge and lessons learned on the 3Ss approach to development of the agri-food system. The private sector will be an important catalyst for scaling and technology transfer within Hubei Province and scaling up nationwide through the Global Environment Facility (GEF) Food Systems, Land Use and Restoration (FOLUR) Impact Program (IP) China Child Project and ensuring that knowledge from the project is transferred into the provincial/national government's action plans and provincial land-use plans. Through the Global FOLUR IP Project and existing global and regional platforms, knowledge and lessons learned will be shared at the regional, national and global levels. The GEF grant will support Hubei's participation in Global FOLUR IP events.*



C. Project Costs

41. The lending instrument will be IPF, and the implementation period for the project is five years. IPF provides the flexibility to build human and institutional capacity, create productive infrastructure, and support the reform agenda in the agriculture/livestock development sector. The total project cost for the proposed project has been estimated at USD 352 million, out of which the Government/beneficiary counterpart financing share would be about USD 195.7 million. The IBRD loan is USD 150 million.

42. The remaining USD 6.28 million in project financing would come from a GEF-7 FOLUR IP grant, to be provided as blended co-financing under the operation. The GEF resources would be used to finance the provision of public goods with important, positive environmental spillover benefits that go beyond individual cooperatives/enterprises or even counties. As a grant, the GEF resources also provide an important incentive for the government to mainstream environmental sustainability and climate change across project activities, including those financed by the World Bank and counterpart funds. At the request of the Chinese MOF and the GEF, the GEF financing proposal for this project will be combined with another proposal put forward by the FAO and the central Ministry of Agriculture and Rural Affairs (MARA) that covers three other provinces in China. FAO will be the lead agency for the combined USD 15 million GEF proposal. The USD 15 million has already been approved by the China GEF Operational Focal Point within MOF. While there will be coordination on reporting and knowledge sharing between the two activities through FAO, once the grant proposal is approved, the USD 6.28 million for Hubei will be implemented by the Hubei provincial government and supervised by the World Bank. Since FAO/MARA are not yet ready with their part of the proposal, this PAD is being submitted to the Bank Board in the meantime showing a financing gap for the USD 6.28 million. Once the GEF grant is endorsed by the GEF CEO (expected by July 2020), the USD 6.28 million grant financing will be submitted to the Board on an absence of objection basis. In the unlikely event the GEF financing does not materialize, the Loan Agreement anticipates that the continuation of the project would require the client's mobilization of adequate funds from other sources to cover any gaps. Table 1 summarizes the overall project costs.

Table 1. Project Financing (USD, millions)

Component	Million USD			
	IBRD	GEF	Counterpart	Total
Agricultural Risk Assessment, Management, and Communications	11.06	1.94	21.10	34.10
<i>Risk Assessment</i>	5.06	0.70	4.02	9.78
<i>Risk Management</i>	6.00	1.15	16.73	23.88
<i>Risk Communications</i>		0.09	0.35	0.44
Demonstration and Replication of Smart and Sustainable Agricultural Practices	137.01	3.40	123.94	264.35
<i>Demonstrations of innovative sustainable production practices</i>	110.11		98.34	208.45
<i>Scaling-up sustainable production practices</i>	25.20	3.40	25.54	54.14
<i>Strengthening farmer cooperatives</i>	1.70		0.06	1.76
Project and Knowledge Management	1.59	0.94	35.68	38.21
<i>Project Management</i>		0.68	14.44	15.12
<i>Monitoring assessment and knowledge</i>	1.59	0.26	0.00	1.85
Contingency fee			21.24	21.24
Total Investment Cost	149.66	6.28	180.72	336.66



Interest during implementation period (3.9%)			14.70	14.70
Front-end fee (0.25%)	0.38			0.38
Commitment fee (0.25%)			0.23	0.23
Total Project Cost	150.0	6.3	195.7	352.0

D. Project Beneficiaries

43. The project design includes activities at the provincial and county levels. While Component 1 will be implemented primarily at the provincial level, the provincial and county governments have proposed an initial set of four counties to be included for the Component 2 investments. The project will consider scaling up project activities through additional counties that satisfy the following criteria: (i) willingness to implement all aspects of the 3S project design; (ii) willingness to draw lessons from successful 3S pilots and inform the domestic support programs; (ii) willingness to invest in institutional capacity development and systems for supporting 3S programs; (iii) agreeable to comply with social and environment safeguards management framework (ESMF) and fiduciary procedures agreed with the World Bank; and (iv) satisfies the debt sustainability parameters stipulated by Provincial Finance Bureau.

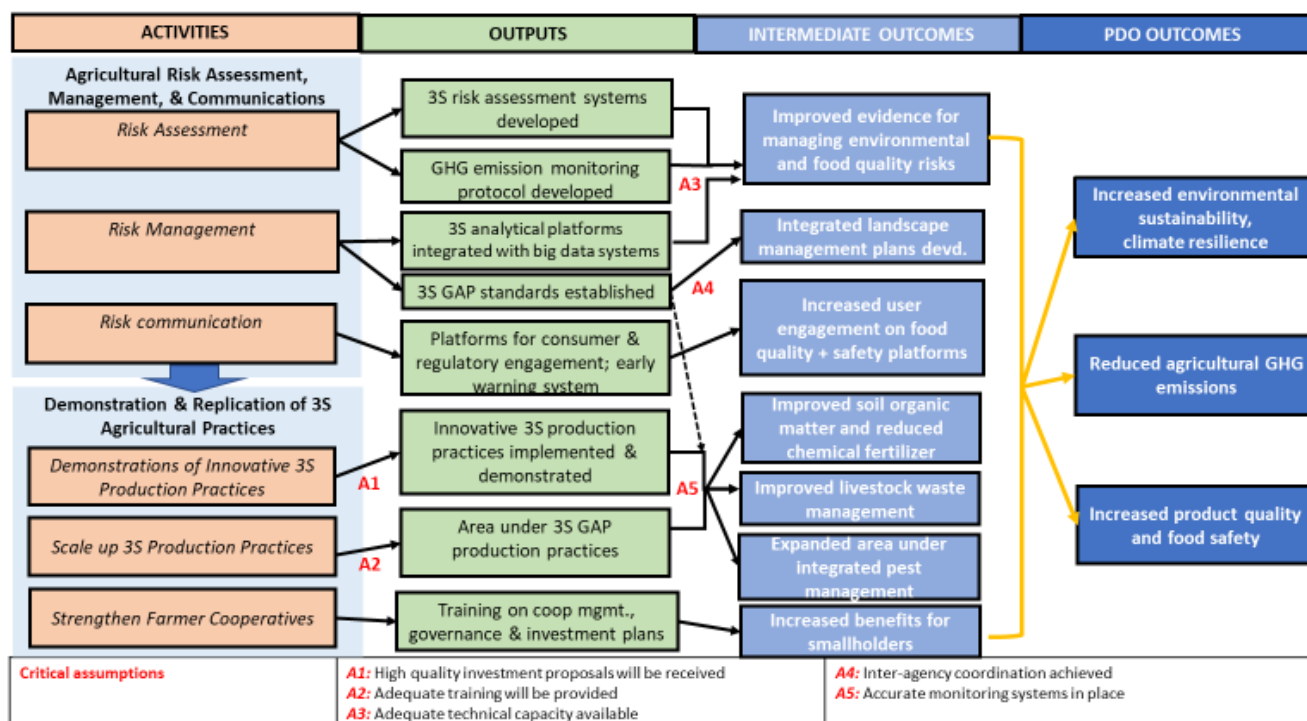
44. The key beneficiaries of the project include: (i) farmers, farmer cooperatives, and agro-enterprises. The provincial PMO has identified four agro-enterprise/cooperative combinations (one for each county) that will be financed by the project during the first year of project implementation. In total, the project is estimated to benefit about 300,000 households (900,000 beneficiaries), of which about 40% are female. (ii) Public institutions at the provincial and county levels that are responsible for promoting climate-smart, sustainable, and high-quality and safe agri-food production will be the other direct project beneficiaries. Chinese consumers (and those in export destination countries) will also benefit from increased supply of high-quality and safe food products. The project is expected to promote Hubei 3S GAP on a land area of 120,000 hectares and cover a total of 280,000 hectares with integrated landscape management plans.



E. Results Chain

45. The development hypothesis of the project's new 3S model is to address in an integrated manner the three main interrelated challenges confronting agri-food systems in China, that is, promoting environmentally sustainable intensive agricultural production models, developing resilience to climate change while mitigating GHG emissions, and ensuring food quality and safety. The rationale for the project activities is as follows: (i) strengthening institutional capacity for managing risk surveillance, monitoring and control systems; (ii) supporting enterprises, cooperatives and producers in enhanced compliance to the regulations relating to agro-environmental hazards, agriculture product quality and food safety risks; and (iii) building smart and agile responses based on analytical evidence and knowledge will lead to improved quality and safety of food production, environmentally sustainable agriculture intensification and climate smart agriculture in Hubei. The three project components are designed to complement one another. Component 1 will lay the foundation for 3S investments under the project and beyond by supporting provincial-level institutional, capacity, standards, and incentives development for promoting and monitoring good, 3S practices in the Hubei agri-food system. Component 2 will support the demonstration of key 3S practices at the level of select farms, cooperatives and processors in the targeted value chains and landscapes of four Hubei counties, and the scaling-up of those practices more broadly through demonstration activities. Moreover, the experiences from the implementation of Component 2 on the ground will also provide feedback for the fine-tuning and scaling-up of provincial level institutions and policies under Component 1.

Figure 1. Theory of Change





46. The results chain for food quality and safety is founded on a risk-based supervision framework, which is informed by scientific evidence and principles of accountability and transparency between the stakeholders. The evidence provided by food quality and safety risk assessments help to: (i) prioritize food quality and safety risks, (ii) set up food quality and safety standards, and (iii) define acceptable tolerance levels. The risk prevention and control measures rely largely upon food risk surveillance, farm information systems, and investigation services. Demonstration of innovative technologies and solutions will allow enterprises to learn new ways of enhancing their compliance with food quality and safety parameters and regulations. Similarly, the project will also help in reducing information and coordination costs for the enterprises, cooperatives and farm producers by supporting investments for creating traceability systems for high-quality, safe food products and implementing nuanced risk communication strategies for effective multi-stakeholder engagement.

F. Rationale for Bank Involvement and Role of Partners

47. Hubei Province aims to become a national leader in smart and sustainable agricultural practices. This calls for a holistic approach from agri-food production to processing and distribution by introducing and scaling up good agriculture practices, improving fertilizer and pesticide efficiency, agri-food traceability system, and market infrastructure, etc. Transformative changes and upgrades are needed. The World Bank is well positioned to bring knowledge of global best smart and sustainable practices in agriculture to Hubei Province. The World Bank has experience with piloting different aspects of the new 3S approach under different projects in other parts of China, including the Guangdong Agricultural Pollution Control Project, Integrated Modern Agriculture Development Project, and the Climate Smart Staple Crops Production Project. However, this is the first time that these elements—which are clearly interrelated—are being brought together in a single project. The Bank also has rich experience in green finance, including issuing the first green bond globally.

48. The proposed project is expected to yield significant environmental and global public goods benefits. The approach chosen through demonstration projects is aimed at correcting market failures and policy distortions that prevent rural producers from adopting safer, smarter and more sustainable practices, including:

- Input based subsidy systems and weak standards and regulations encourage the overuse of fertilizers, pesticides, and other inputs, which are primary sources of agricultural non-point sources of pollution, emission of GHGs, and food quality and safety hazards. The project will work on improving standards and reorienting public support in pilot counties towards good agricultural practices.
- Barriers to entry to higher-value markets, such as demanding quality standards: An example of such market failure is given when smallholders need certification that each producer is following the required production or food quality and safety standards. Public funding would support product certification and quality or safety assurances.
- Production fragmentation and obstacles to interact in value chains with weak organizational structures: To access markets, it is often necessary to provide scale production. Developing cooperatives would allow smallholders to aggregate production and make themselves attractive partners to buyers in high value urban markets.
- Limited access to new technologies and institutional structures: Partnering farmers with enterprises injects private-sector knowledge and innovation. Enterprises become key drivers of technological change and market innovation. Unlike in public extension systems, such innovations are directly related to market needs.



49. The project aims to develop institutional capacity of local and provincial agencies in the area of food quality and safety governance systems based on risk-based supervision frameworks. The project will pilot institutional innovations by strengthening the laboratory network and redefining the hierarchy of roles based their location, risk concentration and risk profile of the enterprises. The risk assessment of the quality and safety of agricultural products, in accordance with the requirements of national legislation and international good practice, is organized and implemented by MARA to focus on production, storage and circulation, and to carry out systematic work on the identification, hazard description, exposure assessment and risk description of agricultural product quality and safety hazards. However, the system has several blind spots in terms of definition of hazards, standards for compliance, laboratory capacity to manage wide spectrum of analytes, sampling techniques and the regulatory capacity training. The risk factors of quality and safety in aquatic vegetables, crayfish and other dominant agricultural products have not been effectively clarified or controlled.

50. The Bank team explored the possibility of using other approaches to providing support to achieve the project's 3S objectives, including through the financing of a line of credit through a financial intermediary. However, a suitable on-lending platform could not be identified in Hubei. Moreover, considering the heavy public good benefits of the project-promoted 3S investments, the marginal expected private financial returns on the investments, and the potential perceived riskiness of such innovative approaches, it would be expected that there would be significant under-investment through purely private finance. Meanwhile, the Bank has had success with the matching grant approach under numerous agriculture projects in China, including the ongoing Guangdong Agricultural Pollution Control Project, Jilin Food Safety Project, and the long-running series of rural poverty projects across the country. In addition, substantial capacity building and institutional support are needed at the provincial level in Hubei to lay the foundations for the implementation of the "New 3 Ss" approach, and such support could not be provided through a financial intermediary.

51. With regard to partnerships, the World Bank has worked closely with the Hubei government to successfully apply for grant financing under the new GEF FOLUR IP. The GEF financing will be implemented in conjunction with a national FOLUR IP program that is being led by FAO and MARA, and has a national component as well as activities in three other Chinese provinces. This will provide ample opportunity for knowledge exchange with other provinces, and also for influencing policies and institutions at the national level. Moreover, the China program is part of a broader global FOLUR IP program that will be implemented in over 20 countries around Asia and throughout the world. As part of that, Hubei will engage in global platforms that will allow it to share its experiences and gain knowledge and networks from around the world. Likewise, the project will partner with Food Industry Asia (FIA) to develop and implement food quality and safety risk communication strategies and a tool kit and, with the help of the Global Food Safety Partnership (GFSP), will also forge partnerships with the on-going EU-China Safe Project in the area of capacity building and knowledge management in food quality and safety standards, laboratory improvements and testing methodologies.

52. The World Bank, through the Community Development Carbon Fund, assisted the implementation of the Hubei Eco-Farming Biogas Project from 2009 to 2014. It was the first household biogas project registered in China under the Clean Development Mechanism of UNFCCC, covering 33,000 households generating energy from biogas based on pig manure. The project was successful in demonstrating innovative approaches and a credible process to trade carbon for the certified emission reductions from the biogas project and household economic benefits of saving up to RMB 3,000 per household on annual fuel expenditure, environmental benefits from reduced indoor pollution, and gender benefits of empowering women. Meanwhile, through the Partnership for Market Readiness, since 2012 the World Bank has been assisting the Government of China to establish and implement seven regional ETS pilots, and eventually to scale them up to a national ETS during the post-2020 period. Hubei Province, as one of the seven ETS pilot regions, gained experience in implementing an ETS for the power and industrial sectors, and in using carbon offsets in the ETS for up to



10% of emissions—however, not yet in agriculture. This project provides the opportunity for the World Bank to extend the technical support and practical experienced in generating and trading carbon offsets from agriculture.

G. Lessons Learned and Reflected in the Project Design

53. The design of the project benefits from lessons learned in the design and implementation of a number of World Bank-financed food safety, agri-environment and CSA projects in other parts of China, including the Guangdong Agricultural Pollution Control, Integrated Modern Agriculture Development, and the Climate Smart Staple Crops Production Projects. The most important lesson is that the challenges of environmental sustainability, climate change, and food quality and safety are inter-related—particularly in the case of China’s current agri-food system—and that they can most effectively and efficiently be addressed by taking an integrated approach that combines all three elements. That is the basis for the new 3S approach developed in this project. Interventions to reduce the overuse of chemical fertilizers and pesticides, or improve the management of livestock waste, should be explicitly designed, implemented, and monitored for their contributions to improved food quality and safety, reduced nutrient pollution, increased soil carbon, and reduced GHG emissions. This project represents the first time that this will be done in China.

54. Experience from other projects, such as the series of rural poverty reduction projects across China, highlight the importance of strengthening farmer cooperatives to ensure that the benefits of projects are widely shared by rural residents, and particularly smallholders, the elderly, women, the poor, and other vulnerable groups. That includes providing training and technical assistance in the establishment and running of the cooperatives and ensuring that shareholder and profit-sharing arrangements are transparent and fair. Recent experience from the Guangdong Agricultural Pollution Control Project has demonstrated the criticality of including biosecurity measures as part of any livestock investments, particularly in the face of animal disease threats such as ASF. Hubei’s recent experience with the COVID-19 outbreak underscores the importance of strengthening agri-food institutions and quality and safety monitoring and systems.

55. Promotion of the 3Ss in different food value-chains and landscapes is a complex and comprehensive task. It requires inter-sectoral interaction and cooperation. Experience learned from other projects, such as the Hebei Air Pollution Project, is that the implementing agency should have the capacity to coordinate with other sectors, and at the same time, should have the ability to provide technical support to project counties and other sectors when needed. An effective cooperation mechanism is necessary in this regard, which is why inter-agency Project Leading Groups will be established at the provincial and county levels under this project.

56. The food quality and safety capacity development and needs assessment work by the World Bank/GFSP in 2017 summarized the best practice experiences of many countries and China’s progress. The main lessons arising from the reports include (i) *ensuring food quality and safety is a shared responsibility of the State, businesses, and consumers*. Such systems have already been tested in the EU food systems and the UK’s Food Standards Agency’s strategy. (ii) *the need to move toward risk-based, preventive approaches to food quality and safety*. International experience, including from the European Union and the United States, shows that risk-based approaches have proven to be resource efficient and the best way to improve food quality and safety. The risk-based approach involves three stages: risk assessment, risk management and risk communication. (iii) *support businesses to achieve full compliance*. The USA, Canada and Australia have good examples of compliance management systems that incentivize firms’ compliance. (iv) *embed good practices and food quality and safety management systems in as many businesses as possible* by providing training to small businesses on good practices (GMP, GHP, GAP), whereas larger businesses should get trainings on more sophisticated food quality and safety management systems (including HACCP). And (v) *rebuild the trust of the public in the enforcement system and in the quality and safety of the food they eat*. For instance, streamlined communication and



access to inspection reports have increased consumer confidence in food quality and safety in both New Zealand and Denmark.

57. The Ag Observatory concept has been successfully implemented by the World Bank in collaboration with client governments in the Africa Region, providing near real-time and high-resolution agricultural weather information that allows Governments to proactively monitor the weather-related performance factors of agricultural production systems. The Ag Observatory's insight is based on 1.5 million “virtual weather stations” (VWS) generated on demand from a combination of data from ground stations, and satellite platforms. The application of Big Data and Machine Learning (using published algorithms) then allows the generation of a contiguous 9km x 9km weather dataset that is used for advanced analytics linking agricultural meteorology, crop and livestock performance, and a variety of socioeconomic and socio-political metrics for decision support. By harnessing the remote sensing and high-resolution real-time weather data with local cropping calendars, it is possible to make early projections of crop yield anomalies from sub national to global scales and thus provide early warning of potential food shocks several months in advance of normal harvest periods. The design of Component 1 of this project draws on that experience.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

58. Institutional arrangements for project implementation have been established at the provincial level and at the four project counties, and will be further detailed in the Project Operations Manual (POM), which must be to the Bank's satisfaction. *Project Leading Groups (PLGs)* of high-level decision-makers from relevant key agencies are needed to provide oversight, strategic guidance, and inter-agency coordination for the project at province and county levels. In addition to DARA and its relevant departments, they would comprise representatives from the development and reform commissions, finance bureaus, water departments, environment departments, food safety agencies (SAMR), poverty reduction offices, auditor's offices, civil affairs bureaus, ethnic affairs commissions, women's federation. These will provide leadership, policy guidance, and strategic direction to the PMOs within their respective jurisdiction.

59. *Provincial Project Management Office (PPMO)*. A Provincial Project Management Office (PPMO) has been established in the Hubei Provincial DARA Office, Foreign Capital Project Management Center. The provincial PMO is responsible for overall project coordination and management, including: annual work and budget planning; coordination of municipalities and counties in public outreach, work planning, procurement, fund withdrawal and disbursement management and financial reporting; technical and institutional implementation aspects; general oversight, field supervision and acceptance checks; and training and capacity building. The provincial PMO will also have primary responsibility for the review and appraisal of investments proposals of participating agro-enterprises prior to county PMO approval. It is responsible for overall project M&E and reporting to the Bank and will maintain and update, as necessary, the POM (including the FMM). The provincial PMO carries out project activities by following the agreed procedures and arrangements documented in the POM. Amendments to the POM require prior written agreement of the Bank. The provincial PMO carries out project activities in accordance with the provisions of the Environmental Management Plan, the Pest Management Plan and the Resettlement Policy Framework. Amendments to any of these documents require prior written agreement of the Bank.

60. *County PMOs*. County PMOs have been established in each of the project counties. They are responsible for project management at the local level. They will prepare county work plans and review and approve cooperative investment and annual work plans, approve and oversee cooperatives' use of project funds, coordinate line departments



in the implementation of cross-village (township) cooperative investments, and coordinate enterprise participation. They will be responsible for the procurement and management of public production infrastructure and services. They will also review and approve investment plans of agro-enterprises that participate in the project and receive financial support. They will oversee cooperatives' use of project funds, coordinate relevant line departments in the implementation of cross-village (township) value chain development projects, and work with enterprises to promote agricultural technology transfer and information and marketing services needed by cooperatives. They will report on the utilization of project funds to the provincial PMO, prepare semi-annual progress reports, and recruit and train cooperative professional advisors. They will also be responsible for identifying and addressing implementation issues and manage the local complaints handling mechanism.

61. *Local public agencies.* In addition to farmer cooperatives/enterprises, the project will also use public agencies at the township and village level as "implementing agencies" for selected activities under components 2, particularly those relating to sub-components 2.2 and 2.3. The POM will define the parameters as to when the project can choose to rely on the public agencies at the township and village level along with their selection criteria. These will be agreed with the CPMOs on annual activity plans. Any procurement of works, goods and services will be undertaken by CPMOs with the assistance of a central procurement agent supervised by the PPMO.

62. *Technical Expert Groups (TEGs).* The province and each county will set up a TEG comprised of technical experts from universities, academicians, agricultural research stations, extension services, and industry groups and the private sector. TEGs will participate in the selection of cooperatives/enterprises for financing under the project, and guide value-chain development investment planning of cooperatives to ensure technical rigor and feasibility, financial viability, and innovation. They will provide inputs to investment costing, technology innovation and dissemination, production organization and processing, and marketing research to strengthen the overall business orientation and operation of cooperatives. They will also assist the counties in soliciting interest from qualified agro-enterprise investors for investment in the project.

63. With regard to the cooperative/enterprise-level matching grant sub-projects under Component 2, financing will be provided in the form of *matching grants to farmer cooperatives/enterprises* to support about 50-55 innovative solutions tailored to the principles of 3S agriculture systems. The matching grants will be implemented using a framework approach (see Annex 2 for more details). A total of four 3S technology packages for demonstration were proposed by the counties and the provincial PMO for the first year's implementation. The remaining proposals targeting different 3S solutions, locations and enterprises will be identified during project implementation through a transparent, competitive selection and appraisal process, applying agreed selection criteria. The details of the process will be described in the Project Operations Manual. Each proposal will identify investments that will be supported by IBRD and counterpart funds. The prospective beneficiaries will submit 3S proposals to County Project Management Offices (CPMOs), who will do the first round of screening, before forwarding the highest-quality proposals to the Provincial Project Management Office (PPMO). Final selection will be done, and consistency ensured, by the provincial-level Technical Expert Group (TEG). The first sub-project investment for each county will require the Bank's no objection. Beneficiaries will sign an Implementation Agreement with the CPMOs. The project-financed matching grants will cover civils works, goods and equipment, and complementary services for training and technical assistance. Beneficiaries will be required to provide substantial counterpart financing of approximately 35% for the first year of investments. For procurement of major civil works and goods, CPMOs will undertake the procurement by following the Bank procurement procedures with the assistance of a central procurement agent supervised by the PPMO. Output-based payments will be used for eligible small or low value works, goods, services and consultant services purchased by the beneficiaries using commercial practices and for other program actions, and monitored, verified and disbursed by the CPMOs.



B. Results Monitoring and Evaluation Arrangements

64. The Results Framework describes the PDO-level outcome indicators and the component specific intermediate indicators, including core sector indicators, and respective baselines and targets (Section VI). The monitoring and evaluation (M&E) arrangements and responsibilities are described in detail in the POM. Project M&E will be the responsibility of the provincial and county PMOs. A designated M&E officer will be appointed at the provincial PMO and in each of the four county PMOs for compiling M&E data for consolidation into the semi-annual and annual project progress reports. A simple Management information System (MIS) will be set-up at the county and provincial PMO levels to help track and document physical, institutional, and financial project progress. The provincial PMO will engage qualified institutions or experts to conduct independent impact assessments at project mid-term and at the end of the project.

65. To monitor and evaluate the performance of climate smart agriculture interventions and to report on the PDO indicator of GHG emissions reduction, a robust M&E system with a component on monitoring, reporting and verification (MRV) of climate smart interventions will be implemented as part of the Component 1.2. The monitoring methodologies, reporting and verification systems to be supported under the project are expected to meet the rigorous and internationally accepted methodologies and monitoring requirements of carbon emission trading. They will cover major sources of GHG emissions and removals by sinks. The monitoring of emissions will focus on major sources of agricultural emissions such as N₂O emissions from fertilizer application; methane (CH₄) and nitrous oxide (N₂O) emissions from manure management; methane emissions from rice. The monitoring of GHG removals by sinks will focus on the increases in carbon sequestered in aboveground biomass and soil pools. The PDO indicator of net GHG emission reductions over the project period is estimated as a sum of reduced GHG emissions and increased GHG removals by sinks of the project.

C. Sustainability

66. The project will promote environmentally sustainable, climate-smart agriculture and improved food quality and safety to benefit farmers, cooperatives, and agro-enterprises. The key for sustainability of these project benefits is the strong commitment of the provincial government to the sustainable development of the agriculture sector. The project activities under Component 1 include institutional capacity building, which will be critical for a sustainable benefit beyond the project implementation period. Public institutions, particularly the various divisions under DARA and the agricultural bureaus at the four counties, will be strengthened, and more efficient coordination will be created. The resulting policy, regulatory, and institutional changes and the innovative approaches that will be introduced with the project will strengthen the technical viability and sustainability of future investments in the sector.

67. The project aims to bring a fundamental shift in the way risk assessment, risk management, and risk communication is performed in Hubei. For instance, the project aims to change Hubei's agricultural product quality and safety management from an approach that relies heavily on policing and enforcement to a more comprehensive approach that introduces standardized good agricultural practices, introduces risk-based monitoring and enforcement, increases knowledge of agricultural product quality and safety, and integrates small-scale farmers into high value food supply chains. Sustainability of this project would be achieved if this multifaceted, risk-based approach to agricultural product quality and safety is adopted in Hubei and can be replicated in other provinces.



68. The project will support production expansion only if: there is potential for improving competitiveness and marketability, identified through industry, technology, and market analyses; such expansion is combined with structural adjustments in production arrangements, e.g., new arrangements that involve enterprises and cooperatives as main actors and investors. Financial sustainability of commodity value chains will be assessed through market competitiveness analysis during the investment preparation. The sustainability of high value production chains that incorporate farmers would depend on the level of profitability for all agents in the chain. Expected profitability would be a necessary condition for the selection of sub-loan recipients, thus reducing the risk that these investments are not sustainable. Environmental sustainability will be confirmed through resource assessments at the cooperative or enterprise level. For example, ruminant livestock development will include feed balances and agriculture as well as livestock supported activities will not depend steep sloping land.

69. The project promotes the participation of cooperatives and agro-enterprises and it will leverage private sector investments through co-financing of investments that are linked to the project. Investment commitments from the private sector are expected to provide an important indication for a clear business rationale and longer-term sustainability of the commodity value chain. Already, private sector cooperatives/enterprises have committed to providing substantial self-financing of approximately 35% of Component 2 sub-project costs for the first year of investments. Lead local enterprises will be selected during the investment proposal preparation based on clear criteria, for example, strong business and financial record, experience in the sector, strong management and business planning. Enterprise participation would be subject to joint review by provincial and county PMOs, as well as the Bank during the detailed investment proposal preparation process.

70. Sustainability of investments to support climate change mitigation will also be supported by the development of technical protocols and capacity to implement offsets under the project, and the inclusion of Hubei agriculture as an offset investment option under China's ETS. That has the potential to channel large flows of private capital to climate-smart agricultural investments in Hubei, thereby creating an incentive system that will long outlive the project. The project activities to influence the design of the domestic public agricultural support programs in Hubei should also provide scaled-up, long-term incentives for 3S investments.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis (if applicable)

Economic and Financial Analysis

71. **The development impact and expected benefits.** The project would generate direct and indirect benefits in the form of improved environmental practices, resilience to climate change and variability, and improved food quality and safety. It will also benefit farmers, farmer cooperatives, and enterprises through improved productivity and efficiency of farming systems, value-addition, and market opportunities. These benefits are expected to result in increased incomes and long-term local employment opportunities for the beneficiary population. These benefits will result from: (a) adoption of new production standards and technology packages that lead to increased value and quality of food products, factor productivity, and climate resilience, and reduced input costs; (b) improved product processing and/or packaging; (c) better access to services, markets, and information; (d) improved product quality and producer (farm-gate) prices; (e) higher production values through market differentiation (e.g. product certification, branding); and (f) improved efficiencies from economies of scale.



72. Indirect benefits are expected from stronger cooperative governance arrangements and partnership models with agro-enterprises, including: (a) strengthening of farmer cooperatives; (b) improving the quality and reducing the costs of forward and backward linkages of farmers to markets and other value chain operators; (c) improving the physical infrastructure associated with cooperative investments which could benefit all members and associated non-members; and (d) public and private sector operators delivering quality services in a more efficient and targeted way.

73. **Methodologies.** A cost benefit analysis has been adopted to estimate the Economic and Financial Analysis (EFA). The evaluation of the economic and financial viability of the project is estimated based on what the project is expected to achieve relative to a counterfactual situation. In other words, the estimation was done under with-and-without project scenarios. Ideally, the effect of project interventions in each of the supported cases would be analyzed with the direct and indirect costs and benefits considered. However, since the project design has adopted a framework approach, we have conducted the EFA for only the first selected sub-projects. The FAO EX-ACT tool is used to estimate the project's environmental and climate benefits. These models would be extrapolated to predict the expected economic and financial returns for farmers, cooperative and entrepreneurs and for the society.

74. **Financial Analysis Results.** Financial analyses were carried out for Component 2 (about 90% of the total project cost) to assess: (i) the profitability of the proposed GAP practices for the enterprises and/or cooperatives; (ii) the financial attractiveness of the proposed first year sub-projects of targeted value chains for the enterprises and/or cooperatives selected. The analysis was based on underlying farm and enterprises models that integrate multiannual cash flow projections for two scenarios: with and without government subsidies (project grants). The Financial Internal Rate of Return (FIRRs) for the sub-projects are estimated to range from 9.7 to 12.6% under the without project scenario, and in the range of 16.1 and 19.5% under the with-project scenario (see annex 3). These results suggest that project grants (government subsidies) are needed to make the investments financially profitable and attractive to farmers, cooperatives and entrepreneurs.

75. **Fiscal Impact.** The provincial government and the four project county governments are firmly committed to providing counterpart funds based on the project financing plan. Fiscal impact after project completion is related to: (i) the funding of the big data center and laboratory operating costs, which the government has committed to cover a significant amount through its budget allocations; and (ii) servicing the WB loan. For provincial level institutions involved, the O&M cost and debt service will be mainstreamed in annual budget allocations. Similarly, county level O&M cost and Bank loan service (only accounting for a fraction of their public expenditure) will also be well covered. Furthermore, according to MOF (Decree 85 issued in 2017), counties selected in the project must go through its internal fiscal evaluation, which demands that project counties have fiscal capacity to borrow (not exceeding debt ceiling) and will have enough fiscal revenue stream in future to service the Bank loan. The COVID-19 outbreak will affect budget revenues at all government levels. On the assumption of a relatively rapid recovery after the initial outbreak has been brought more or less under control in Hubei Province, this is likely to be a temporary shortfall and should not affect the debt servicing capacity of project counties. However, in view of the current situation, the macroeconomic risk has been set to substantial (see below).

76. **Economic Analysis Results.** The economic analysis has been conducted to assess the overall project's net impact on economic welfare of the society. The total incremental benefits include (i) benefits from project activities under Component 2 and (ii) net carbon sequestration benefits resulting from project implementation. The economic analysis includes the total incremental project costs (that is, project costs of all components), suggesting that these are conservative estimates. Excluding benefits from GHG emission reduction, the economic internal rate of return (EIRR) of the project over a 25-year period is 11.6%, with a corresponding Net Present Value (NPV) of USD -7.5 million (assuming a discount rate of 12%). Accounting for the potential GHG emission reduction benefits, which is estimated at 707 thousand metric tons of CO₂ equivalent (tCO₂e) annually, the EIRR increases to 27.4% (with the lower shadow carbon



price projection that increases linearly starting at USD 40 in 2020) and 51.1% (with the higher shadow carbon price projection that starts at USD 80 in 2020).⁶ The corresponding NPVs are estimated at USD 263 million and 514 million USD with the lower and higher shadow prices of carbon, respectively.

77. **Climate Co-benefits (including GHG screening).** The project would generate climate benefits in terms of both adaptation and mitigation. Several project interventions are proposed to promote climate-smart practices on about 120,000 ha of land across the four counties in Hubei Province. The relevant climate resilient agricultural technologies and agronomic practices proposed under the project and considered for GHG accounting, in view of the EX-ACT modules, include: improved agronomic practices (such as conservation agriculture and crop residue retention), alternate wetting and drying paddy production, reduced synthetic inputs such as fertilizers and pesticides, nutrient management, water management, improved manure application and waste management, among others. The estimates from the EX-ACT tool show that the above project activities would lead to a carbon balance of 14.1 million tons of CO₂e that are mitigated over the period of 20 years. This is equivalent to an annual emission mitigation of 0.70 million tons of CO₂e (see annex 3 for the details). The project finances several activities that are expected to generate large adaptation and mitigation climate co-benefits, which are preliminarily assessed at 43% (the final assessment is expected to be higher).

Technical Assessment

78. Many of the technical options proposed under the project are currently being piloted or promoted in an ad hoc manner in several parts of China, including in Hubei. Potential climate changes will need to be considered in the choice of agricultural production technologies. Enterprises and/or cooperatives may propose improved plant varieties or livestock breeds, which are not yet used in the project areas. In such cases, technical appraisal teams at the county level and the joint appraisal team at the province level will consult with the relevant provincial agricultural departments and supporting research institutions to ascertain the suitability of the proposed variety/breed for the project area, prior to obtaining approval.

79. A primary objective of the project activities under Component 1 is to introduce a risk-based monitoring system for agricultural product quality and safety and to train personnel to service this monitoring system. Risk based monitoring is a well-established technique for monitoring the quality and safety of agricultural produce, used widely in developed countries (and for export product monitoring in China). The technique uses statistical sampling techniques to collect random samples of product and test them for known hazards, for example agricultural pesticide residues, veterinary product residues, heavy metal contaminants, or microbial contaminants. Based on the results of this random sampling, a risk profile of different agricultural product risks facing the Province is developed. This risk profile is then used to adjust the next round of testing, giving higher priority to testing for the higher risks. This higher priority would result in more frequent random testing and purposive testing in specific areas or on specific products to find the source of the problem. The project will also support development of Hubei 3S GAP standards by adapting widely applied global standards such as HACCP and Codex.

80. For the practices/technologies that have not been successfully demonstrated in the province, a pilot scheme will be introduced under Component 2 with the goal of quickly scaling up these practices once its positive results have been demonstrated early within the project's implementation timeframe. The technical options that will be promoted under Component 2 including, various anaerobic digestion technologies, manure treatment modalities, integrated land management, and IPM, are well tested in the country. The economic and financial sustainability indicators are sensitive to estimated revenues from biogas production, electricity generation and sales of treated wastes, as well as estimates

⁶ The calculation uses the recommended shadow price of carbon in the 2017 *Guidance note on shadow price of carbon in economic analysis*.



of recurrent costs. Some farming models in the project areas include a rice farming with fish, turtle, and shrimp. The project will promote GAP in the targeted areas. These practices have been piloted extensively in China in recent years, including in project provinces, and successful local experiences are available for scaling up. In addition, the technical design of the project emphasizes the linkages between Component 2 and the institutional capacity building activities under Component 1. This will ensure the right institutions and technical capacity are available to implement the project activities.

81. All agricultural production will follow Good Agricultural Practice (GAP) standards and the provisions set forth in the project's Pest Management Plan (PMP). To reduce grazing pressure, the project will only support livestock productions systems that do not involve any free grazing of animals. Waste disposal systems and related technical options for waste treatment (biogas fermentation or composting) will be assessed and, if necessary, included on a mandatory basis for all animal production support under the project. The design of all agro-processing facilities supported under the project will follow HACCP principles. Only trained staff will operate food testing and certification facilities. A selection of GAP for the agricultural sector were discussed with the PMO and technical advisory group will follow up for proper implementation. The principles of Conservation Agriculture (CA), including minimum or no soil disturbance; permanent soil cover by leaving the soil covered with residues or establishing a cover crop; and increasing plant diversity in the form of well balanced and wide crop rotations, will be followed.

B. Fiduciary

(i) Financial Management

82. A financial management (FM) assessment has been carried out to assess the FM capacity of provincial project management office (PMO) established within Hubei Provincial Agriculture and Rural Affairs Department (DARA) and PMOs established in project counties. This is done to assess if the project FM arrangements and associated with risk mitigating measures satisfy the World Bank's minimum requirements under the Bank Policy and Bank Directive on Investment Project Financing. The project FM arrangements are expected to satisfy the FM requirement subject to implementation of the FM manual (FMM) acceptable to the Bank and the recommended FM mitigating measures when implementing project activities.

83. *The FM capacity assessment identified the following principal FM risks:* a) all project financial staff are quite new and do not have adequate experience with World Bank-financed projects; b) county government and enterprise/cooperative are required to invest more than 50% of total project cost as counterpart funds, project implementation will be negatively impacted if the committed funds could not be delivered to the project timely and completely. Meanwhile, the financing sources for county government could not be defined until the commencement of project activities; and c) some project activities under component 2 will be implemented by enterprise/cooperative which may not have clear understanding about the project and Bank's related requirements.

84. *The following actions need to be taken to mitigate these risks:* a) the CVs of all project financial staff should be submitted to the Bank and all financial assigned staff should register for the fiduciary e-learning platform developed by the Bank. They should pass the test for disbursement module before the signing of loan agreement; b) the financing sources of the counterpart funds from county government should be defined before preparing project annual implementation plan and the funds should be included in government annual budget approved by county People's Congress. County PMOs should monitor the contribution from enterprise/cooperative closely during project implementation by using MIS system.; and c) detailed implementing arrangement procedures have been designed for the matching grant sub-component and agreed by the Bank and clients. A financial management manual, which includes



the mentioned implementing arrangement for matching grants, and that standardizes project FM procedures and requirements and provides necessary guidance to project financial staff, has been prepared.

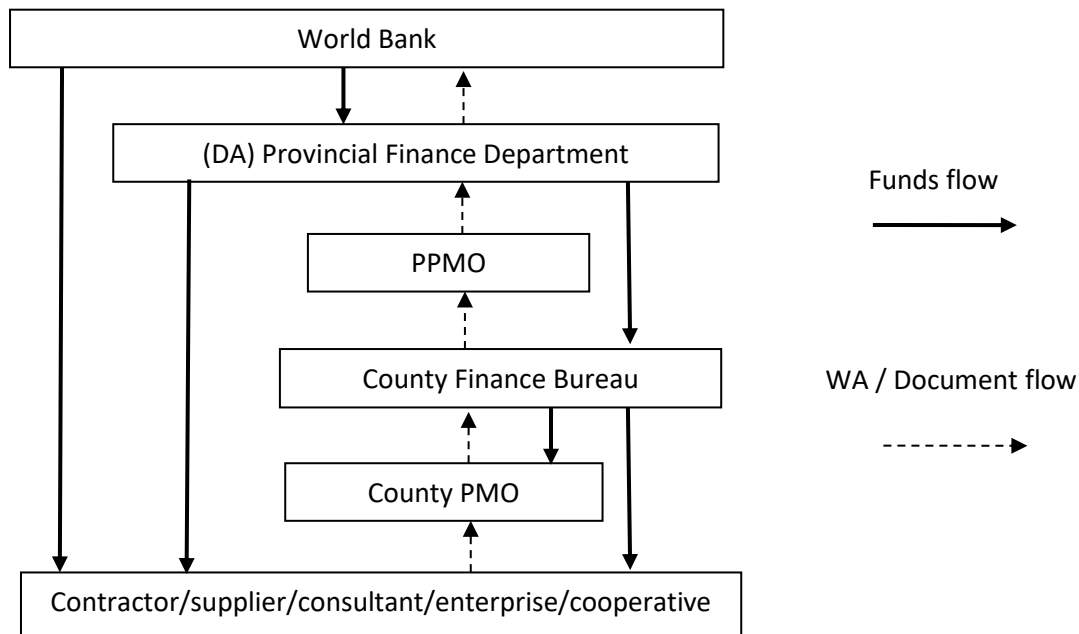
85. The assessed FM risk of the project is considered as Substantial and could be updated when the proposed mitigating measures are implemented and are shown to be effective.

86. Funding sources for the project includes Bank loan, GEF grant and counterpart funds. The Bank loan proceeds and the GEF grant will directly flow to project Designated Accounts (there will be two DAs with one for IBRD loan and one for GEF grant) to be set up at and managed by provincial finance department. The Bank loan agreement will be signed between the People's Republic of China represented by MOF and the Bank, and on-lending agreements for the Bank loan will be signed between MOF and Hubei province via provincial finance department, then provincial finance department will on-lend the loan to county finance bureaus, and project county government is responsible for the repayment of IBRD loan. The GEF grant agreement will be signed between the People's Republic of China represented by MOF and the Bank (as implementing agency of the GEF). Counterpart funds comprise the investment from provincial and county government and the contributions from enterprises/cooperatives in the form of cash or in-kind.

87. *Project budgeting.* The budget cycle of the project would run from January 1 to December 31 of the calendar year. Each enterprise/cooperative is required to prepare its subproject proposals under component 2 and the proposals are to be submitted to related government entities for approval. The first batch proposals are subject to Bank's review and no-objection. County PMOs are responsible for preparing their next year's annual implementation plan. The consolidated project implementing plan which including all activities financed by IBRD loan, GEF grant and counterpart funds would be prepared by PPMO and submitted to the Bank for review before the end of the year.

88. All PMOs are required to conduct variance analysis at least on semi-annual basis. Significant variations will be identified, reported and investigated to ensure the budget is well monitored and project activities could be implemented as planned. The standardized format for project progress report should be designed by PPMO and distributed to all county PMOs. The progress report should be furnished to the Bank in line with the legal requirements.

89. *Flow of Funds.* The Bank loan agreement will be signed between the People's Republic of China represented by MOF and the Bank, and on-lending agreements for the Bank loan will be signed between MOF and Hubei province via provincial finance department, then provincial finance department will on-lend the loan to county finance bureaus, and project county government is responsible for the repayment of IBRD loan. The GEF grant agreement will be signed between the People's Republic of China represented by MOF and the Bank (as implementing agency of the GEF). Following the on-lending arrangement and existing fiscal management, two designated accounts (DAs) will be opened and managed by Hubei provincial finance department (one for IBRD loan and one for GEF grant). To request Bank loan proceeds/GEF grant, each CPMO will prepare a payment request with supporting documents and submit it to the respective county finance bureau for review. The requests will then be processed by the PPMO and consolidated before submission to the provincial finance department. The latter will review the requests and transfer funds from the DAs to the respective CFBs, which will then transfer the funds to contractors/suppliers/consultants/enterprise/ cooperatives. For those activities implemented by PPMO, the payment request will be submitted to provincial finance department and the reimbursed funds will be delivered to contractor/supplier/consultant directly. The detailed disbursement application/request and funds-flow arrangements will be described in the project's FMM. The fund flow is shown in the following chart:



90. *Internal Controls.* Accounting policy, procedures, and regulations for Bank projects have been issued by the MOF which covering appropriate FM duty segregation, payment, and authorization controls and all these requirements will be intergrated in project fianncial manageemnt manual (FMM). FMM aligns the financial management and disbursement requirements among various implementing agencies. To mitigate the FM risk and to strengthen the project FM arrangements in general, the following specific financial controls will be incorporated into the FMM, which is an integrated part of the Project Operations Manual:

- The PPMO shall enhance their guidance and FM supervision of the CPMOs by establishing the FM supervision plan to ensure compliance with the FMM. Such supervision should cover, but not be limited to, the following: (1) review of semi-annual project financial reports, (2) review of project accounts, (3) examination of the project expenditure eligibility and related supporting documents, (4) variance analysis between the approved annual work plan and actual expenditures. The supervision results should be documented in a written report and filed.
- A web-based MIS system will be procured and installed in all PMOs which will cover the whole process of project implementation, including annual plan, procurement, contract management, payment, disbursement, accounting and financial reporting. The required project management and financial information could be generated from MIS system automatically. The MIS system will enhance the capacity on project implementation and management.
- For those activities implemented under Component II using matching grants, county PMO is going to sign an implementation agreement with selected enterprise/cooperative, the contents should include, but not limited to, a) activities to be implemented; b) main technical, fiduciary (including anti-corruption) and safeguard criteria/requirement; c) total investment cost and composition of financing; d) the responsibility of related parties; e) verification procedures; f) the ways of grant delivery/disbursement; and g) dispute resolutions and refund mechanism. The activities associated with civil works and goods which could be centrally procured by CPMO will be following the Bank's procurement regulations and the loan will be paid to the contractors directly. The procurement for the activities related to training, study tours, workshops,



operation expenses and small goods will be carried out by the enterprise/cooperative following commercial practices acceptable to the Bank, and the disbursement will be based on the verification conducted by CPMO and the supporting document provided by the enterprise/cooperative. The remaining activities listed in the agreement will be financed by the contributions from county government and enterprise/cooperative by following related domestic regulations, but all activities are subject to the final verification carried out by CPMO.

91. *Accounting and Reporting.* The administration, accounting and reporting of the project will be set up in accordance with Circular #13: “Accounting Regulations for World Bank Financed Projects” issued in January 2000 by MOF. The circular provides in-depth instructions of accounting treatment of project activities and covers the following:

- Chart of Account
- Detailed accounting instructions for each project account
- Standard set of project financial statements
- Instructions on the preparation of project financial statements

92. The standard set of project financial statements mentioned above has been agreed between the Bank and MOF and applies to all Bank projects and includes the following:

- Balance sheet of the project
- Statement of sources and uses of fund by project components
- Statement of implementation of loan agreement
- Statement of implementation of grant agreement
- Statement of designated account (loan)
- Statement of designated account (GEF)
- Notes to the financial statements

93. The PPMO and each CPMO will be managing, monitoring and maintaining their respective project accounting records for the components they execute. Original supporting documents for project activities will be retained by PPMO and CPMOs. In addition, PPMO and CPMOs will prepare their own financial statements which will then be reviewed and consolidated by PPMO before being submitted to the Bank for review and comment on a regular basis. The interim unaudited financial reporting should be submitted to the Bank within 60 days before the end of each semester.

94. Adequate project accounting staff with educational background and work experience commensurate with the work they are expected to perform is one of the factors critical to successful implementation of project financial management. Based on discussions, observation and review of educational background and work experience of the staff identified for financial and accounting positions in implementing entities, the task team note that the financial staff are qualified and appropriate to the work they are expected to assume. However, given all financial staff do not have previous experiences on the Bank project, the tailored training courses should be provided to all the project financial staff before or during project implementation. For any new counties to be added in the project, the CVs of financial staff should be submitted to the Bank for review and the financing plan for counterpart funds should be updated accordingly. Project financial management manual may need to be revised in responding to the changes on financial management arrangement and the revised manual should be reviewed by the Bank.

95. To strengthen financial management capacity and achieve consistent quality of accounting work, the task team recommended that a Project FMM be prepared as a part of the Project’s Operational Manual. The FMM provides detailed guidelines on financial management including internal controls, accounting procedures, fund and asset



management, withdrawal application procedures, financial reporting and auditing arrangement and so on. The FMM will be distributed to all the relevant financial staff before project effectiveness.

96. *Auditing.* Hubei Provincial Audit Office (HPAO) will be assigned by the China National Audit Office (CNAO) as the auditor for the project. The annual audit report will be issued by the HPAO. The PPMO will submit audited project financial statements satisfactory to the World Bank within six months after the closure of each fiscal year during the entire project life. According to the agreement reached with the MOF and CNAO, the project audit reports will be made publicly available in both World Bank and the HPAO's official websites.

97. *Disbursements.* It was decided that the project will use the traditional disbursement method and the IBRD loan will be disbursed against the eligible expenditures incurred. Three disbursement methods will be applied under the project: advance, reimbursement, and direct payment. Disbursements under the project will be carried out in accordance with the provisions of the World Bank Disbursement Guidelines for Investment Project Financing, the Disbursement and Financial Information Letters (DFILs), and the Loan Agreement and Grant Agreement. The details on the disbursement arrangements are provided in the project's DFILs and the Loan Agreement and the Grant Agreement.

98. The proposed Bank loan allocation and financing percentage are presented in the table below:

Category	Amount of WB Loan Allocated (EUR)	Percentage of Expenditures to be financed by Bank (inclusive of Taxes)
Works, goods, non-consulting services, consulting services, and Training	136,500,000	100%
Total	136,500,000	

99. Retroactive financing will be needed for project activities. It is agreed that no withdrawal shall be made for payments made prior to Signature Date, except that withdrawals up to an aggregate amount not to exceed EUR 13,650,000 may be made for payments made prior to Signature Date but on or after September 1, 2019 for Eligible Expenditures.

100. The GEF grant is expected to be parallel co-financing with the IBRD loan, and the proposed GEF grant allocation and financing percentage are presented in the table below:

Category	Amount of WB Loan Allocated (US\$)	Percentage of Expenditures to be financed by Bank (inclusive of Taxes)
Goods, works, non-consulting services, and consulting services, and Training	6,280,000	100%
Total	6,280,000	

(ii) Procurement

101. *Applicable Procurement Rules and Procedures.* Procurement for the project will be carried out in accordance with the World Bank's Procurement Regulations for IPF Borrowers, dated July 2016 and revised in November 2017 and August 2018, as required by the provisions of the Loan Agreement. Also applicable to the project is WB's Guideline on



Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants. In this project, the Bank's planning and tracking system (Systematic Tracking of Exchanges in Procurement, STEP) will be used to prepare, clear and update Procurement Plans and conduct all procurement transactions. Accordingly, all the procurement activities under the proposed project will be entered into, tracked, and monitored online through the system.

102. *Project Procurement Strategy for Development (PPSD)*. Based on the Procurement Regulations, a PPSD has been developed for the project by the Provincial PMO. The PPSD informs that the local market will be interested and is capable to execute the contracts included in the project. The procurement activities under the project include goods, IT equipment, agricultural machines and tools, non-consulting services, rural infrastructure etc., among which the works, goods and IT equipment (the big data platform) as well as non-consulting services will be procured through open competition by approaching the national market, following national competitive procurement procedures, and using the harmonized model bidding documents agreed with the Bank. Nevertheless, foreign contractors and suppliers are still allowed to participate if they wish to do so. For the consulting services, Consultant's Qualifications Based Selection (CQS) will be mainly used for selection of the consultants, which will be carried out through Open Competition by approaching national markets considering that the participation of domestic firms is most likely to achieve the best fit-for-purpose and value-for-money. Nevertheless, foreign firms are still allowed to participate if they wish to do so.

103. *Potential Risks*. The potential risks related to procurement and contract management have been identified during project preparation. The risks include: (i) The PMO and the county agricultural and rural bureaus (the County PMOs or CPMOs) do not have experience in implementing the Bank financed projects; and (ii) The procurement staff assigned in the PMO and the CPMOs do not have the Bank procurement experience; and (iii) The PMO established within Hubei Provincial Agriculture and Rural Affairs Department (DARA) and the CPMOs established within County Agriculture and Rural Affairs Bureaus may have weak technical capacity in reviewing or preparing works, goods and IT equipment as well as non-consulting services bidding documents, Terms of References (TORs) as well as deliverables or outputs. They may also be weak in executing works contracts as employers, reviewing variations and pricing, and acceptance of the works etc. However, the PMO has recently completed the Hubei Province Shiyuan Smallholder Agribusiness Development Project (SSADP) financed by IFAD, and the county agricultural and rural bureaus have implemented similar government funded projects. Both the PMO and the CPMOs have been officially established and a procurement staff has been respectively designated for the PMO and each CPMO. A procurement agent with the Bank procurement experience has been hired by the PMO, which will assist the PMO and CPMOs in conducting procurement of the contract activities in the Procurement Plans, including preparing commercial part of the bidding documents, publishing procurement notices and contract awards, issuing bidding documents, clarifications or amendments of the bidding documents, conducting bid opening, organizing bid evaluation etc. With the implementation of proposed actions to strengthen the procurement capacity (see below), the assessment concluded that PMO and CPMOs have adequate capacity to carry out procurement activities for the proposed Project. The procurement risk is rated as Moderate. For any new counties to be added in the project, the CPMOs shall be officially established and CVs of their designated procurement staff should be submitted to the Bank for review and the Procurement Plan should be updated accordingly. The PPSD and the Procurement Manual may need to be revised in responding to the changes on the procurement arrangements and should be reviewed by the Bank.

104. *Proposed Mitigation Measures*. To mitigate the above potential risks, the proposed measures include: (i) Designers and residential supervision engineering firms will be hired to prepare technical part of bidding documents, including technical specifications, drawings and bill of quantities, and to supervise the works contracts on the sites during contract implementation under Component 2; (ii) Technical experts will be hired or engaged to assist the PMOs to review the bidding documents, bid evaluation reports, draft contracts and variations and pricing from a technical perspective; (iii)



the Bank team should provide continuous procurement training and the PMO and CPMOs' staff are also encouraged to attend the procurement training organized by an institute acceptable to the Bank throughout the project preparation and implementation; (iv) to enable the PMO and the CPMOs to get familiar with Bank's related procurement requirements, all procurement assigned staff should register for the fiduciary e-learning platform developed by the Bank (www.wbelp.com) and complete the self-learning of procurement module and get the completion certificate before effectiveness of the loan agreement; and (v) since the proposed Project covers a number of counties with a variety of contracts and activities, a Procurement Manual should be prepared, including detailed procurement arrangements and procedures for each procurement approach, so that the county PMOs may easily follow the Bank's procedures and requirements during project implementation.

105. *Procurement Plan.* Based on the PPSD, two Procurement Plans with one for GEF and one for the Bank loan, have been separately prepared and agreed by the Bank. These plans include the contract activities to be procured for Components 1 and 3 during the whole project period as well as the contract activities to be procured for the first year's proposals submitted by the enterprises/cooperatives under Component 2 as a framework approach will be applied to the design of the enterprise-level value chain investments under Component 2. The Procurement Plans will be updated at least annually to (a) reflect project implementation; (b) accommodate changes to be made; and (c) add new packages as needed for the project. All the contract activities included in the two procurement plans will be procured by following the Bank Procurement Regulations.

106. *Procurement Arrangements.* In the Procurement Plans respectively for the Bank loan and GEF, the contract activities under Components 1 and 3 will include goods, IT system (the big data platform) and consulting services, and will be procured and executed by the PMO or CPMOs depending on provincial or county level activities; and the contract activities being financed by the matching grants in the proposals submitted by the enterprises/cooperatives under Component 2 will be procured and executed by the respective CPMO. For other activities eligible for being financed under Component 2 and not listed in the Procurement Plan, such as the low value procurement activities, and non-procurable items of training, study tours, workshops, extension of sustainable production practices etc. financed by the matching grants, the PMO has agreed to have an implementation agreement signed between the CPMOs and each enterprise/cooperative including at least scope, technical, the Bank's social and environment safeguards, fiduciary and anti-corruption requirements and verification procedures etc. Under the implementation agreement low value procurement activities, such as small goods, may be directly procured by the enterprise/cooperative by following the commercial procurement practice as specified in the Procurement Manual with due attention to economy and efficiency under the implementation agreements. Such low value procurement activities will not be included in the Procurement Plan, and the Bank Procurement Regulations do not apply to them either. Under the implementation agreement the non-procurable items of training, study tours, workshops, extension of sustainable production practices etc. financed by the matching grants will be directly carried out by the enterprise/cooperative, and disbursement to the enterprise/cooperative will be made to the enterprise/cooperative against the verification conducted by CPMO and the supporting documents for relevant eligible expenditures provided by the enterprise/cooperative.

C. Safeguards

(i) Environmental Safeguards

107. **Environmental Assessment (OP4.01).** The project is expected to bring about positive environmental and social impacts in terms of more sustainable and climate smart agricultural practices. These benefits include farmland protection, agricultural pollution and GHG emission reduction, and improvement of food quality and safety. Meanwhile, the project may bring adverse impacts during the operation of the project, including (1) impacts on natural habitats such as soil erosion, vegetation clearance, and water pollution, particularly in the areas near surface waters; (2)



construction impacts and social disturbance such as noise and dust associated with small civil works; (3) waste management in livestock farms during operation; and (4) pesticide misuse associated with growing a number of agricultural products. However, these environmental impacts are found to be limited, localized, and temporary and can be avoided or minimized with readily available measures. The project is therefore classified as Category B as per OP 4.01. The project will not involve any dams and legally protected physical cultural resources. As designed, the project will adopt a framework approach. As the location of investments are to be identified in the implementation stage, therefore, an Environmental and Social Management Framework (ESMF), including a set of generic Environmental Code of Practice (ECOP) for different physical activities, and Pest Management Plan (PMP), was developed during the project preparation. Several WBG Environmental, Health, and Safety Guidelines (EHSGs) relevant to the agribusiness and crop production sector were incorporated into the ECOP where applicable.

108. Project activities under Component 2 will involve physical activities. Under this component, the project will support several cooperatives and enterprises in selected counties/districts of Hubei Province. The project will finance renovation and rehabilitation of production bases and related infrastructure and equipment, including processing centers and related equipment, agricultural waste treatment and disposal capacities in tea, paddy, vegetables, fruits, and livestock value chains. The physical activities include off-grade access roads, small-scale irrigation and drainage facilities, silos, farmland leveling/grading, small civil works such as labs, processing workshops and warehouses, and biological isolation belts. Except paddy and vegetables, the plants to be engaged by these cooperatives and enterprises are all perennial and existing local species. This component doesn't involve massive expansion of plantation or livestock farms but aims to help farmers improve the quality and safety of their products and treat/dispose of their agricultural wastes to reduce the use of agrichemicals and reduce GHG emission and pollution and increase their resilience. The project activities under component 1 and 3 will not cause any environmental impacts. Thus, implementation of the technical norms and GAPs is limited only to the physical activities under component 2.

109. **Location and baselines.** The Hubei Province is in the central part of China and at the middle stream of the Yangtze River. The province is surrounded by mountain ranges to the east, west and north. While 56% of the total land area is mountainous, hills and plains account for 24 and 20% of the total area, respectively. Hubei has an abundant surface water resource. There are 4,228 large rivers, with a total length of 59,200 km. Hubei is also known for its large number of lakes, most of which are in the Hanjiang Plain. Currently, there are 755 lakes with a combined surface area of 2,706 km². The project covers selected counties/districts/cities, including Honghu City, Tongcheng County, Nanzhang County and Jingshan City. Some of these areas have abundant ecological resources with high biodiversity value, which have been well conserved in the forms of natural reserves and forest parks. The lakes within the project area are eutrophic due to the discharge of wastewater from agricultural and domestic sources.

110. **Natural Habitats (OP 4.04).** During the development of the ESMF, surveys on ecological and social baselines were carried out through desk review, consultation, and field visits. Several ecologically sensitive areas, including nature reserves, scenery areas, geological parks, and drinking water source protection areas, were identified in the project location. Hence, OP 4.04 is triggered. The map for each project county/district has been prepared under the ESMF which has scoped these sensitive areas. This map will be used by the design team to avoid these sensitive areas. The project design and the ESMF have incorporated procedures and measures to avoid involving the identified sensitive areas and to mitigate effectively the potential impacts on the common natural habitats in the project area.

111. The agricultural products involved in the project are expected to be local species, most of which are perennial. The project will not support production scale-up through large-scale plantation development. The focus is on improving product quality and safety by promoting advanced agricultural technologies and organic food. There may be limited vegetation clearance and soil erosion associated with the growing activities, which have been assessed, and mitigation measures have been included in the ECOP.



112. **Pest Management (OP 4.09).** The project does not directly finance pesticides and agrochemicals. Conversely, this project intends to reduce the use of agrochemicals by promoting the integrated pest management approach which is a core part of the project design. Yet, the project activities may alter cropping pattern or the mode of pest management, thus OP 4.09 is triggered and a Pest Management Plan (PMP) has been prepared. A survey of the pest management practices in the project area was conducted and plant specific pesticide practices were studied. The pesticides used for this project would be limited given the following considerations: (1) A significant share of agricultural products to be supported by the project are local perennial plants that are adapted to the local ecological environment and thus do not require significant use of agrochemicals. Compared to annual crop production, pesticide use is anticipated to be very limited and most of them are fungicide. (2) The main thrust of the project is to support the production of high-quality, safe and pollution-free food products (organic and green food) for which currently a strong demand exists among increasingly quality conscious urban consumers. To this end, the PMP includes a set of physical, mechanical, and biological pest control measures that are specific to each type of plant, and a concrete plan to promote IPM to reduce chemical pesticides. Capacity-building, monitoring, and reporting requirements are also included. Further, during the project implementation, the proposals prepared by farmer cooperatives and enterprises are expected to present pest management measures (including training aspects) specific to the plant types. A clear rationale and justification are required for any pesticide use, given that the purpose of the project is to produce high-quality, safe food.

113. **ESMF/EMP/PMP.** The PPMO engaged an experienced Environmental Impact Assessment (EIA) consultant to prepare the ESMF, which addresses the project-related environmental issues and sets out principles and procedures to address the environmental impacts of subprojects. The ESMF is prepared in accordance with domestic and World Bank safeguards requirements, which will guide the environmental and social screening and subsequent assessment of subprojects activities. During the implementation, each cooperative and enterprise will prepare an Environmental Management Plan (EMP) based on the ESMF. The PPMO takes overall responsibility for the implementation of the ESMF and EMP. Each county/district has established a PMO to take the responsibility for implementing the ESMF and EMP within its geographical scope.

114. **Consultation and Information Disclosure.** Public consultation with key project stakeholders from the private and public sectors as well as information disclosure were done during the project preparation. The project environmental and social consultants carried out consultation through questionnaire surveys, focus group meetings, and interviews. Public opinion has been incorporated into the project design and the ESMF/ECOP. In accordance with the World Bank's Access to Information policy, on October 30, 2019, the ESMF was disclosed locally and on websites of the relevant government agencies and made accessible Hubei's Agricultural and Rural Department. The ESMF along with Pest Management Framework, Resettlement Policy Framework, Social Assessment Report were disclosed on the World Bank's website on December 20, 2019.

(ii) Social Safeguards

115. **Social Impact Assessment (SIA).** A full social impact assessment has been conducted by the borrower to assess potential positive and negative project impacts to local communities. A SIA report has been submitted to the task team to inform project design. The following summarizes the impacts and required measures based on findings of this assessment.

116. **Involuntary Resettlement Policy (OP4.12).** Project activities in Component 2 include financing productive infrastructure and equipment (including all-season access roads, efficient irrigation and drainage systems, machinery for straw return, among others). Land acquisition or temporary land use restrictions are unavoidable to support this component, hence OP4.12 is triggered. The SIA conducted by the borrower indicates that about 80.03 mu (5.34 hectare) of collective land, which has been acquired in the past two years and that affected 76 households with 330 persons, will



be used for the Project. A due diligence report has been prepared by the borrower that indicated that the process of land acquisition was in line with local rules and regulations, which also met compliance requirements of OP4.12. A further 53 mu (3.53 hectare) of collective land is planned to be acquired for the Project to support two cooperatives, affecting 45 households with 135 persons. Because the exact nature and location of civil works will be determined at project implementation stage, the Borrower has prepared a Resettlement Policy Framework (RPF). The RPF has been consulted upon, validated in-country and at the World Bank, and publicly disclosed in July and again in October 2019. A Resettlement Action Plan (RAP) will be prepared if detailed design is clear under the guidance of the RPF. Project activities under component 1 focus on developing systems and building intuitional capacity enhancement to implement the 3S risk assessment systems, hence no civil works is expected. Similarly, there is no civil work expected to implement project activities under Component 3, which include knowledge and project management to gather and share the experiences and lessons learned from the project.

117. Indigenous Peoples Policy (OP4.10). Although the official registration information suggests there are ethnic minority people in the project area, they do not meet the definition of OP4.10 from all aspects. The social assessment report indicates that there are 166 people with ethnic minority registration accounting for 0.002% of the population in the project area. These people mainly came via marriage and migration in previous generations and have been well-adapted into mainstream society, speaking the same language, and working on allocated land the same way as other people, and they cannot be separated from others from cultural, economic, or political perspectives. Therefore, there are no ethnic minority in project areas satisfying definition of World Bank OP4.10, hence OP4.10 is not triggered.

118. Citizen Engagement. Citizen engagement has been done through the social assessment process, where local communities including farmers and agricultural businesses have been informed of the proposed project activities and consulted on their views and feedback on these activities. The consultations also included related project impact such as opportunities for increased income through agricultural investment and improved rural infrastructures, and negative impact including land acquisition/resettlement. There is wide support from local farmers in all project counties, and this is recorded in the SIA report. The GRM was also established through information disclosure at project township level during the social assessment. Contact details of project management units at county and provincial levels has been included in the information. The consultative process will continue to be a key feature during project implementation, reaching out to stakeholders and citizens at large through targeted communication tools, consultative processes such as workshops and focus group discussions, and feedback mechanism to build ownership of project interventions and enhance sustainability of outcomes. Monitoring and evaluation includes specific indicators to monitor continued citizen engagement for further guidance in adopting better citizen engagement practices in subsequent project years. Staff receiving feedback/complaints from affected people has been appointed and will be trained on how to manage the GRM.

119. Inclusion. There are 36 poor villages in the initially proposed project counties, with 10,702 poor households and a poor population of 42,808. Tongcheng County is a provincial-level poverty county. The social assessment report describes stakeholder engagement process. The assessment identified and consulted with main stakeholders who are expected to be affected by project interventions directly. The social assessment indicated that the main reason causing poverty is limited income resources. The project is expected to improve local people's income in general through investing in smart and sustainable agriculture. It has been designed that agricultural development cooperatives participating in project activities will demonstrate mechanism for engaging local poor households and bring benefits to these people. Most cooperatives use land pooled from individual farmers to achieve scaled production. Many farmers are freed from their land and would opt to do migrant work, but it is recommended that these farmers should be given opportunities to gain more from their land in addition to receiving rent. These opportunities include receiving training on 3S agriculture, which would benefit them in the long run. When approving business plans from cooperatives,



conditions such as farmers' participation in benefits sharing will be included as important selection criteria. Selection of participating cooperatives will also use inclusion of poor households as a key criterion.

(iii) Gender

120. China has made substantial progress on gender equality; however, inequalities remain across livelihoods sectors, especially in the agriculture sector. A gender analysis was conducted as part of the project's SIA, which includes demographic information, social and economic status of women, and employment status. The SIA report indicates that, in project areas, women are the main farming workforce while men are mostly doing migrant work. Other evidence shows that gender is the single most important circumstance determining incomes in China.⁷ The nationwide female to male earnings ratio is only 0.64. This gender gap in income earnings is even wider in the central part of the country (which includes Hubei) and for those in rural areas, where men earn nearly twice that of women. Food safety risks, which as discussed above have disproportionately negative impacts on women, also reduce women's labor productivity, thereby worsening income gaps. Membership in farmer cooperatives can be instrumental to closing the gender gap in income earnings as studies have shown that the average income of farmer cooperative members was 20% higher than non-members.⁸ However, Chinese men are more likely to be members of farmer cooperatives than women.⁹ They are also more likely to manage cooperatives than women, with data from Chaoyang City showing that only 29% of farming cooperatives are managed by women or have a majority share of female members.¹⁰ Although no data are available on the funding gap, compared to men-led cooperatives, women-led cooperatives tend to be smaller, have less access to funding, and have inadequate technical, financial and commercial management. Only 27% of surveyed female-managed cooperatives had received funding support from governments at all levels.

121. To address the gap in funding that exists between male and female-owned cooperatives, the project will prioritize investing in women-led cooperatives and enterprises, or those with a defined significant share of women members.¹¹ This will be done by prioritizing applications from these cooperatives/enterprises, supported by an outreach effort to women-led cooperatives and their female members, and providing additional assistance during the application process. The project will monitor the progress in reducing the gender gap by ensuring at least 21 of the 50 farmer cooperatives that the project will support are managed by women or have a significant share of female members. This represents 42% of cooperatives receiving funding, a large improvement over the 27% of women-led enterprises receiving funding on average.

122. To address the other abovementioned constraints to women farmers, the project will (i) enhance women's skills and awareness of environmental, climate, and food quality and safety risks with trainings and capacity building activities in a specific platform; and (ii) ensure that where ICT innovations are promoted by the project, they are optimized for accessibility by women. Specific actions under the project include (a) setting a quota/target that 55% of the total users engaged in 3S food quality and safety platforms (and in all other trainings and capacity-building events) are women. The project will have extensive outreach to potential women participants, provide assistance in their applications, and give a preferential treatment for women applications to participate in these project activities. The associated indicator for

⁷Inequality of Opportunity in China's Labor Earnings: The Gender Dimension, *China & World Economy*, 2019

⁸Farmer Cooperatives in China: Development and Diversification, *Economics and Management of Networks Conference*, 2013.

⁹The Service Supply Effect of Cooperatives under Economic Transformation: A Demand-Supply Perspective, *Sustainability*, 2018.

¹⁰The Development of Rural Women's Specialized Cooperatives in China: An Analysis from New Institutionalism Perspective. *Advances in Politics and Economics*, 2018.

¹¹For the purpose of this indicator, cooperatives with a "significant share of female members" are defined as those cooperatives with female members making up at least a third of their total members.



this action is that 2,750 of the 5,000 users that are targeted to benefit from the food quality and safety platform are women.

(iv) Grievance Redress Mechanisms

123. Multiple public consultations were conducted during the social assessment in all project counties. Local communities were consulted on project plan and it was discovered that local communities support the proposed project. Project information including contact persons was disclosed in all project townships and selected villages through posting. The postings included instructions for raising concerns to project management offices at various levels. Project staff at provincial, county and township levels will be trained on how to operate the GRM. Participatory processes such as social audit, citizens report cards, and community score cards that would acquire feedback on performance of the interventions and of the agencies involved in planning and execution of project activities will be the key tools used for social accountability. Special consideration will be given to remote locations and areas with vulnerable population groups. The Steering Committee will act as the first tier of the GRM. A second-tier GRM will be established at the county level and the third tier of the GRM will be the project director at the province level.

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

V. KEY RISKS

125. Overall Risk and Explanation: The overall risk is Substantial. From a technical perspective, there are very few projects which have tried addressing the challenges of food quality and safety, sustainable agriculture and climate smart agriculture with interlinked interventions in one operation posing design challenges in the initial period. The technical design risk of the proposed project is therefore rated Substantial. The planned investments supported under the proposed project draw on experiences from a variety of World-Bank supported projects, such as the Guangdong Agricultural Pollution Control Project, Integrated Modern Agriculture Development Project, and the Climate Smart Staple Crops Production Project. The project will largely invest in technologies that have already been piloted, while also aiming to introduce new technologies, to be identified during the preparation, where feasible, and combine them in new and innovative ways. Investments in agricultural production would be subject to 3S GAP standards. Given the overall focus of the project to reduce pesticide use, there may be no need for the separate pest management plan. As an agriculture project, investments are also at risk from climate change and climate hazards. Since one of the project's objectives is to promote CSA, the project will be contributing to the increased resilience of agriculture in Hubei compared to traditional approaches.

126. Macroeconomic risks are rated substantial given the particularly severe economic costs expected for Hubei province as a result of the COVID-19 outbreak. While the size of the project is moderate and should not in and of itself exceed the debt carrying capacity of provincial and county-level governments, the size of the expected economic



downturn in Hubei may affect the ability of beneficiary enterprises as well as county level governments to mobilize the required matching investments and public counterpart funds envisaged under the project. Careful due diligence will be required, and the financing parameters may need to be adjusted during project implementation to take these risks into account. At the same time, if the baseline macroeconomic expectation for a rapid recovery of the Chinese economy holds, this together with the substantial fiscal support provided by the central government should alleviate economic and fiscal constraints in Hubei by the second half of 2020 and thus prior to the implementation of most project activities. The financing provided by the project should also help beneficiary cooperatives/enterprises, and also local government implementing agents, who may be strapped for cash as a result of the economic fallout of COVID-19.

127. Sector policies and governance and political risks are rated moderate. The rapid replacement of key political leaders in Hubei in response to the delayed action during the initial phase of the COVID-19 outbreak has focused the attention of policy makers on the complex linkages between agricultural production practices, and animal and human health. Against this backdrop, the project is highly relevant, and the provincial authorities have reconfirmed their strong commitment to it, as a complement to the COVID-19 Emergency Response and Preparedness operation. While some policy and governance risks persist, the multipronged engagement of the Bank through two parallel operations provides some risk mitigation.

128. From an institutional perspective there are a few areas that require capacity building, especially as they relate to strengthening of governance arrangements of farmer cooperatives. There are also risks related to the institutional capacity for implementation. Primary responsibility for project implementation will be by the Provincial Project Management Office (PPMO) under the Department of Agriculture and Rural Affairs (DARA) of Hubei Province, in coordination with county PMOs (CPMOs) that have been established in the DARAs of each of the participating project counties. Although the PPMO does not have recent experience in implementing World Bank-financed projects, it recently completed implementation of an IFAD-financed agriculture project. The four county DARAs have implemented similar government-funded projects. Nevertheless, this risk is rated as Substantial. Mitigation measures will include the provision of training on all aspects of Bank project management for both the PPMO and all CPMOs. It will be complemented by more intensive supervision during the first two years of project implementation.

129. The fiduciary risk is rated Substantial due the following considerations: (i) the PPMO and CPMOs do not have recent World Bank-financed project experience; (ii) the PMO and the four County PMOs have assigned FM and procurement staff. However, they do not have Bank FM or procurement experience; and (iii) the PPMO and CPMOs may have weak technical capacity in reviewing or preparing reimbursement and bidding documents; they may also be weak in monitoring deliverables, executing works contracts, and reviewing variations and withdrawal applications for disbursement, and acceptance of the works. To mitigate these potential risks, the proposed measures include: (i) the PMO and the county PMOs should set up project management team(s) comprising technical, FM, procurement and contract management experts who will assist the PPMO and CPMOs to review the bidding documents, bid evaluation reports, draft contracts, variations and withdrawal applications for disbursement, including supporting documents; (ii) the WB team should provide continuous FM and procurement training to the PPMO and CPMOs; and all the procurement staff assigned should register for the fiduciary e-learning platform developed by the Bank; and (iii) since the proposed project covers four counties with a variety of contracts and activities, it is recommended that FM and Procurement Manuals should be prepared, including detailed arrangements and procedures, so that the PMOs may easily follow the WB's procedures and requirements during project implementation.

130. The environmental and social risks are rated Moderate because the project is expected to have in general positive environmental and social impacts. The project aims to significantly reduce the use of chemical fertilizers and pesticides which is expected to reduce non-point sources of agricultural pollution and reduce chemical residue hazards in the agro-produce. From a social perspective there is a risk of imbalance of power between enterprise and farmers in vertically



integrated production structures. Farmers are generally the weaker stakeholders in such value-chains. Particularly, in the cases of specialized products, market channels tend to be narrow with often only one processor or marketing company determining production conditions and price. The same company often also provides inputs and technical services. In such arrangements, benefits from added value or increased productivity could be captured primarily by the enterprise partner. There are also concerns related to benefit-sharing arrangements of farmer cooperatives. The project would aim to reduce power imbalances by strengthening the farmer cooperatives' legal status and their governance arrangements. Permanent or temporary restrictions on land use by farmers in small quantities is expected for rural infrastructure development. The social screening indicates that there are no ethnic minority groups in project areas. An ESMF has been developed for the project to guide the mitigation of safeguards risks during implementation.



VI. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: China

HUBEI SMART AND SUSTAINABLE AGRICULTURE PROJECT

Project Development Objectives(s)

The PDO is to promote integrated environmentally sustainable and climate-smart agriculture, and agri-food quality and safety, in targeted value chains and landscapes in Hubei Province.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	End Target
Sustainability and Resilience			
Area under 3S GAP production practices (area of landscapes under improved practices) (Hectare(Ha))		0.00	120,000.00
Climate Smart Agriculture			
GHG emission mitigated (Metric tons/year)		0.00	600,000.00
Food Quality and Safety			
Reduced pesticide and veterinary drug residue levels in the select value chains (Percentage)		0.00	20.00



Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	End Target
Agricultural Risk Assessment, Management, and Communications			
3S risk assessment systems developed (Number)		0.00	5.00
3S GAP standards developed (Number)		0.00	5.00
Pre-conditions in place for agriculture as offset for emissions trading scheme (newly established incentive mechanism) (Number)		0.00	4.00
Number of 3S analytical platforms fully integrated with big data systems (Number)		0.00	5.00
3S risk communication programs in place (Number)		0.00	5.00
Number of users engaged in 3S food quality and safety platforms (Number)		0.00	5,000.00
Number of female users engaged in 3S food safety platforms (Number)		0.00	2,750.00
Demonstration and Replication of Smart and Sustainable Agricultural Practices			
New area under Integrated Pest Management (Hectare(Ha))		0.00	35,000.00
Area under Integrated Landscape Management Plans (Hectare(Ha))		0.00	280,000.00
Reduction in quantity of fertilizers applied (Percentage)		0.00	20.00
Increased soil organic matter (soil organic carbon) (Metric tons/year)		0.00	200,000.00
Improved livestock waste management investments supported (Number)		0.00	11.00
Proportion of production in project assisted areas covered by traceability platform (Percentage)		0.00	30.00
Crop production (Percentage)		0.00	40.00
Livestock production (Percentage)		0.00	40.00



Indicator Name	DLI	Baseline	End Target
Newly certified products (Number)		0.00	25.00
Number of farmer cooperatives strengthened/supported (Number)		0.00	50.00
Of which are managed by women or have a significant share of female members (Number)		0.00	21.00
Project and Knowledge Management			
Farmers reached with agricultural assets or services (CRI, Number)		0.00	300,000.00
Farmers reached with agricultural assets or services - Female (CRI, Number)		0.00	115,000.00
Grievances registered related to delivery of project benefits addressed (Percentage)		0.00	100.00
Citizen's feedback received on services provided by Project (Percentage)		0.00	80.00

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
Area under 3S GAP production practices (area of landscapes under improved practices)	This is the sowing area that applies green agricultural and environmentally friendly farming practices.	Annually	MIS and progress report	Farm survey using appropriate sampling techniques.	PMO
GHG emission mitigated	This indicator measures the reduction in metric tons of greenhouse gas emissions	Annually	Monitoring report	Monitoring point sampling	PMO & Independent experts



	from nitrous oxide, methane and carbon dioxide from agricultural activities of the project.				
Reduced pesticide and veterinary drug residue levels in the select value chains	This indicator refers to keeping pesticide and veterinary drug residues under the limitation of the state food safety legislation.	Once or twice a year	Sample survey and test report	Summary analysis of sampled data.	PMO and Independent agency

Monitoring & Evaluation Plan: Intermediate Results Indicators

Indicator Name	Definition/Description	Frequency	Datasource	Methodology for Data Collection	Responsibility for Data Collection
3S risk assessment systems developed	This indicator refers to an establishment of a platform, mechanism, program, standard and other systems for conducting 3S production risk assessment.	Annually	MIS and Progress reports	Monitoring of systems using checklist for each System developed	PMO
3S GAP standards developed	This indicator measures the number of standards developed that meet 3S production requirements in the select value chains.	Annually	MIS and Project Reports	Monitoring of GAP standards by using checklist for each developed standard.	PMO
Pre-conditions in place for agriculture as offset for emissions trading scheme (newly established incentive mechanism)	This indicator measures the number of preconditions that are in place for mechanisms of agricultural carbon trading and formulate incentives for	Annually	MIS and Project reports	Monitoring of Pre-conditions in place	PMO



	carbon emission reduction. This is also a GEF indicator.				
Number of 3S analytical platforms fully integrated with big data systems	This indicator refers to the number of 3S data platforms established at the provincial and county levels.	Annually	MIS and Project reports	Monitoring data platforms using checklist of eligible platforms developed	PMO
3S risk communication programs in place	This indicator refers to the number of 3S risk communication programs in place at the provincial and county levels.	Annually	MIS and Project reports	Monitoring and reporting communication programs developed.	PMO
Number of users engaged in 3S food quality and safety platforms	This indicator measures the number of users engaged in 3S food quality and safety platforms from the project supported FCs, companies, farmers, agencies, and others.	Annually	Progress and output verification reports	Monitoring and survey of platform users	PMO
Number of female users engaged in 3S food safety platforms					
New area under Integrated Pest Management	This measures the area covered by an integrated pest management (IPM) farming practices. This is a GEF indicator.	Annually	Farm surveys		PMO
Area under Integrated Landscape Management Plans	This indicator refers to the area covered by agricultural management plan in a comprehensive consideration and understanding with	Annually	MIS and Progress reports		PMO



	ecological analysis such as crop succession, soil condition, neighbour plants, animal dynamics, input disturbance, social activity in a relative larger area. This is a GEF indicator.				
Reduction in quantity of fertilizers applied	This indicators measures the percentage reduction in synthetic fertilizer use. This is also a GEF indicator.	Annually	Surveys and project reports	Environmental Monitoring, reporting, verification	PMO and Independent monitoring agency
Increased soil organic matter (soil organic carbon)	This indicator is a measure of an increase in carbon organic matter such as polysaccharides, proteins, amino acids, and humic acids in soil. This is a GEF indicator.	Annually	Sample farm surveys and progress reports	Monitoring, reporting, and verification	PMO and Independent monitoring agency
Improved livestock waste management investments supported	This indicator measures the number of improved livestock manure management such supported by the project. This is a GEF indicator.	Annually	MIS and project reports	Monitoring and project reporting	PMO
Proportion of production in project assisted areas covered by traceability platform	This indicator measures the coverage of food quality and safety traceability system in the production system.	Annually	MIS and progress reports	Monitoring and reporting	PMO
Crop production					



Livestock production					
Newly certified products	This indicator measures the number of agricultural products certified for meeting food quality and safety standards by an accredited agency.	Baseline, mid-term, end of project	Market and trader surveys		PMO
Number of farmer cooperatives strengthened/supported	This measures the number of farmers cooperatives' that the project finances to build their capacity as well as their investments in 3S agricultural practices. This is also a GEF indicator.	Annually	Farmers surveys and progress reports		PMO and Independent M&E agency
Of which are managed by women or have a significant share of female members	This indicator measures the number of cooperatives that are either women-led or with a "significant share of female members", which in this RF is defined as those cooperatives with female members making up at least a third of their total members.				
Farmers reached with agricultural assets or services	This indicator measures the number of farmers who were provided with agricultural assets or services as a result of World Bank project support. "Agriculture" or	Annually	MIS and project Reports		PMO



	<p>"Agricultural" includes: crops, livestock, capture fisheries, aquaculture, agroforestry, timber, and non-timber forest products. Assets include property, biological assets, and farm and processing equipment. Biological assets may include animal agriculture breeds (e.g., livestock, fisheries) and genetic material of livestock, crops, trees, and shrubs (including fiber and fuel crops). Services include research, extension, training, education, ICTs, inputs (e.g., fertilizers, pesticides, labor), production-related services (e.g., soil testing, animal health/veterinary services), phyto-sanitary and food safety services, agricultural marketing support services (e.g., price monitoring, export promotion), access to farm and post-harvest machinery and storage facilities, employment, irrigation and drainage, and finance. Farmers are people</p>				
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	engaged in agricultural activities or members of an agriculture-related business (disaggregated by men and women) targeted by the project.				
Farmers reached with agricultural assets or services - Female					
Grievances registered related to delivery of project benefits addressed	The indicator measures the proportion of grievances received by the Grievance Redress Mechanism system (GRM) set up by the project that are actually addressed within the standard timeframe set up by the GRM system.	Annually	Progress reports		PMO
Citizen's feedback received on services provided by Project	This indicator provides the average satisfaction/dissatisfaction received from clients from farmers on services provided by the project.	Quarterly	GRM system		PMO



The World Bank

HUBEI SAFE, SUSTAINABLE, SMART AGRICULTURE PROJECT (P168061)



ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: China

HUBEI SMART AND SUSTAINABLE AGRICULTURE PROJECT

1. The project will require intensive implementation support and a continuous dialogue with the client. The World Bank's implementation support strategy combines periodic supervision with timely technical support and policy advice as necessary. Implementation support will include (a) an implementation support mission (ISM) every six months; (b) interim technical missions and field visits by the World Bank; (c) monitoring and reporting by the PMO on implementation progress and achievement of results; (d) third-party impact evaluation (baseline, midterm, and final); (e) annual internal and external financial audits and FM reporting; and (f) periodic procurement post review. The ISM will visit randomly selected project sites, to assess and physically verify the work financed by the project. These site visits will include interaction with herders and their organizations, private sector, aimag and soum level officials, and so on.
2. It is expected that the early implementation phase, in particular, could face implementation challenges, which will be addressed through the following actions:
 - (a) **Implementation support strategy.** This will be largely built on dialogue and partnership. The implementation support team will have continuous interaction with all stakeholders of the project. This will require consistency in the composition of the core implementation support team, technical expertise, and familiarity with country/local situations.
 - (b) **Capacity building of the implementation agencies.** Significant training and hands-on support will be required on a technical level and in terms of fiduciary and safeguards management. This will include supporting the PMO in (i) developing annual works and financial plans, (ii) task planning and task supervision, (ii) review of important ToRs for key consultancies, and (iii) coordination with development partners.
 - (c) **M&E and learning.** Coordination of M&E and the capturing of project outcomes and results will need professional guidance from an M&E expert on the implementation support team.
 - (d) **Fiduciary assurance support.** The proposed funds flow brings challenges for project financial management. The implementation support team will provide hands-on guidance related to review and audit reporting procedures. Similarly, procurement activities will be spread widely among entities, types of procurement, and size of contracts. This will require intensive implementation support.
 - (e) **Social and environmental safeguards.** M&E and mitigation of social risks require experienced expertise on the implementation support team with a good understanding of the culture and business process in China. In addition, sufficient staff time and resources will be provided to review site-specific environmental management measures during the investment planning process for private agribusiness enterprises, producer cooperatives and family farms. Special emphasis will be placed on the (i) strengthening of the GRM and (ii) other feedback loops to solicit feedback and grievances from the beneficiaries. The World Bank team will be able to have access to the report.



3. **Implementation support plan.** The following implementation support plan reflects the preliminary estimates of skill requirements, timing, and resource requirements over the life of the project. Keeping in mind the need to maintain flexibility over project activities from year to year, the implementation support plan will be reviewed periodically to ensure that it continues to meet the implementation support needs of the project. Table 2.1 indicates the World Bank team's implementation support plan and the required skill mix.

Table 2.1. Implementation Support Plan and Skill Mix

Time Needed	Focus	Skills
0–18 months	<ul style="list-style-type: none"> Setting up core team at the PMO, project management systems including fiduciary, safeguards, and M&E Baseline investigation survey completed Onboarding Technical Staff in the PMO Staff capacity building of the PMO Conducting risk assessments and improving risk management frameworks Action planning for demonstration sites and rolling out innovative 3S technology packages Call for proposals under big data systems and traceability systems Upgrade of labs/equipment purchase and so on Developing carbon sequestration protocols and roadmap for MRV protocols 	<ul style="list-style-type: none"> Core team, particularly FM, procurement, M&E, and so on Climate agriculture expert Livestock waste management expert Digital agriculture experts Project economist
18–36 months	<ul style="list-style-type: none"> Review of implementation strategies and developing a scale up plan Assessments of the risk surveillance and control measures Integration of siloed data-bases/platforms into big data center and customized reports generated Evaluation of digital agriculture pilots and scale-up plans Review of performance of demo technologies and packages – process documentation Facilitate exchange among counties, enterprises, farmer cooperatives and farmers to learn from each other 	<ul style="list-style-type: none"> Core team, particularly FM, procurement, M&E, and so on Food safety expert Climate smart experts Private sector development experts Digital agriculture experts
36–54 months	<ul style="list-style-type: none"> Continued improvements in project management systems including fiduciary, safeguards, and M&E Midterm evaluation of the project Stocktaking of project interventions and design improvements Prepare detailed learning and analysis framework 	<ul style="list-style-type: none"> Core team, particularly FM, procurement, M&E, and so on Technical specialists based on thematic focus of the missions
54–60 months	<ul style="list-style-type: none"> Completion of activities Understand failure and success parameters in close dialogue with the implementing agencies. Facilitate knowledge exchange and events to consolidate project learnings Prepare detailed learning and analysis framework and prepare for end-of-project evaluation 	<ul style="list-style-type: none"> Core team, particularly FM, procurement, M&E, and so on Climate smart/sustainable agriculture expert Private sector development experts Digital agriculture experts



Time Needed	Focus	Skills
	<ul style="list-style-type: none"> Support technical and financial analysis of project investments End-term evaluation and project completion report 	

4. **Skill mix.** The skill mix and team composition for supporting project implementation is as proposed below:

Table 2.2. Skill Mix and Team Composition

Skills Needed	No. of Staff Weeks	Number of Missions	Comments
Task team leaders	20	Two per year but three in the first year	Staff in the country office or Washington, DC
Procurement specialist	3	Two per year including field travel	Staff in the country office
FM specialist	3	Two per year including field travel	Staff in the country office
Social safeguards specialist	3	Two per year including field travel	Staff in the country office
Digital agriculture specialist	4	Two per year but three in first year	Staff in the country office
Sustainable agriculture expert	4	Two per year but three in first year	Staff in the country office
Climate smart agriculture expert	4	Two per year including field travel	Consultant (international)
Livestock waste management expert	4	Two per year including field travel	Consultant (national)
Food safety specialist	4	Two per year including field travel	Consultant (national)
Agriculture economist	8	Two per year including field travel	Consultant (national)



ANNEX 2: Implementation Arrangements for Component 2 Sub-Projects

1. With regard to the cooperative/enterprise-level sub-projects under Component 2, the project will support about 50-55 investments that embody innovative solutions tailored to the principles of safe, sustainable and smart agriculture systems. In order to promote institutional learning and development and to allow for greater agility during implementation, the Bank team agreed with the client to apply a framework approach to this component. According to Bank operations guidance, a framework approach is defined as follows:

In contrast to traditional activity-defined projects, there are some projects where at the preparation stage the definition focuses on the type of project-financed activities but not necessarily the identification of each of the specific activities. One example that falls into this category is a rolling program of yearly interventions targeting different locations and enterprises. Only a few activities (usually those to be financed during the first year of project implementation) are identified and well-defined during preparation. For those, the locations and beneficiary cooperatives/firms are known, and detailed investment proposals are developed with specific details and management plans. Those proposals are appraised during preparation. For the following project years, eligibility criteria are designed to select future interventions during implementation, and a management framework (selection process, safeguards, disbursements, etc.) is designed to be applied to those future interventions. The future investments are selected according to those criteria and management framework during implementation. An example is a competitive grants scheme.

2. Prior to Appraisal, a total of four 3S technology packages for demonstration were proposed by the counties and the provincial PMO for the first year's implementation—one for each county. With the revised FSR submitted by the client at the end of October 2019, they also submitted detailed investment proposals for the first four investments, based on a format agreed with the Bank. Those were reviewed by the Bank prior to Appraisal and due diligence was carried out on each of them during Appraisal, with the Bank team providing detailed feedback to the client and the proponents. The remaining proposals targeting different 3S solutions, locations and enterprises will be identified during project implementation through a transparent selection and appraisal process defined in the Project Operations Manual (POM), and subject to the Bank's no objection. Once beneficiary cooperatives/enterprises have been selected, an Implementation Agreement will be signed between the county PMO and the beneficiary, spelling out the responsibilities of both parties for implementation of the matching grants. The county PMO will be responsible for supervising the sub-project implementation, with support from the PPMO.

3. A structure for implementing the framework approach to the Component 2 sub-projects has been discussed with the client, as follows.

- a) **Selection of value chains.** The project will select agriculture and/or livestock value chains at the project level and/or county level based on the assessment of potential impacts on **food safety, environmental sustainability and climate smart agriculture** together.
- b) **Selection of innovative solutions and participating enterprises**
 - 1. **Eligibility criteria** participating enterprises/cooperatives.
 - i. Enterprises that are in operation for at least three years
 - ii. Enterprises with proven expertise in agriculture innovation and extension
 - iii. Enterprises having formal engagement with at least 1000 farmers and/or equivalent membership in farmers' cooperatives



- iv. Enterprises willing to strengthen their farmers' cooperatives to comply with the provisions of Chinese cooperative law
 - v. Have no arrears in audit and disclosure of accounts
 - 2. **Call for proposals/Expressions of Interest.** The project will give wide publicity for call for proposals seeking expression of interest from enterprises, cooperatives and development/research institutions through local print and electronic media. The project may also consider holding an innovation showcase allowing the interested enterprises to a pitch before a panel of technical experts with expertise in food safety, sustainable agriculture and climate smart agriculture for shortlisting the innovative 3S technologies or solutions in the selected value chains.
 - 3. **Technical assistance for preparing sub-project proposals.** The shortlisted enterprises / cooperatives will be required to submit comprehensive sub-project proposal along with detailed techno-economic viability analysis. The project could also consider providing technical assistance and guidance to the shortlisted enterprises for developing their proposals.
- c) **Appraisal of detailed sub-project proposals.** The salient features of the appraisal methodology are listed below.
- 1. **Desk appraisal by experts.** The Technical Expert Group (TEG) constituted by the PMO, bringing together at least five experts from DARA, DEEE, a local agricultural university or research institution with sustainable agriculture and climate smart agriculture background, a commercial bank with agricultural lending experience, and an expert in a food safety discipline, will undertake the desk appraisal. A representative of the CPMO will also be invited to participate in the TEG meetings.
 - 2. **Appraisal criteria.** The PMO will facilitate the appraisal process by the TEG based on a scoring tool using the following criteria.
 - i. **Institutions:** This will entail review of proponent enterprise's track record, financial status and outreach models viz. partnerships with other production enterprise, farmer cooperatives and family farms and the nature of contracts.
 - ii. **Innovations:** Proposals should demonstrate use of new agriculture and information technologies, innovative package of practices, high impact service delivery solutions or sustainable business models addressing the 3S challenges with regard to sustainable and climate-smart agriculture, and food quality and safety, technology solutions.
 - iii. **Inclusion:** Proposals will clearly indicate the number of benefitting farmer cooperatives, family farms and individual farmers within and outside the proponent enterprise's production base. Preference will be given to larger outreach and inclusion of women and youth. Benefits sharing mechanism between the enterprise and farmer cooperatives and family farms and individual farms is another indicator for inclusion.
 - iv. **Investment:** Each sub-project proposal will separately articulate investments envisaged in proponent enterprise's own production for demonstration, and those for scaling up



and expansion phase through technology extension and strengthening of cooperatives. Investments relating to demonstrations within proponent enterprise's own production base cannot exceed 75 percent of sub-project investment. In other words, a minimum of 25 percent of the sub-project investments must be made towards scale-up and strengthening cooperatives. Sample list of investments under the two categories is given below:

- a. *Investments in demonstration of safe and sustainable agriculture practices (within proponent enterprise's own production base):* This could include (i) on-farm investments, (ii) critical farm inputs for 3S production practices; (iii) assets, equipment, and technology solutions; (iv) market development efforts (certification and branding); (v) public good infrastructure (development of GAP), traceability platforms for whole value chain, on-site food quality and safety labs, etc.); (vi) Monitoring, reporting and verification services; (vii) **Smart Response Fund**¹²; and (viii) operations and maintenance expenses.
 - b. *Investments in scale-up and strengthening cooperatives (outside proponent enterprise's own production base):* This category of investments could support (i) assets, equipment, and technology solutions; (ii) shared infrastructure and services; (iii) critical input supplies for 3S production practices); (iv) technology extension support; and (v) institutional strengthening of cooperatives.
- v. **Impacts:** Impacts will be assessed at farm level in terms of agriculture pollution reduction, GHG removals, pesticide and veterinary drug reduction, increased resilience.
- vi. **Efficiency:** Efficiency indicators will be measured at investment level and at the sub-project level to select those proposals that demonstrate good value for money viz. high impact with high level of investment/financial efficiency.
- a. *Investment efficiency:* Some of the indicators that could be used include (i) 3S investment per mu/per unit of production; (ii) investment per mu, (iii) investment per GHG ton removed, (iv) grant per additional farmer supported in scale up,
 - b. *Financial efficiency:* Economic and financial analysis of the sub-project proposal (with and without matching grants scenario) include assessment Net Present Value (NPV), Financial Rate of Return (FRR). The appraisal will also entail assessment of returns against benchmark rates to arrive at viability gap and calibrate the size of matching grants.

3. **Review of safeguards plan.** The safeguards specialist in PMO will review the proposal and safeguards plan and ensure that it is consistent with EMSF agreed with the Bank.

¹² **Smart Response Fund** works as contingency and emergency response fund up to 5% of the matching grant that allows project participants to be agile and smart in responding to extreme climate events, pest attacks, pollution incidents, food safety incidents, etc. during the project implementation, provided an equivalent amount is brought in by the partnering enterprise.



4. On site due-diligence. The appraisal team will make site visits to the production base and processing facilities to undertake on-site diligence to

- d) Duration of the sub-project.** The sub-project duration should not normally exceed three years include one agriculture year for demonstration. Subsequent two years will be used for scaling up successful pilot innovations and demonstration
- e) Negotiations and implementation agreement.** The PMO/CPMO will negotiate with the selected enterprise or cooperative on the level of impact and amount of matching grant based on the viability gap and investment efficiency of the project. In any case the matching grant will not be more than 50 percent of the agreed project size. PPMO/CPMO will enter into a formal agreement with the enterprise, per a template agreed with WB. The CPMOs will make payments in tranches against the delivery of agreed outputs.
- f) Implementation support.** PMO/CPMO will undertake regular on-site and off-site review during implementation and offer technical guidance from time to time.
- g) Procurement and financial reporting.** The participating enterprise or cooperative must comply with fiduciary mechanisms and meet reporting standards agreed with the World Bank.
- h) Process and results monitoring.** The participating enterprise or cooperative must undertake to share data, preferably in digital format, with the project against agreed indicators in the implementation agreement. The project will also commission a quarterly process monitoring study during the first two years to gaining insights on what works, and what does not, so mid-course corrections can be made.



ANNEX 3: Economic and Financial Analysis

1. *Development impact and expected benefits.* The project would generate direct and indirect benefits in the form of improved food safety, sustainable environmental practices, and increased resilience to climate change and variability. It will also improve farmer incomes and profitability of farmer cooperatives and enterprises through improved productivity and efficiency of farming systems, value-addition, and market opportunities. These benefits are expected to result in increased incomes and long-term local employment opportunities for the beneficiary population. These benefits will result from: (a) adoption of new production standards and technology packages which lead to increased value and quality of food products, factor productivity, and climate resilience, and reduced input costs; (b) improved produce processing and/or packaging; (c) better access to services, markets, and information; (d) improved product quality and producer (farm-gate) prices; (e) higher production values through market differentiation (e.g. product certification, brand naming etc.), and (f) improved efficiencies from economies of scale. Indirect benefits are expected from the strengthening of the cooperative governance arrangements and partnership models with agro-enterprises, thereby reducing the costs of forward and backward linkages of farmers to markets and other value chain operators. All cooperative members and associated non-members will also benefit from improved physical infrastructure related to project investments in cooperatives.
2. *Rationale for public sector provision/financing.* The project focuses on correcting market failures faced by farmers and their cooperatives and generating public goods in targeted geographic areas. Public funds will be provided to address the following. (a) Overuse of chemical fertilizers, pesticides, and other inputs, which are primary sources of agricultural non-point sources of pollution, GHG emission, and food safety hazards. (b) Entry barriers to higher-value markets, such as those with high quality standards. An example of such market failure would be when smallholders need certification that each producer is following the required production or food safety standards. Public funding would support product certification and quality or safety assurances. (c) Production fragmentation and obstacles to interact in value chains with weak organizational structures. Economies of scale (producing and supplying at scale) is often critical to access markets. Supporting cooperatives would allow smallholders to aggregate production and make themselves attractive partners to buyers in high value urban markets. (d) Limited access to new technologies and institutional structures. Linking farmers with enterprises injects private-sector knowledge and innovation. Enterprises become key drivers of technological change and market innovation. Unlike in public extension systems, such innovations are directly related to market needs.
3. *Valued added of Bank's support.* The Hubei Province aims to become a national leader in agricultural sustainability, food safety, and Climate Smart Agriculture (CSA). The province has the potential to become a leading producer in China in the pursuit of "cleaner and greener" agriculture and food systems, by differentiating itself through the production practices applied, the quality of its products, and the integrity of its institutional arrangements for food governance. This calls for a holistic approach from agri-food production to processing and distribution by introducing and scaling up good agriculture practices, improving fertilizer and pesticide efficiency, agri-food traceability system, and market infrastructure. Transformative changes and upgrades are needed. The World Bank is well positioned to bring knowledge of global best practices in agriculture, food safety, and sustainability to Hubei Province together with bank expertise and investments. The Bank has experience with piloting different aspects of "The New 3 Ss" under different projects in other parts of China, including the Jilin Agricultural product Quality and Safety Project, Guangdong Agricultural Pollution Control Project, Integrated Modern Agriculture Development Project, and the Climate Smart Staple Crops Production Project.
4. *Methodology.* A cost benefit analysis has been adopted to estimate the Economic and Financial Analysis (EFA). The evaluation of the economic and financial viability of the project is estimated based on what the project is expected to achieve relative to a counterfactual situation. In other words, the estimation was done under with-and-without project scenarios. Ideally, the effect of project interventions in each of the supported cases would be analyzed with the direct



and indirect costs and benefits considered. However, since the project design has adopted a framework approach, we have conducted the EFA for only the first selected sub-projects. The FAO EX-ACT tool is used to estimate the project's environmental and climate benefits. These models would be extrapolated to predict the expected economic and financial returns for farmers, cooperative and entrepreneurs and for the society.

5. *Financial Analysis.* Financial analyses have been carried out for the sub-projects that will be implemented during the first year of project implementation. These sub-projects are under Component 2 (accounting above 80% of the total project cost), which supports the demonstration of safe, sustainable, and climate-smart practices in the agri-food system, and the scale up adoption of these 3S practices to reduce the vulnerability of agriculture and its own adverse impacts on the environment and human health. Sub-component 2.1, Demonstrations of Innovative Sustainable Production Practices, supports investments in the productive infrastructure and equipment needed for a diverse range of demonstration schemes involving GAP (safe and sustainable) and climate-smart applications (all-season access roads, efficient irrigation and drainage systems, and machinery for straw return); ecologically sound livestock production and management systems as well as livestock waste management and circular agriculture technologies; and investment in and upgrading of warehouses, processing plants, transport and logistics infrastructure for downstream value.

6. At entity/farm level, financial analysis only includes the incremental benefits from productivity increases, quality price premium and increase costs to be incurred, using with and without project compactions. It should be noted that the national and global benefits (health and carbon reduction) generated by the project are positive externalities that will not be directly accrued to the entities/farmers directly, and therefore not included in the financial analysis (these are accounted for in the Economic Analysis below).

7. Notwithstanding that the project will adopt the value approach, different stakeholders participate in the different segments of the value chains. Farmers involved in production may not directly benefit from downstream value chain such as processing except receiving price premium for their quality products as raw material for the processing unit. Therefore, in addition to the value chain approach analysis to cover the cooperatives and enterprises integrating the production and downstream value activities, the analysis also has been done separately at: (i) farm level to gauge the profitability of the proposed GAPs in rice, fruit, tea and livestock farming for the farmers and /or cooperatives; and (ii) enterprise level to assess the financial attractiveness of the proposed sub-projects of targeted downstream value chains for the enterprises/cooperatives selected. All models integrate multiannual cash flow projections for two scenarios: with and without government subsidies (project grants).

8. *Farm level analysis.* For without project situation, farm budgets are based on the baseline survey for the four value chains involved, while the data for "with-project" situation was based on the projections and experimental data from the local GAP experts commissioned by the FRS team. Investment costs for the various "3S technologies" promoted by the project are drawn from the detailed cost tables for the specific sub-projects. All the prices in the cash flows are in 2019 constant prices. No tax is applicable to the farm level production activities.

9. *Enterprise Analysis.* Financial analyses were undertaken for each downstream value chain enterprise on the basis of their current and projected production, investments and operating costs. Major assumptions for the financial analysis are:

- Project life: In line with the practice prevailing in the downstream food value chain sector, the project life is assumed to be 25 years;
- Constant prices in 2019: all the investment cost and operating costs, and input and output prices, and the projected future cash flows are in 2019 constant prices;
- Investment costs and residual value of fixed assets: The investment costs used in the analysis are based



on cost estimates (linked to the project cost tables), including procurement and installation of equipment, and technical training and extension costs to link up with the contract farmers. The residual value of the fixed assets is estimated as 5% of their book values and treated as cash inflow at the end of the project life;

- The Revenues and Operating Costs. The revenues are from sales generated from operating capacity projected by the entity management. Detailed data concerning the amount and prices of products sold, amount and costs of raw materials, labor, utilities, marketing and administrative expenses are obtained from the feasibility study report of each sub-project;
- Incremental working capital, depending on the capacity utilization, and management of current assets and liabilities, is projected by the factory management and is included in the analysis;
- Taxes: VAT is exempted for agro-processing industry and the corporate income tax is 20% of taxable income; and
- Capacity Utilization: capacity utilization for years in operation is actually achieved, and future projections are provided by factory management. Direct operating costs vary approximately in proportion to the plant capacity utilization.

10. The FIRR for the sub-projects range from 9.74 to 12.62% without subsidies/grants, and between 16.10 and 19.48% with subsidies (see table 3.1). The indicative commercial target for FIRR from agri-food investments in Hubei is 14%. Therefore, the results indicate that project grants are needed to make the sub-projects financially profitable and attractive to farmers, cooperatives and entrepreneurs.

Table 3.1: Results of Financial Analysis for First Year Project Interventions under C2

Sub-Project	FIRR (Without grants)	FIRR (with grants)
Rice Value Chain Sub-project	9.74%	16.10%
Tea Value Chain Sub-project	10.49%	18.23%
Pig Value Chain Sub-project	12.62%	19.48%

11. *Fiscal impact.* The provincial government and the four project county governments firmly committed to providing counterpart fund based on the project financing plan. Fiscal impact after project completion is related to: (i) the funding of the big data center and laboratory operating costs, which the government should fully cover through its budget allocations; and (ii) servicing the Bank loan. For provincial level institutions involved, the O&M cost and debt service will be mainstreamed in annual budget allocations. Similarly, county level O&M cost and Bank loan service (only accounting for a fraction of their public expenditure) will be also well covered. Further, per MOF Degree 85 (issued in 2017), counties selected in the project must go through its internal fiscal evaluation, which demands that project counties have fiscal capacity to borrow (not exceeding debt ceiling) and will have enough fiscal revenue stream in future to service the Bank loan. On a positive side, the project will generate fiscal revenues through the VAT and corporate income tax collection as shown in the financial analysis for Component 2.

12. *Economic Analysis.* The economic analysis has been conducted to assess the overall project's net impact on economic welfare of the society (including global benefit such as carbon emission reduction). The total incremental benefits include (i) benefits from Component 2 as included in the financial analysis; and (ii) mitigation co-benefits from increased carbon sequestration in soils and biomass (see the climate-benefit results below). While total incremental costs included are as shown in the total project cost summary table, including C2, and C1 and C3 baseline costs plus the physical contingencies, exclusive of price contingencies front-end fee, committee fee and interests during project implementation.



13. Components 1 and 3 will contribute to achieving the benefits of Component 2 and beyond, which are difficult to quantify separately, particularly for food safety. Food safety is one of the highest priorities for the Chinese government, and the new implementation regulations of food safety law has been approved by the National People's Congress and just signed into force by the Premier on 1 Dec. 2019. Nevertheless, cost effectiveness could be achieved through comparison of alternative designs for the labs and big data center, ensuring the good networking of the existing facilities and the appropriate equipment to be added. The competitive bidding for procurement of equipment and service for both Components 1 and 3 would also contribute to the least costs of the project inventions.

14. *Economic Prices for outputs and inputs.* The Chinese economy has undergone tremendous changes in the past 40 years, particularly since its accession to WTO in 2001. It has been increasingly integrated into world economy and has been generally acknowledged for its "market status". Therefore, the current market prices of both inputs and outputs reflect, by and large, the actual export and import parity prices for the products of identical varieties and quality if they are tradable. As such, the financial prices are used as "proxies" for economic prices. Similarly, no further adjustments are made to the prices of non-tradable farm inputs and outputs, as Chinese currency has been under pressure for appreciation. The foreign exchange premium is therefore not relevant in China now. This practice has been adopted in the Bank projects in recent years.

15. *Show price of carbon.* According to the 2017 Bank Guidance Note on Shadow price of carbon in economic analysis, projects' economic analysis should use a lower and higher estimate of the carbon price starting at US\$40 and 80, respectively, in 2020 and increasing to US\$50 and 100 by 2030; and the lower and higher values on carbon prices are extrapolated from 2030 to 2050 using the same growth rate of 2.25% per year that is implicit between the 2020 and 2030, leading to values of US\$78 and \$156 by 2050.

16. *Opportunity Cost Capital (Economic Discount Rate):* In line with the NDRC guideline, the opportunity cost of capital for public investments is set at 8%, whereas most Commercial Banks however use 12% for agribusiness enterprises.

17. *Conversion Factor for investment costs:* A conversion factor of 0.9 has been applied to adjust the financial investment costs into economic prices, mostly to account for the taxes and duties on the goods and equipment for various investment items.

1. *Climate co-benefits (including GHG screening).* The project would generate climate benefits in terms of both adaptation and mitigation. Several project interventions are proposed to promote safe food, environmentally sustainable and CSA practices on about 120,000 ha of land across the project counties in Hubei Province. The relevant climate resilient agricultural technologies and agronomic practices proposed under the project and considered for GHG accounting, in view of the EX-ACT modules, include: improved agronomic practices (such as conservation agriculture and crop residue retention), alternate wetting and drying paddy production, reduced synthetic inputs such as fertilizers and pesticides, nutrient management, water management, improved manure application and waste management, among others. The project finances climate-smart and ecologically sound crop and livestock production systems as well as waste management and circular agriculture technologies. To this end, the GAPs financed by the project will contribute to reducing GHG emissions by:

- Mitigating CO₂ emissions through reducing N₂O emissions (e.g. through improved nutrient management based on soil testing, organic and synthetic fertilizer use efficiency is expected to reduce 0.5 to 2.0 ton of CO₂e per hectare);



- Reducing methane CH₄ emissions (through manure management in livestock production systems involving piggery and poultry; improved management of crop residues, water and soil drainage in rice (e.g. alternate wetting and drying water management regime in rice reduces 20 to 30% methane emissions);
- Increasing carbon sequestration because of improved agronomic practices, which include crop rotation, green manuring, cover crops and conservation tillage;
- Increasing biomass carbon sequestration in tree crops through citrus and loquat production systems.
- Reducing pollution by promoting stress tolerant varieties/species, IPM, biopesticide use and reducing fertilizer consumption (use of controlled release fertilizer, deep application of fertilizer, fertigation systems), reduction of use of plastic films, use of biodegradable plastic mulch, and livestock waste management;
- Increasing bio-diversity conservation by maintaining and promoting the diversity of rural landscape through enhanced crop and species diversity and cover crops; maintaining in-field and off-site biodiversity through the absence of destructive soil disturbance and protective soil shelter;

18. The carbon-balance is defined as the net balance from all greenhouse gases (GHGs) expressed in CO₂ equivalent that were emitted or sequestered due to project implementation as compared to a “without project” scenario. The estimates from the EX-ACT tool show that the above project activities would lead to a carbon balance of 14.1 million tons of CO₂e that are mitigated over the period of 20 years.¹³ This is equivalent to an annual emission mitigation of about 707,000 tons of CO₂e (table 3.2).

Table 3.2. Results of the Ex-Ante GHG Analysis (EX-ACT methodology) *

Sources for GHG Emission Reduction	GHG balance over the Project Life of 20 Years (tCO ₂ eq)			GHG balance per year (tCO ₂ eq/year)		
	w/o project scenario	With project scenario	Net carbon balance	w/o project scenario	With project scenario	Net carbon balance
<i>GAP for annual crops</i>		-1,202,180	-1,202,180		-60,109	-60,109
<i>GAP for perennial crops</i>	273,065	-3,088,877	-3,361,942	13,653	-154,444	-168,097
Rice	34,774,359	30,798,055	-3,976,304	1,738,718	1,539,903	-198,815
<i>Reduced fertilizer and chemical use</i>	23,185,691	19,128,195	-4,057,496	1,159,285	956,410	-202,875
<i>Improved livestock production and waste management</i>			-1,542,240			-77,112
Total (tCO₂eq)	58,233,116	46,837,374	-14,140,162	2,911,656	2,281,760	-707,008

Note. *The GHG emission reductions from the livestock production and waste management were based on the client's FSR calculations that adopted parameters/coefficients and methods of the Ministry of Agriculture and Rural Affairs (MARA).

19. *Results of Economic Analysis and Sensitivity Test on Carbon Shadow Prices.* Based on the above, the financial cash flows have been adjusted to economic flows by (i) converting financial into economic investment costs (CF of 0.9), (ii) eliminating tax and subsidies (grants); and (iii) adding the carbon emission reduction benefits. The project level economic cash flows have been extrapolated from the first-year sub-projects and accounting for the above total annual GHG reduction benefits. The results of the Project EIRR under different scenarios of carbon reduction benefits are as below:

Table 3.3: Economic analysis results and sensitivity to low and high SPC

	Without carbon benefits	With carbon benefits	
		Low SPC	High SPC

¹³ GEF recommends using a 20 year investment period for the calculation of GHG benefits



EIRR	11.58%	27.40%	51.12%
NPV (discount rate, 12%), Million USD	-7.5	253.5	513.7

20. The results show that without carbon benefits, the project has negative NPV and it is not viable for agribusiness enterprises (given a discount rate of 12%). When the project's carbon benefits are accounted for, however, the project has an EIRR of 27% (with the low SPC) and 51% (with the high SPC), suggesting that providing matching grants from the project is justified and that the sizes of the grants are appropriate. The project would generate adequate public goods towards achieving the 3S objectives. However, as indicated above, the results are extrapolated from the first-year selected subprojects. Given the demand-driven nature of other sub-projects after the first year and the progress expected to be made in measuring the carbon emission for carbon trading market development during the project implementation, the results should be treated with caution and considered as indicative. Good practice would be to redo the analysis with more reliable data and improved methodologies for carbon accounting at MTR and ICR.



ANNEX 4: Map of Project Areas

The project initially covers four counties/districts/cities in Hubei Province (see Map 1). These counties/districts/or cities include Honghu City, Tongcheng County, Nanzhang County and Jingshan City.

Map 1: Hubei Province, with project counties

