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Report No: PAD00058

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED LOAN

IN THE AMOUNT OF US$200 MILLION

TO INDIA

FOR THE

KERALA CLIMATE RESILIENT AGRI-VALUE CHAIN MODERNIZATION (KERA) PROJECT

OCTOBER 8, 2024

Agriculture and Food
South Asia

CURRENCY EQUIVALENTS

(Exchange Rate Effective August 29, 2024)

Currency Unit	=	INDIAN RUPEES (INR)
INR 83.88	=	US$1

FISCAL YEAR
April 1 – March 31

Regional Vice President:	Martin Raiser
Regional Director:	Dina Umali-Deininger
Country Director:	Auguste Tano Kouame
Acting Practice Manager:	Gayatri Acharya
Task Team Leader(s):	Christopher Paul Jackson, Azeb Fissha Mekonnen, Amadou Dem

ABBREVIATIONS AND ACRONYMS

AEZ	Agro-ecological zone	IPF	Investment Project Financing
CCAP	Climate Change Action Plan	IRRI	International Rice Research Institute
CERC	Contingent Emergency Response Component	IUFR	Interim Unaudited Financial Report
CGIAR	Consultative Group on International Agricultural Research	KAU	Kerala Agricultural University
CPF	Country Partnership Framework	KERA	Kerala Climate Resilient Agri-Value Chain Modernization Project
CRA	Climate Resilient Agriculture	KINFRA	Kerala Industrial Infrastructure Development Corporation
CSA	Climate Smart Agriculture	KSUM	Kerala Start-Up Mission
DoA	Department of Agriculture (and Farmer Welfare)	M&E	Monitoring and Evaluation
DoI	Department of Industry (and Commerce)	MSME	Micro, Small and Medium Enterprise
ESCP	Environment and Social Commitment Plan	NDC	National Determined Contribution
ESMF	Environment and Social Management Framework	PA	Productive Alliance
FPC	Farmer Producer Company	PBC	Performance Based Conditions
FPO	Farmer Producer Organization	PDO	Project Development Objective
FY	Fiscal Year	PIE	Project Implementing Entity
GA	Grant Agreement	PIM	Project Implementation Manual
GDP	Gross Domestic Product	PIU	Project Implementation Unit
GHG	Greenhouse gas	PMIS	Project Management Information System
GoI	Government of India	PMU	Project Management Unit
GoK	Government of Kerala	TA	Technical Assistance
GRS	Grievance Redress Service	ToR	Terms of Reference
HLSC	High-level Steering Committee		

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DATASHEET

BASIC INFORMATION

Project Beneficiary(ies)	Operation Name		
India	Kerala Climate Resilient Agri- Value Chain Modernization (KERA) Project		
Operation ID	Financing Instrument	Environmental and Social Risk Classification	
P178254	Investment Project Financing (IPF)	Moderate	

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[✓] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[✓] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[✓] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternative Procurement Arrangements (APA)	[ ] Hands-on Expanded Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
31-Oct-2024	30-Nov-2029
Bank/IFC Collaboration	
No	

Proposed Development Objective(s)

To promote the resilience and commercialization of Kerala’s food and agriculture sector.

Components

Component Name	Cost (US$)

Component 1: Climate Resilience in Agriculture	96,000,000.00
Component 2: Enhancing Small-holder Commercialization for Value Addition	108,000,000.00
Component 3: Strengthening Agribusiness and the Food System	61,000,000.00
Component 4: Project Management	20,000,000.00
Component 5: Contingent Emergency Response Component	0.00

Organizations

Borrower:	India		
Contact	Title	Telephone No.	Email
Implementing Agency:	Department of Agriculture and Farmers Welfare, Government of Kerala		
Contact	Title	Telephone No.	Email
Dr B. Ashok	Agriculture Production Commissioner and Principal Secretary, Agriculture	919446366777	secy.agric@kerala.gov.in

PROJECT FINANCING DATA (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)? Yes

Is this project Private Capital Enabling (PCE)? Yes

SUMMARY

Total Operation Cost	**285.50**
Total Financing	**285.50**
of which IBRD/IDA	**200.00**
Financing Gap	**0.00**

DETAILS

World Bank Group Financing	
International Bank for Reconstruction and Development (IBRD)	200.00
Non-World Bank Group Financing	
Counterpart Funding	85.50
Borrower/Recipient	85.50

Expected Disbursements (US$, Millions)

WB Fiscal Year	2025	2026	2027	2028	2029	2030
Annual	9.00	42.50	55.50	50.00	28.00	15.00
Cumulative	9.00	51.50	107.00	157.00	185.00	200.00

PRACTICE AREA(S)

Practice Area (Lead)

Agriculture and Food

Contributing Practice Areas

Finance, Competitiveness and Innovation; Climate Change

CLIMATE

Climate Change and Disaster Screening

Yes, it has been screened and the results are discussed in the Operation Document

SYSTEMATIC OPERATIONS RISK- RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Low
2. Macroeconomic	Low
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate

5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Overall	Moderate

POLICY 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

ENVIRONMENTAL AND SOCIAL

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Relevant
ESS 10: Stakeholder Engagement and Information Disclosure	Relevant
ESS 2: Labor and Working Conditions	Relevant
ESS 3: Resource Efficiency and Pollution Prevention and Management	Relevant
ESS 4: Community Health and Safety	Relevant
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Not Currently Relevant
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
ESS 8: Cultural Heritage	Relevant
ESS 9: Financial Intermediaries	Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

LEGAL

Legal Covenants

Sections and Description
The Project Implementing Entity (PIE) shall maintain, throughout Project implementation period: (a) the Project Management Unit ("PMU") with its DoA (Section I.A.2(a) of the Schedule to the Project Agreement); (b) the High-Level Steering Committee ("HLSC") (Section I.A.2(d) of the Schedule to the Project Agreement); and (c) the Project Executive Committee ("PEC") (Section I.A.2(e) of the Schedule to the Project Agreement).
The PIE shall establish, by no later than six (6) months after the Effective Date, or any other date as agreed in writing between the Bank and the PIE, and thereafter maintain throughout the Project implementation period, three Regional PMUs (Section I.A.2(c) of the Schedule to the Project Agreement).
The PIE shall vest the responsibility for implementation, management, coordination, and monitoring and evaluation of the Project to the respective Project Implementing Agencies, as set forth in the Project Implementation Manual, and to this end, shall, by no later than six (6) months after the Effective Date, establish and thereafter maintain a Project implementation unit ("PIU") in each of the Project Implementing Agencies (Section I.A.2(b) of the Schedule to the Project Agreement).
The PIE shall: (a) prepare and adopt, by not later than two (2) month after the Effective Date, and thereafter maintain, throughout the implementation period of the Project, the Project Implementation Manual ("PIM") in form and with substance satisfactory to the Bank; and (b) carry out the Project in accordance with the Project Implementation Manual (Section I.B.1 of the Schedule to the Project Agreement).
For purposes of carrying out Parts 1.1(ii)(b), 2.1(i), 2.1(ii), 2.2(ii), 2.2(iii), 3.1(iii), and 3.2(i) of the Project, and prior to the implementation of any activity thereunder, the PIE shall: (a) prepare, adopt, and thereafter maintain, throughout the implementation of the Project, the Sub-Grant Manual in form and with substance acceptable to the Bank; and (b) carry out Parts 1.1(ii)(b), 2.1(i), 2.1(ii), 2.2(ii), 2.2(iii), 3.1(iii), and 3.2(i) of the Project in accordance with the Sub-Grants Manual (Section I.B.2 of the Schedule to the Project Agreement)
For purposes of carrying out Part 2.2(iv) of the Project, and prior to the implementation of any activity thereunder, the PIE shall cause the PCGF Operator, pursuant to the Trust Deed to: (a) prepare, adopt, and thereafter maintain, throughout the implementation of the Project, the PCGF Operational Manual in form and with substance acceptable to the Bank; and (b) carry out Part 2.2(iv) of the Project in accordance with the PCGF Operational Manual. (Section I.B.3 of the Schedule to the Project Agreement)
For the purposes of carrying out Part 2.2(iv) of the Project, the PIE shall: (a) prior to provision of any Capital Contribution to the PCGF, establish a public credit guarantee facility (PCGF) in a manner and with structure, eligible investment activities, functions, and operational policies, guidelines, and procedures acceptable to the Bank, and in line with the Principles for Public Credit Guarantee Schemes for SMEs, and thereafter maintain the PCGF throughout the Project implementation period with a structure, function, composition, eligible investment activities, and responsibilities acceptable to the Association and set forth in the detail in the PCGF Operational Manual; and (b) provide to the PCGF the Capital Contribution to the PCGF, as required by the Trust Deed and the PCGF Operational Manual, to provide partial credit guarantees to cover credits extended by the PFIs to PCGF Beneficiaries, all in

accordance with the requirements and procedures set forth in the PCGF Operational Manual (Section I.E.1 of the Schedule to the Project Agreement).
Prior to procurement and/or use of drones under the Project, the PIE shall: (a) Notify the Bank of such proposed procurement and/or use, and assess any risks related to such procurement and/or uses, including operational, legal and regulatory, institutional, technical, social and environmental, and fiduciary risks, and to recommend appropriate mitigation measures; and (b) Develop a risk mitigation plan for the procurement and/or use of drones in form and substance satisfactory to the Bank. No drones shall be procured/or used under the Project unless the PIE has implemented the risk mitigation measures in accordance with the paragraph 1 above, in form and manner satisfactory to the Bank (Section III of the Schedule to the Project Agreement).

Conditions

Type	Citation	Description	Financing Source
Disbursement	Section III.B.1 of the Schedule 2 to the Loan Agreement	No withdrawal shall be made: (a) for payments made prior to the Signature Date, except that withdrawals up to an aggregate amount not to exceed $ 10,000,000 may be made for payments made prior to this date but on or after November 29, 2023, for Eligible Expenditures under Categories (1) and (3); (b) under Category (4) until and unless the PIE has furnished to the Bank evidence, satisfactory to the Bank, showing that the PIE has: (i) established the PCGF in accordance with the provisions of Section I.E.1 of the Schedule to the Project Agreement; (ii) engaged the services of the PCGF Operator under the Trust Deed in accordance with provisions of the Section I.E.2 of the Schedule to the Project Agreement; and (iii) prepared and adopted the	IBRD/IDA

		PCGF Operational Manual, in form and with substance satisfactory to the Bank, in accordance with Section I.B.3(a) of the Schedule to the Project Agreement; (c) under Categories (2) and (3) until and unless the PIE has furnished to the Bank evidence, satisfactory to the Bank, showing that the PIE has prepared and adopted the Sub-Grants Manual in form and with substance satisfactory to the Bank, in accordance with Section I.B.2(a) of the Schedule to the Project Agreement; or (d) for Emergency Expenditures under Category (5), unless and until all of the following conditions have been met in respect of said expenditures: (i) (A) the Borrower, and/or a Project Implementing Entity, as the case may be, has/have determined that an Eligible Crisis or Emergency has occurred, and has/have furnished to the Bank a request to withdraw Loan amounts under Category (5); and (B) the Bank has agreed with such determination, accepted said request and notified the Borrower, and the respective Project Implementing Entity, as the case may be, thereof; and (ii) the Borrower, and/or a Project Implementing	

		Entity, as the case may be, has/have adopted its/their respective CERC Manual and Emergency Action Plan, in form and substance acceptable to the Bank.	

I. STRATEGIC CONTEXT

A. Country Context

1. **Growth is estimated to have risen to 8.2 percent in fiscal year (FY) 2023/24, and it is expected to remain robust in the medium term.** In FY2023/24, India remained the fastest-growing large economy. While consumption growth is estimated to have softened and export demand moderated due to a weak global environment, strong public investment and a nascent private capex upcycle kept economic growth elevated. Going forward, consumption demand will recover gradually, thanks to declining inflation and higher rural incomes, and private capex is expected to accelerate, facilitated by healthy corporate balance sheets and strong macroeconomic fundamental. The Governments' efforts to contain current spending coupled with strong revenue performance helped reduce the general government fiscal deficit to 8.5 percent of GDP in FY2023/24. They should contribute to narrowing the deficit further over the medium term, with the debt-to-GDP ratio stabilizing at around 82 percent of GDP. India's external position remains favorable, with growing services exports, a narrowing merchandise trade deficit, steady net foreign capital inflows, and large foreign exchange reserves of more than US$670 billion (as of August 16, 2024).

2. **India has made remarkable progress in reducing extreme poverty over the past two decades.** The share of the population living below US$2.15 per person per day (2017 PPP) is estimated to have declined significantly between 2011 and 2019 from 22.5 to 13.2 percent. In line with global trends, extreme poverty increased by two percentage points in 2020 on account of the pandemic. However, broad access to vaccines and government mitigation measures contributed to the return to pre-pandemic poverty levels. The extreme poverty rate is estimated to have declined to 12.9 percent in FY2021/22, while the moderate poverty (US$3.65 per person per day) rate is estimated at 44.1 percent in FY2021/22. India's long-term progress in reducing extreme poverty was accompanied by a sharp decline in the incidence of multidimensional poverty, from 27.7 percent in 2015/16 to 16.4 percent in 2019/21. Inequality in consumption has remained stable over the past two decades, with a Gini index of between 32 and 35. Child stunting (under the age of 5) has been steadily declining since 2005/06, to 35.5 percent in 2019/21. Headline employment indicators have consistently improved since 2020, and unemployment rates have recovered in urban and rural areas but concerns about job quality remain.

B. Sectoral and Institutional Context

3. **Kerala is at the forefront of India's structural transformation.** It is the second most urbanized state, its economy is largely service-led and has one of the highest per capita incomes in India. Daily wage rates are among the highest in India. State-wise poverty rates (data for 2011/12) are among the lowest in India, where the Kerala State Planning Board reports an estimate of 11.3 percent. Contrary to India as a whole, urban poverty is more severe than rural poverty. Nevertheless, almost one quarter of employment is in agriculture and one third of households are agricultural households.

4. **Historical investments in health and education have paid dividends, and 'the Kerala model' has delivered the highest human capital index among Indian states.** A well-educated labor force has delivered strong labor productivity growth and a large diaspora of skilled migrant workers. Historical land redistribution and investments in connectivity were critical in promoting inclusive development – inequality is low compared to other states. But these past successes now present challenges: human capital investments have driven up wages while land fragmentation, absentee landlords and urban expansion has reduced agricultural land utilization and undermined agricultural competitiveness. State-led industrialization prohibited the growth of a competitive private sector. Kerala's structural transformation has been characterized as a paradox: modern industries were slow to emerge and failed to generate sufficient jobs. Labor force participation rates declined; educated unemployment emerged as a major concern and the better educated workers had little option but to work in lower value adding sectors or seek employment overseas. This has discriminated against women and their participation in the labor force remains below half that of men. Gender parity remains elusive.

5. **Kerala features diverse agro-ecological conditions, a varied topography and myriad micro-environments with a variety of farming systems.** There has been a steady shift towards industrial crops and fruit and vegetables, with staple food crops, such as rice, now accounting for only 8 percent of the cropped area. Many smallholders adopt mixed farming systems, in part as a risk mitigation strategy and because the benefits from specialization are largely absent. Kerala is India's leading producer of cardamom, vanilla and nutmeg, the second largest producer of black pepper and the third largest producer of coconut and coffee. It is a major producer of rubber which has long been a feature of Kerala's landscape. However, productivity among many tree crops is declining as the tree stock age and a substantial area is estimated to be beyond its productive life.

6. **Climate change is widely expected to increase losses from natural disasters and will impact directly on the economy of Kerala.** India experiences some of the highest maximum temperatures globally; these averages could surge by 2.4°C to 4.4°C by 2100, potentially leading to a fourfold increase in summer heatwaves. Given its location and topography, Kerala is highly vulnerable to climatic dynamics and associated natural disasters. Indian Ocean warming, and intensive marine heatwaves exacerbate monsoon rainfall, triggering devastating floods and landslides; the intensity of the latter exacerbated by the hilly terrain. The state is also prone to cyclones originating from the Arabian Sea. The high summer temperatures lead to heatwaves, wildfires, sea level rise and earthquakes. These extreme weather events are expected to become more frequent and intense in the coming decade. The percentage of drought-prone areas varies by district from 22 – 93 percent, and the percentage of area prone to multiple hazards (flood, landslide, coastal hazards) from 21 – 67 percent. Forest fires are also prevalent, linked to the early onset of summer. Agriculture accounts for 14 percent of India's overall greenhouse gas (GHG) emissions (mainly through methane emissions from the paddy and livestock sectors) with crop yields projected to decline by 10 percent and 20 percent by 2030 and 2050 respectively because of climate change. Estimates suggest a 1°C increase in mean daily temperature will reduce yields by 5 – 7 percent for major crops, including rice.

7. **Climate change adaptation will entail widespread adoption of appropriate climate smart agriculture technologies**. These practices – referred by the Government of India (GoI) as climate resilient agriculture (CRA) – require a research system delivering varieties that reflect future climate trends, an extension system capable of supporting on-farm adoption, and market linkages providing economic incentives for the adoption of improved technologies. Low-cost private financing solutions are essential for better implementation of CRA practices and increased adoption of low-carbon technologies; de-risking these investments to crowd in private capital is essential. It is important to note that agriculture is currently excluded from India's international climate commitments although the project will reduce emissions from agriculture as important co-benefits. There is considerable potential to reduce emissions – especially methane – from improved husbandry and by scaling up CRA practices across commodity value chains, including in paddy where alternate wetting and drying offers proven potential to improve water efficiency and for low carbon rice with methane emissions falling by half. Agriculture utilizes over 90 percent of India's groundwater contributing significantly to water stress. Improving water use efficiency is critical in Kerala: per capita freshwater availability has declined from 14,443 m^3 in 1951 to 5,301 m^3 in 2021.

8. **Kerala's food system presents considerable economic potential.** India's food and beverage sector has grown at 7 percent annually over 2017 – 2022 while agri-food exports increased from US$36 billion in 2014/15 to US$51 billion in 2022/23, with Kerala estimated to account for 20 percent. Tree crops are an important source of foreign exchange. With high incomes, an urbanized population, a tourism sector worth US$64 billion pre-COVID (equivalent to one-tenth of the state's economy) and an established export sector based in part on demand from the diaspora especially in the Middle East, Kerala already enjoys a comparative advantage in processed food products. The agri-business sector is characterized by several export-focused multinational companies as well as around 6,000 food manufacturing companies. One-fifth of all factories manufacture food items and employ almost

one-third of all factory labor. Kerala has a bifurcated enterprise sector with many Micro, Small and Medium Enterprises (MSMEs) and few large firms. Women are significantly under-represented in the MSME sector, with only 4 percent owned by women. Nationally, one-third of women owned MSMEs are in the agricultural sector. Yet several factors are constraining growth. Access to finance and high up-front investment costs for 'last mile' infrastructure represent considerable challenges to agri-based MSMEs. The Government of Kerala (GoK) has implemented special economic zones for aggregating enterprises into sector-focused industrial parks to provide connectivity infrastructure to tenant businesses and to leverage network economics. There are policy-induced disincentives for smaller firms to formalize and continue to grow. Firms consider investments in backward linkages to farmers too risky and value chains are fragmented.

9. **Value-added in agriculture is, at best, stagnating although the sector continues to employ over 22 percent of the population.** Agricultural wages are high and land holdings small (the average landholding is 0.18 ha) severely undermining agricultural competitiveness. Farm incomes are insufficient for a farm family; 61 percent report non-agricultural activities as significant sources of income. Access to land is extremely difficult, especially for women (only 23 percent of agricultural land holdings are owned by women). There is considerable fallow land with absentee landowners reluctant to allow others to utilize their land. Remaining farmers are aging; most are 55 years old or more. Structured relationships between producers and processors/ exporters are rare, denying smallholders opportunities to mitigate price and market risk through off-taker agreements. Their limited market power restricts the pass-through of any value-added that does occur.

10. **Market failures significantly hinder MSMEs and startups from comprehending market demands and advancing their businesses.** Although government-backed credit initiatives have spurred the creation of new enterprises in the agri-food domain, these MSMEs often exhibit deficiencies in managerial practices. This shortfall impedes their capacity to innovate, adopt green practices, and effectively meet market needs. Demand and supply conditions mean there is a notably limited market for consultancy services to fill these gaps. The nature of business development services as 'experience goods' means firms are unable to gauge their value and utility without firsthand usage. For agri-tech startups, their business models overlook smallholders as a target market, focusing primarily on larger landholders. This issue is compounded through the incubation process, which is largely based on a framework tailored for software companies, with no built-in interaction with smallholders. Additionally, startups in pre-revenue stages typically depend on risk capital. Yet, venture capitalists favor startups with higher potential for exponential returns and lower risks, such as software companies, thereby constraining the flow of risk capital to agri-tech startups.

11. **The limited availability of land for industrial development in Kerala poses a significant challenge to the growth of the food sector.** However, to address this issue at scale, the Kerala Industrial Infrastructure Development Corporation (KINFRA) has established food parks that offer ready-to-use plots or standard design factory buildings, equipped with essential infrastructure such as water, power, waste management, and other facilities like single-window clearances. These initiatives have been successful in promoting private sector investment, creating over 3,500 jobs and attracting nearly INR 45,000 lakh in investment. However, the current availability of public-owned land for establishing additional food parks presents a challenge. The size and location of the plots may require verification of their viability and adjustment of business models, particularly in terms of collaboration. While the Department of Agriculture and Farmer Welfare (DoA) and other agencies have land available, the area tends to be smaller, and the agencies may lack the necessary expertise to build and operate food parks in Kerala. Therefore, it is crucial to ensure proper collaboration and knowledge transfer from KINFRA and to effectively utilize the available land to overcome the challenges associated with establishing and operating new food parks.

C. Relevance to Higher Level Objectives

12. **The proposed project is consistent with the World Bank Country Partnership Framework** (CPF) for India FY18–22 discussed by the Board of Executive Directors on September 20, 2018 (Report No. 126667-IN) and extended to FY25 by the corresponding Performance and Learning Review dated October 23, 2023. In particular, the project is well aligned with the objectives of supporting *resource-efficient, inclusive, and diversified growth in the rural sector* (CPF Pillar 1) and *enhancing competitiveness and enabling job creation* (CPF Pillar 2). The proposed project will contribute to the implementation of the CPF by: (i) supporting specific interventions that leverage the private sector to invest in agribusinesses; (2) strengthening capacities of state and local level institutions related to agriculture, industry and water through increasing technical capability; and (3) introducing innovations to align public sector programs with best practices. Additionally, it will support *Lighthouse India* through knowledge generation and policy dialogue on key policy areas such as effective land utilization approaches, leveraging private sector investments in agribusinesses and climate change mitigation. The project also reflects the World Bank's Climate Change Action Plan (CCAP; 2021 – 2025) and the new vision for a world free of poverty on a livable planet.

13. **Several existing central and state-level government priorities will be supported directly by the project in line with the principle of convergence** – i.e. generating synergies between programs at national and state level including externally aided projects. It will contribute directly to the Government of India's (GoI's) goal of doubling farmer incomes. It will support the national and state-level programs to support high-tech start-up companies including the Kerala Start-Up Mission (KSUM) and their respective programs to promote MSMEs (such as Kerala's Mission 1,000 to scale-up the use of technology by MSMEs to increase turnover to INR 100 crore within three years). Finally, the project will also reinforce the objectives of Kerala's program for increasing value addition (the Value-Added Agriculture Mission) which establishes a state-level program for enhanced competitiveness.

14. **The proposed project is consistent with India's National Determined Contribution (NDC) commitments and National Action Plan on Climate Change** in enhancing resilience of India's agriculture sector and to the State Action Plan on Climate Change 2023 – 2030. India's goal is to reduce overall emission intensity and improve energy efficiency of its economy towards the long-term goal of reaching net-zero by 2070. The project contributes to national and state climate strategies by promoting climate resilience and realizing associated co-benefits from climate change mitigation in agriculture and augmenting agriculture value addition. The Action Plan sets out the mitigation and adaptation priorities for the state and reinforces ongoing efforts to calibrate support to agriculture to local agro-ecological zones (AEZs) which promotes location-specific CRA practices tailored to local soil types, topography and climatic patterns.

15. **The proposed project is consistent with the Bank's agenda on maximizing finance for development and is considered private capital enabling.** The project will support several interventions to leverage commercial financing, and the use of grants that require beneficiary contributions from farmers, farmer groups and agribusinesses as well as MSMEs. The project explicitly seeks to share credit risk for commercial banks' portfolios of loans to agriculture.

16. **The proposed project will build on and coordinate with recent World Bank operations in Kerala that support cross-sectoral resilience.** Under the Rebuilding Kerala Initiative, the World Bank supported a range of policy reforms in the agriculture sector as part of two Development Policy Operations (DPO). These included notification of AEZs and 23 agro-ecological units to promote region-specific farmer support services. Additionally, the DPOs supported pilot testing of agriculture risk insurance products. In the ongoing Resilient Kerala PforR Project, the Bank is supporting results in the areas of improved adoption of risk insurance and development of

sustainable Farmer Producer Organizations (FPOs) and Farmer Producer Companies (FPCs) in key river basins. KERA builds on these engagements.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

17. To promote the resilience and commercialization of Kerala's food and agriculture sector.

PDO Level Indicators

18. The PDO level indicators are provided below:

(i) Farmers adopting CSA practices, disaggregated by gender (number)
(ii) Net GHG emissions per year (CO2 equivalent), (metric tons/ year)
(iii) Value of sales by FPCs and agribusinesses (percentage)
(iv) Commercial finance mobilized (US$)
(v) New jobs created in agribusinesses, disaggregated by gender (number)

B. Project Components

19. **The project builds on existing initiatives of the GoK to enhance value added and strengthen climate resilience in the agricultural sector.** The project will scale up existing innovations and introduce new instruments to speed up economic transformation and climate outcomes. The project will include climate change mitigation, especially of methane, in agricultural production systems as a co-benefit of a broader resilience agenda and will establish the necessary scientific baseline for quantifying resulting emission reductions. Recognizing the imperative of competitiveness, a major element of the project is to overcome constraints facing firms looking to invest in value addition and processing for domestic and export markets. It seeks to demonstrate alternative instruments for risk sharing to mobilize commercial lending and to 'downscale' successful policy interventions to increase their relevance to smaller enterprises located in the hinterlands, thereby expanding their impact into rural areas. Kerala is a high-capacity state and there are existing instruments being deployed that provide partial solutions: with incremental innovation these have the potential to deliver greater and more sustainable results for the long term. The project seeks, therefore, to introduce new instruments to incentivize long-term decision-making and to build on existing instruments where feasible to promote innovation and sustainable solutions to promote resilience and commercialization of Kerala's food and agriculture sector.

20. **To do this, the project includes three components,** in addition to project management and a zero-allocation contingent emergency response component (CERC). These are described below.

Component 1: Climate Resilience in Agriculture

21. **This component focuses on strengthening the agricultural production base in the face of CC across all 14 districts in Kerala and piloting mechanisms for encouraging farmers to enable reductions in emissions through low carbon rice.** Based on the innovative AEZ-based approach, Kerala has been delineated into 23 agro-ecological units which promotes the delivery of tailored CRA-based extension services. This component will help to implement this new approach by: (i) aligning existing CRA practices to the individual AEZs and farmer preferences; (ii) deploying extension services necessary to foster adoption of these practices with a focus on

enhancing the capacity of public sector agriculture extension and advisory service providers; and (iii) doing so in a sustainable basis with expanded coverage utilizing digital technology in the delivery of extension advice to farmers. The major emphasis is to promote climate resilience, climate change adaptation and quantify emission reductions for the sector as an important co-benefit. The component activities are structured around two subcomponents.

22. **Subcomponent 1.1: Scale-up adoption of CRA practices.** This will be done by supporting the development of locally specific CRA technologies and practices with demonstrable benefits for Kerala's farmers; strengthen the capacity of agriculture extension and advisory service providers to disseminate technologies including use of Information and Communication Technology (ICT); and upgrade agromet infrastructure to generate high quality weather information. The following specific activities will be financed by the project:

(i) **A climate change vulnerability assessment** which will identify localized climate-related risks (such as temperature fluctuations, floods, drought, pests and diseases as well as risks of landslides) for all 23 agro-ecological units in collaboration with Kerala's relevant research institutes and will inform tailored adaptation and resilience-building strategies for all major crops, including coconut.

(ii) **An update to the existing Package of Practices** to incorporate the latest CRA technologies for improving resilience (including disaster preparedness) and boosting productivity and will inform revisions to materials used by extension agents at the Panchayat level. This update will include: (i) short-term research to generate new scientific knowledge; and (ii) improved management practices by farmers to incorporate indigenous knowledge, improved modalities for extension (e.g. farmer field schools, demonstration plots, and related farmer-level knowledge platforms). To develop a longer-term pipeline of CRA technologies, this component will also finance limited priority (determined by the vulnerability assessment adaptive research through open and competitive research grants to agricultural research entities and institutions in Kerala. This approach will fill critical gaps in high quality research by building a more diverse and pluralistic agricultural innovation system that is able to bring a range of innovative options to address priority challenges related to climate change.

(iii) **A comprehensive capacity building program of Kerala's extension and advisory service providers to deliver improved practices to farmers on a cost-effective basis. Activities will include** training staff, upgrading physical infrastructure and investments in digital technology. Few extension officers are trained in contemporary and emerging CRA technologies and there is a lack of state-of-the-art soil testing facilities in the state. A diagnostic needs assessment will underpin a comprehensive training program and will include the provision of a mandatory 'refresher' training of agriculture officers to stay abreast of the latest technologies and solutions relevant to their respective agro-ecological units. The training program would be developed with technical inputs from various state, national and international institutions and delivered via Kerala's state-level agencies such the State Agricultural Management and Extension Training Institute (SAMETI). Soil testing capabilities will be strengthened.

(iv) **An expansion of the role of ICT in the delivery of extension and advisory support to facilitate informed decision making by farmers as they seek to adapt to climate change.** The project will support the development and scaling up of digital applications that can be easily accessed by farmers and used by agriculture officers. It will also upgrade the ICT infrastructure in Krishi Bhavans and local Plant Health Clinics. Additionally, support will be provided to pilot a selected set of precision agriculture technologies leveraging existing digital technologies, including those developed by startups incubated through KSUM (see below). To support longer-term institutional sustainability of the new modalities supported in this

subcomponent – including a management system that fully incorporates the agro-ecological units approach – technical assistance (TA) will be provided for a functional review of the agriculture extension service delivery model.

(v) **Strengthening the system for agromet.** Recognizing that not all risks can be mitigated, the project will finance the provision of TA and equipment to improve the quality and availability of climate and weather data and expanding the number of weather stations across the state. Resulting data will be integrated into the extension systems; the greater resolution of weather data will improve the functioning of existing agriculture insurance schemes. The project will leverage parallel technical assessments of existing agricultural insurance instruments.

23. **Subcomponent 1.2: Supporting Low Carbon Paddy Production.** This subcomponent will support low carbon paddy in over 20,000 ha in two districts with the aim of developing the necessary protocols for on-farm practices, water management and the technical baselines necessary for valuing the co-benefits of emission reductions. The following specific activities will be financed under this subcomponent:

(i) **Adoption of low carbon paddy cultivation by leveraging the global expertise of the CGIAR System, including application of alternate wet and dry practices and demonstration of methodologies for on-farm adoption** in the two districts of Palakkad and Thrissur. Through the application of alternate wet and dry and other practices under the system for rice intensification, with potential emissions reductions of over 2,760 kg of CO_2 per ha per year, this gives the potential emissions reductions of over 50,000 metric tons of CO_2 per year. While the aggregate volume is modest, this activity will demonstrate methodologies for on-farm adoption in a range of irrigated paddy cultivation AEZs of wider replicability.

(ii) **The necessary scientific baseline technical baseline studies to calculate the volume of emissions reductions and preparing the required verification protocols.** This will be done in collaboration with local research institutions, with the objective of establishing a robust measuring, reporting and verification system to prepare Kerala for securing climate finance by project close in anticipation of the necessary policy decisions. Finally, the project will pilot a mechanism for payment for ecosystem services for mitigation efforts adopted at the farmer level in the project locations, based on the estimated emissions reductions achieved through the application of alternate wetting and drying. The goal of this activity is to have the on-farm practices adopted, the measuring, reporting and verification established, and the payment value and transfer mechanism piloted such that at the end of the project, GoK can secure alternative climate finance and continue the payments to farmers on a sustainable basis.

Component 2: Enhancing Small-holder Commercialization for Value Addition

24. **This component augments the commercialization of market-based agricultural production systems by investing in market linkages and promoting climate smart value addition.** It supports efforts to build mutually beneficial alliances between farmer groups and agribusinesses across a range of crops with the project playing the 'matchmaking' function and providing targeted support for essential investments through sub-grants and investments in critical value chain infrastructure – specifically agribusiness centers at the local level. The component activities are structured around three subcomponents.

25. **Subcomponent 2.1 provides support to generate up to 150 productive alliances (PAs) between farmers (or farmer groups, especially FPCs) and agribusinesses.** PAs are an established methodology for strengthening the linkages between producers, buyers and the public sector within the agriculture value chain. This

subcomponent will support PAs initiated by FPCs and by agribusiness by: (1) issuing a call for proposals to FPCs (and other eligible farmer groups) interested in seeking PAs; and (2) issuing a separate call for proposals to agribusinesses seeking to invest further in their value chains with project support. The project will: (1) assess the readiness of FPCs/ agribusinesses against established assessment methodologies to engage in a PA; (2) undertake a match-making function to then identify potentially interested counter-parties; (3) undertake a detailed analysis of the potential benefits to the FPCs and agribusinesses from a (tailored) PA agreement which would include the expected investments (cash or in kind) by the agribusinesses and FPCs; (4) identify the constraints to a successful PA and the required remedial measures whether these are written commitments, investments in productive assets and/ or additional equipment for value addition as well as any physical infrastructure for FPCs. The project will then: (5) prepare a written tri-partite agreement setting out the rights and obligations of the three parties under the PA; (6) provide (partial) matching sub-grants to the agribusinesses and FPCs (as appropriate) to undertake these investments as well as the direct provision of required physical assets through in-kind sub-grants to FPCs; and (7) monitor implementation of that PA, providing further guidance and TA as necessary (including facilitating access to finance from commercial lenders) throughout the life of the agreement. The partial sub-grants under (6) will include CRA approaches as a key selection criterion where relevant and will also favor specified adaptation/ mitigation outcomes. This subcomponent will be implemented by a technical service agency, which will (1) identify potential PAs; (2) provide all necessary TA to their formation; and (3) prepare business plans and requests for sub-grants/ infrastructure (to be determined by the Project Management Unit [PMU]) as well as monitoring and follow-up. A Sub-Grants Manual will set out operational procedures.

26. **This subcomponent will also support the preparation of a climate-informed commodity cluster development plan** that identifies more direct synergies between the interventions in Component 1 and the potential for coordinated investments in specific value chains, in particular for high value exports, that may not emerge from the PA modality. The plan will be informed by climate risks and propose pathways which enhance the adaptive capacity and resilience of the respective value chain(s). Finally, this component will finance the construction of nine agribusiness centers on pre-identified locations (under the DoA's scheme for 'one-acre parks') to benefit selected FPCs – subject to (basic) feasibility studies demonstrating the commercial benefits of such investments, viable arrangements for operations and maintenance of these facilities, and incorporating energy-efficient design options (including solar) and measures to ensure the physical resilience of the infrastructure against natural hazards.

27. **Subcomponent 2.2 will support the replanting of certified climate resilient varieties of coffee, cardamom and rubber in a total of 8 districts, with the on-farm investment costs largely leveraged from the financial sector via a partial credit guarantee (PCG).** The project will support intervention in three main areas:

(i) **Provision of TA and training to farmers and broad dissemination of state-of-the-art production techniques,** including recommended clones/ varieties for each location (produced by accredited nurseries under a scheme developed by the project) and a suite of improved agronomic practices to maximize the yield potential and minimize mortality risks of the replanted trees.

(ii) **Financial incentives to adopt the recommended technologies** through a performance-linked replanting sub-grant provided to eligible farmers. The sub-grant will finance replanting activities and will be disbursed retroactively based on farmer adherence to recommended practices and the use of approved seedlings with on-field verification. The sub-grant for rubber will target by far the largest number of farmers among the three crops corresponding to its dominant position in the state economy. The coffee and cardamom sub-grant will focus on expanding the existing grant schemes to improve their performance. A separate

matching sub-grant will be available to coffee farmers to finance a set of activities to encourage the use of high-efficiency irrigation technology (irrigation sub-grant); and

(iii) **Improved access to long-term finance for farmers interested in such loans through the establishment of a partial credit guarantee facility (PCGF) mechanism and TA to participating financial institutions.** The project will finance the initial capital to set up a new PCGF to facilitate agriculture long-term loans in Kerala including replanting loans. Technical assistance will be provided to establish PCGF operational policies and procedures. The scheme will be managed by *Nabsanrakshan*, a PCGF subsidiary of the National Bank for Agriculture and Rural Development. The operation of the PCGF will not distort existing financial markets. Some banks have already identified opportunities to expand their engagement in financing replanting, and other banks will be 'crowded in' by a combination of de-risking and TA. Activities (i) and (ii) will improve the risk-return equation by not only increasing farmers' interest in investing in replanting but also increasing the effective demand for long-term finance enabling farmers to better cope with the negative cash flow during the gestation period. This PCGF scheme (covering 70 – 80 percent of the outstanding loan balance) will incentivize participating financial institutions to provide longer-term finance with appropriate grace periods. The operational procedures will be set out in the PCGF Funds Operational Manual.

28. **Interventions across the three tree-crops are summarized as follows:** The rubber replanting program will be rolled out in six districts with the highest population of aging trees. All rubber producers with less than 10 ha will be eligible to participate although replanting sub-grants will target smaller farmers (up to 5 ha). Training/ TA can be availed by larger farmers (5 – 10 ha of rubber) as well. The total number of farmers benefiting would amount to 51,055 farmers across 30,000 ha – this equates to about 20 percent of the estimated area requiring replanting. Small farmers are expected to account for the majority of the total beneficiaries and the total area replanted. The cardamom replanting activities will focus on Idukki district. The project will provide sub-grant and TA packages covering improved agronomic practices and post-harvest activities of the small farmers with up to 2 ha and TA only to all the replanting farmers. The priorities of the sub-grant will be given to the farmers in FPOs/ FPCs to encourage aggregation, improved post-harvest treatment and value addition. The project intends to support 22,000 farmers with a replanting area of about 8,750 ha in total for 5 years. Coffee replanting will be focused in Wayanad district: all the replanting farmers up to 10 ha will be eligible for the project-funded replanting sub-grant following the Coffee Board's existing program. Priority will be given to the farmers in FPOs/ FPCs to support aggregation and greater market access. The remaining replanting farmers will receive TA which covers improved agronomic practices and post-harvest activities. In total, the project intends to support the replanting of 1,360 ha and 3,400 farmers for 5 years. In addition, as the medium farmers with 2 – 10 ha of land face greater drought risk with water conservation potential, a sub-grant for irrigation covering 40 percent of the capital investment costs will be made available to them.

29. **Finally, subcomponent 2.3 will develop context-specific measures to address land-related issues in Kerala**. In particular, TA would be provided to: (i) identify modalities for bring fallow land back into production through leasing-type arrangements; and (ii) carry out measures to promote collective decision-making among small-holders in order to generate economies of scale that can increase competitiveness and adaptive capacity of an agricultural system based on fragmented land holdings. CRA practices will be promoted on formerly fallow land.

Component 3: Strengthening Agribusiness and the Food System

30. **This component will support value addition, technological innovation and a more (environmentally, economically and financially) sustainable base of agribusiness firms, including through expanded and**

downscaled investment of food parks that help address land constraints and harness 'network economies' of interrelated firms. This component will also support women-owned MSMEs in Kerala access commercial financing for business development and growth through tailored TA in business plan development and sustained technical and mentorship support beyond the initial onboarding period. The component activities are structured around three subcomponents, which build on existing GoK interventions and implementation mechanisms.

31. **Subcomponent 3.1 seeks to enhance competitiveness and growth of agri-food MSMEs in Kerala.** Consistent with the existing Mission 1,000 initiative of the Department of Industries (DoI) it will provide technical and financial support to high-growth agri-food MSMEs to enhance competitiveness, market access, job-creation and value-added in the agricultural sector. The subcomponent will finance the following activities: (i) identification and standardized assessments of high-growth enterprises in the sector; (ii) quality technical service provision across identified gap areas including technology adoption, marketing, mobilizing commercial financing, and improving food quality and safety standards; and (iii) partial financial support (in the form of MSME sub-grants) to incentivize MSMEs adopting improved low-GHG and resilient technologies, enhanced marketing efforts and improved product standards. Interventions under (iii) will include a focus on 'greening' MSMEs, supporting the adoption of energy efficiency (e.g., energy efficient irrigation systems, upscaling the use of energy efficient farming equipment, and energy efficient storage and processing through improved insulation and ventilation) and improved waste management measures. Food waste will be reduced through improved storage, cooling and inventory systems, and a circular approach to food waste management will be scaled. The subcomponent will support more limited TA to a larger number of agri-food MSMEs in the state for: (i) energy and waste management assessments leading to a reduction in GHG emissions; and (ii) onboarding onto digital marketing platforms. The subcomponent will also support capacity building of the DoI to manage support programs targeting the agri-sector including partnering with recognized technical agencies to develop a pool of accredited TA providers in the state.

32. **Subcomponent 3.2 will support technology incubation and agri-based agri-tech startups.** Since 2014, KSUM has supported over 5,039 startups creating over 60,000 jobs and attracted over US$669 million of venture capital funding. However, to date less than 10 percent have been focused on agri-tech. Moreover, the existing support infrastructure is tailored predominantly for software enterprises, which requires recalibration to meet the unique nuances of the agribusiness sector. As such, the project will support incremental innovations to the existing incubation process that are tailored to agri-tech startups and their key clientele in Kerala – smallholder farmers – thereby contributing to solutions to the state's distinct agricultural challenges, climate change being paramount among them. Entrepreneurs from states/ areas with similar agroecological conditions (as defined in the PIM) will be invited to tackle Kerala's agricultural challenges. Drawing on synergies of the priorities for climate change adaptation (component 1) and opportunities for value addition (component 2), KSUM will release specific calls for proposals centered on these challenges and the project will support – via Startup Grants – 150 startups, each boasting prototypes equipped to confront these identified issues. The subcomponent will refine the traditional incubation process, making it more relevant to Kerala's agri-food sector, by: (i) emphasizing a field-driven methodology, enabling agri-tech startups to immerse themselves among their clientele, extract direct insights, and trial their innovations with smallholders in Kerala; and (ii) facilitating workshops to guide startups in tailoring their business models to Kerala's specific requirements, complemented by bespoke support based on each startup's distinct needs. To be sustainable, the project will establish a network of *fellows* and institutions that facilitate the direct interaction/ incubation of startups with farmers across the state. This component will be implemented through two scalable performance-based conditions (PBCs) as it leverages KSUM's experience in startup programs through its operations, facilities, and systems. The PBCs are: (PBC 1) 150 technologies incubated by project supported agri-tech startups with inputs from farmers; and (PBC 2) 40,000 farmers and enterprises adopting technologies developed by startups.

33. **Subcomponent 3.3 provides support for the establishment of food parks at differing scale in several locations across Kerala.** Food parks are not new to Kerala: KINFRA has already set up seven food parks, helping businesses access land and critical infrastructure thereby creating over 4,200 jobs and attracting nearly INRs 53,000 lakh in investment. At the same time, DoA's current approach – targeted at a more local level and more directly connected to producing areas – is less market-oriented and uptake has been limited. Therefore, the project seeks to leverage Kerala's success in two ways: first, by rolling out the existing approach of KINFRA – with a strong market focus – to support the development of a further 3 large agri-parks managed by KINFRA; and second, by supporting the 'down-scaling' of KINFRA's approach to 2 smaller agri-parks which they would normally consider too small. In all 5 cases, publicly owned land has been identified. The project will finance pre-feasibility studies to determine the commercial and operational viability of constructing food parks on the proposed locations. Should the evaluated locations prove suitable, this subcomponent will subsequently finance comprehensive feasibility studies (including the formulation of design parameters and bidding documents, and implementation mechanisms that maximize private sector expertise) and the construction of infrastructure for developing the land for future leasing to tenants. The design of food parks will reflect local hazards and will include energy efficiency measures and consider options for the parks to be powered with renewable energy. In addition, this subcomponent will support a more commercially oriented approach to the development of a further 5 smaller common processing centers on a similar basis. Should any of the pre-feasibility studies conclude negatively, the project will support GoK to identify alternative potential locations instead. Similar to the food parks, the design of the common processing centers will include energy efficiency measures, as well as options for them to be powered with renewable energy. Again, the design will integrate measures to enhance resilience against climate risks. Implementation of the infrastructure improvement works will start towards the end of the project's second year.

Component 4: Project Management

34. **This component will finance project management costs for** the (central) PMU and three regional PMUs and component specific subsidiary Project Implementation Units (PIUs) in DoI (responsible for implementing subcomponent 3.1), KSUM (subcomponent 3.2) KINFRA (subcomponent 3.3). A PIU will also be established within Kerala Agricultural University (KAU) given their significant role envisaged role across multiple components. The arrangement with the International Rice Research Institute (IRRI) will include a management overhead for their overall implementation of activities under subcomponent 1.2. Funds will be provided to key state agencies to cover incremental operational expenses directly related to their role in the project. The PMU will establish the financial management (FM) and procurement systems, implement a communication plan, carry out governance and accountability actions and be responsible for monitoring and evaluation (M&E) and third-party audits. Roles will be defined in the PIM, formalized in individual memorandum of understanding and resources allocated annually based on workplans and budgets.

Component 5: Contingent Emergency Response Component

35. **The project will include a contingent emergency response component (CERC)** with no allocation at project approval: provision of immediate response to an Eligible Crisis or Emergency, as needed. This arrangement shall permit a rapid project restructuring which will provide immediate response to an Eligible Crisis or Emergency, as needed.

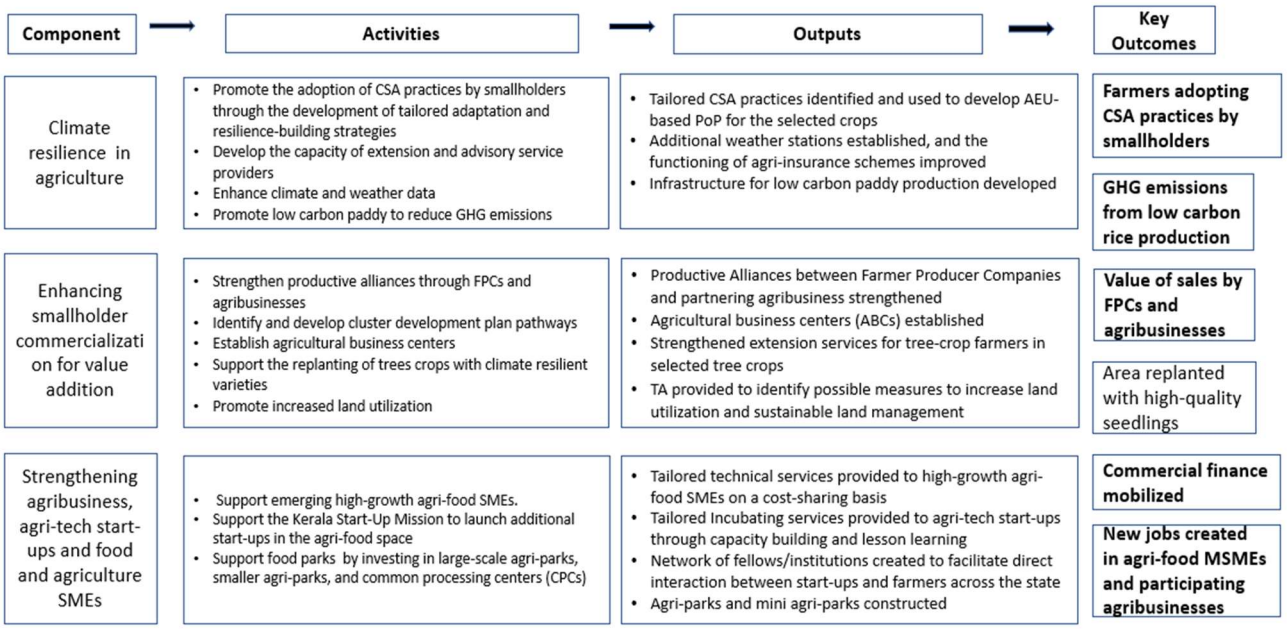
C. Project Beneficiaries

36. **The main project beneficiaries** are: (i) participating farmers benefiting from climate resilient cropping systems and increased incomes from productivity improvements and/ or value addition; and (ii) entrepreneurs

and employees of agribusinesses along the value chain. Direct beneficiaries will be located in all 14 districts in Kerala, including 140,000 farmers benefiting from advisory services in CRA practices; over 50,000 farmers benefiting from rejuvenation of their tree crops; 45,000 farmers within the 20,000 ha benefiting from low carbon rice, agribusiness staff and FPC members engaged in the 150 PAs, employees of the 150 startups and 250 MSMEs assisted under the project as well as employees of the agribusinesses established in the food parks, common processing centers and agribusiness centers. Secondary beneficiaries are: (i) farmers benefiting from the application of technology fostered by the startups and farmers supplying the MSMEs and food park tenants created by the project; and (ii) participating government agencies with mandates for promoting climate smart agriculture, agricultural value chains and agro-processing.

D. Results Chain

Figure 1 Theory of Change



37. The project addresses the problem statement: Climate change threatens the underlying production base and opportunities for competitive value addition and agro-processing within the wider agri-food system are not currently realized. The project's Theory of Change is summarized in Figure 1. (Note: key outcomes in bold denote PDO-level indicators.) Critical assumptions are: (i) commodity prices do not decline such that the application of CRA practices are rendered unprofitable; (ii) there is a continued stream of entrepreneurs and innovators within Kerala with whom the project will partner; and (iii) the overall macroeconomic context in Kerala and India remains conducive.

E. Rationale for Bank Involvement and Role of Partners

38. **There are three key justifications for Bank support to the project:** (i) the project embodies several innovative interventions/ implementation modalities in Kerala with the potential to transform the way GoK (and other states) support the continued structural transformation of the agri-food system; (ii) the Bank has considerable global experience with the technical interventions proposed in the project and can draw on these

lessons to ensure best practice in their application in Kerala; and (iii) the project reflects the Bank's new vision of poverty reduction on a livable planet and its specific role in supporting climate adaptation and mitigation in client countries.

39. **The project embodies critical partnerships both internally and externally.** The implementation modalities reflect the principles of *convergence* that seek to avoid duplication in delivery mechanisms across state/ national entities and between GoI/ GoK programs and externally aided projects. The project will harness existing capabilities and simultaneously strengthen delivery systems to ensure sustainable impacts. Second, the partnership with IRRI leverages international expertise of a leading CGIAR center into Kerala – a state where IRRI is not currently active.

40. **An Investment Project Financing (IPF) instrument is most suited to finance specific investments in the project.** The modalities include the delivery of services from institutions and technical service agencies and are best deployed under IPF arrangements. Investments in infrastructure are also well suited to this modality. The project includes two PBCs in the support for startups: the rationale for this specific modality is that: (i) the KSUM is an extremely capable implementation partner with robust technical and administrative capabilities; (ii) the broad package of support for startups including those in the agri-food space is well defined and costed; and (iii) results are well defined and can be objectively verified and hence amenable to a results-based approach. Finally, including a CERC is recognized best practice in IPFs.

F. Lessons Learned and Reflected in the Project Design

41. **All elements of the project reflect best practice** from the Bank's global experience combined with external lessons from other institutions/ the literature:

- **The World Bank has wide experience of supporting CRA practices** – they are core to the Bank's CCAP – and the specific modalities incorporated in the project reflect the operational experiences that informed the CCAP, including the use of nature-based solutions, as well as the Bank's considerable global experience in promoting adoption of improved practices and the use of competitive research grants.

- **The support for PAs incorporates more than two-decades of experience,** originally in Latin America and now extended across all regions including elsewhere in South Asia. Continual support to farmers and agribusinesses under each PA is shown to nurture adaptability to evolving business needs thereby strengthening the buyer-seller relationship. Lessons from projects in India emphasize the importance of technical leadership within departments to be complemented with outside expertise via a technical service agency. Furthermore, strong FPOs are necessary but not sufficient for successful PAs. Well organized FPOs with strong leadership, high literacy/ numeracy rates and a long-term strategic perspective provide the foundation for more balanced – and therefore mutually beneficial – partnerships under PAs, while participating agribusiness also need to be of a certain caliber.

- **Lessons have been drawn from the 2019 evaluation of WBG support to MSMEs,** such as the focus on high growth potential MSMEs, the 'graduated' approach from broader, more generic support to more tailored solutions requiring a larger beneficiary contribution and avoiding the over-reliance on credit. The project modalities are essentially a sector- and state-focused drill-down of – and are fully consistent with – the approach deployed in the on-going national-level MSME support project. Support to startups in the project reflects lessons from similar World Bank-funded projects, including: (i) financing alone is insufficient; rather startups need a comprehensive package of financial and non-financial services

(including mentoring, training, business advisory services, and networking); (ii) providing the option to invest through a fund-of-funds approach (as already established by KSUM) provides for a more streamlined selection process and an opportunity to leverage greater resources from the private sector; and (iii) there should be capital available for follow-on funding as the market evolves – experience of the contrary from Morocco and Lebanon shows that lack of follow-on funding after they have received initial grants and/ or seed investment can be an obstacle to their continued growth.

- **Finally, the project's investment in food parks incorporates best practices identified by the World Bank report *The Dos and Don'ts of Special Economic Zones* and experience of UNIDO.** The guidance is based on three key questions to determine if a spatial industrial intervention is advisable: (i) is industrial development a key pillar of the government's economic development strategy? Kerala is a very fertile land with a diverse range of crops providing numerous opportunities for value addition; (ii) what are the market failures the region is facing in implementing such a strategy? The main problem challenging the industrial development of Kerala is the availability of land; and (iii) is an industrial park one of the instruments that could help address such failures? The development of industrial food parks addresses the market failure link to land availability: KINFRA and other government entities have land holdings that permit the development of industrial land at scale, including the provision of shared service infrastructure.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

42. **The project will be implemented primarily by DoA with the DoI playing a substantial role and other agencies also having important implementation responsibilities.** The PMU will be headed by a Project Director as assigned by the DoA. There will be three regional PMUs and four PIUs to support field-level implementation. The project will be overseen by the high-level steering committee (HLSC) chaired by the Chief Secretary and including the Agriculture Production Commissioner, Secretaries of the Departments of Finance, DoI, Water Resources (DoWR), Law, and Electronics and Information Technology, the Vice Chancellor of the KAU. The Director is the Convenor. The HLSC has already been established is expected to meet every six months. A project executive committee will be stablished with authority to approve all operational matters coming above the powers of the Project Director and will have overall responsibility for the implementation of the project. The executive committee will meet every three months. The committee is chaired by the Commissioner and includes the Secretary, Finance Expenditure, DoF; Director, Industries, DoI; Chief Engineer, Irrigation, DoWR; Director, Plantation, DoI; Director, DoA and the Project Director and Additional Director.

B. Results Monitoring and Evaluation Arrangements

43. The PIM will set out details for results monitoring and proposed project evaluations. In summary: (i) surveys will be conducted at baseline, midline and endline to provide quantitative and qualitative data for evaluative purposes and to inform the mid-term review; these will be commissioned (i.e. procured) from specialist agencies/ consultancy firms; and (ii) much of the data for monitoring PDO-level and intermediate-level indicators will be derived from the project management information system (PMIS) through regular reporting and monitoring arrangements. The nature of the project interventions prohibits a randomized approach to beneficiary selection and therefore constrains the potential for a robust impact evaluation. However, it is possible to adopt propensity score matching or similar methodologies which would nevertheless permit a quantitative impact evaluation. In addition, there may be scope to sequence project implementations and to utilize phasing for similar purposes. The design of the baseline survey will include recommendations in this regard.

C. Sustainability

44. **The project promotes a sustainable impact at three levels:** (i) sustainable change on production practices at the farmer level; (ii) sustainable impacts among beneficiary agribusiness and firms; and (iii) sustainable change at the institutional level. Taking each in turn:

- **Ensuring sustainable impacts from CRA technologies requires a focus on adoption by farmers** which is a function of: (i) the suitability to local farmer conditions and preferences, and (ii) the application of proven modalities of demonstration (e.g. lead farmer and Farmer Field School models). Activities are based on evidence-based approaches and will be subject to ongoing monitoring. New CRA practices supported by the project will be subject to explicit agronomic and socio-economic appraisal to ensure their broad appeal to farmers (including women farmers). Emission reductions from low carbon rice will be sustained by the planned graduation of the farmer payments from project resources to alternative carbon financing by project close.

- **Projects that seek to 'select winners' from prospective MSMEs or firms are inherently risky.** However, the rigorous and evidence-based screening process will promote the selection of high-potential beneficiaries. By developing a pool of technical service providers to agri-food MSMEs and agribusinesses throughout Kerala, the project will leave a lasting ecosystem to the benefit of future enterprises. Furthermore, by leveraging private capital rather than direct subsidies, the project will also strengthen the ability of the financial system to meet investment needs of enterprises through commercial lending beyond project close.

- **Finally, the project's approach seeks to pilot new instruments and new delivery mechanisms** in order to showcase how GoK's own programs could evolve to be more efficient and/ or effective. Although designed with a PMU as the central implementation modality, by seeking *convergence* and in leveraging existing institutional mandates through collaboration with other entities, the project is well positioned to deliver a lasting impact.

IV. PROJECT APPRAISAL SUMMARY

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

Technical Appraisal

45. **The project deploys a range of proven technical solutions** in response to constraints identified through diagnostic assessments and validated through extensive stakeholder consultations during project preparation. The efficacy of the proposed interventions is evidence-based, drawing on the Bank's experience in India and elsewhere, and validated in a series of stakeholder discussions convened by GoK during project preparation. All interventions seek the appropriate balance between introducing the innovation necessary for transformational change with the technical and institutional realities of the Kerala context. Component 1 incorporates lessons from the deployment of CRA interventions in the Bank's portfolio of agriculture projects with a focus on adoption: this recognizes the challenge of permanently changing farmer behavior through revised incentives necessary for sustainable impacts. Component 2.1 embeds the established PA model with the specific modalities based on extensive consultations with local agribusiness. Consultations with local retail banks demonstrated their aversion to long-term lending and confirmed that partial risk sharing would increase their credit provision. The proposed PCGF has been subject to specific technical review and confirmed as non-distorting to the financial sector. Under Component 3, the interventions to support food parks leverage the success of KINFRA and down-scale their market-based approach. The interventions for startups and MSMEs seek to deploy existing modalities specifically to the food and agriculture space. These ongoing programs have been assessed as appropriate with certain modifications to be supported by the project.

Economic and Financial Analysis

46. **An economic and financial analysis has been prepared for the project which shows the project components are all economically justified.** The analysis is based on a series of models corresponding to the main activities in project subcomponents. The lifespan of models ranges from 10 years for shorter-term investments such as paddy to 20 years for longer term investments such as the rehabilitation of tree crops plantations. No economic and financial analysis is calculated for the CERC.

- For subcomponents 1.1 and 1.2, three representative farm models were developed representing three AEZs, with each farm cultivating two or more crops from the most prominent crops in each AEZ, and the cropped areas correspond to average cropped areas for small holders in Kerala. With project benefits are based on an increase in the production margin compared to the plot without project. GHG benefits of low carbon rice are considered to amount to 2 metric tons CO2e per hectare, corresponding to 1 tonne CO2e per season based on the expected mitigation benefits. For the financial analysis, producers are considered to receive US$25/tCO2e under the pilot scheme (for comparison, the low social price of carbon for 2024 is US$52/tCO2e). For the economic analysis, the social price of carbon is used to value GHG reduction.

- The economic and financial analysis for subcomponent 2.1 on the PAs and subcomponent 3.1 on support for agri-food MSMEs were estimated directly at the subcomponent level. Economic benefits of PAs are modelled on empirical evidence that most PAs globally have generated satisfactory average rates of return at the commonly assumed discount rate of 12 percent and 10-year estimation period. Similarly, subcomponent 3.1 on agri-food MSMEs is demand-led, and the eligibility condition of the MSME sub-grants programme will confirm the economic and financial viability of proposed investments. Benefits assume a conservative return of 12 percent over a period of 10 years following the activity start, because of the difficulty of identifying and modelling representative investments at the design stage. Project investments are expected to lead to additional job creation: Component 3 will lead to the creation of around 7,000 jobs (based on existing trends) while subcomponent 2.1 would lead to the creation of around 1,000 jobs. Job creation is only assessed for post-harvest activities. To calculate returns of the food parks subcomponent, a mini-food park of 10 acres was modelled based on cost data and revenue estimates provided by KINFRA. The main sources of revenues for the parks are the rental of land (service plots) the rental of built-up space (standard design factory). The model assumes that the park achieves full occupancy in year five of the investment, and the profitability is assessed over a period of twenty years.

- **The financial analysis shows that all models are profitable, while the project is viable economically.** For the financial analysis, net present values per household range from US$155 to US$4,366 per household. Models include all costs valued at market prices. A discount rate of 10 percent accounts for the opportunity cost of capital. Not all models have data on the Internal Rates of Returns (IRRs) because some models represent different production models and hence yearly margins as opposed to an upfront investment cost. The mini food parks are also very profitable. For the economic analysis, economic prices were computed by removing taxes, subsidies, and other transfers and accounting for distortions in the exchange rate. For fertilizer, which are heavily subsidized in India, the shadow price is used in the economic analysis, without using the conversion factors. The economic models include family labor costs. A discount rate of 10 percent was used as per standard practice for India projects. Adoption rates are assumed to vary from 60 percent for the tree crop models to 80 percent for the alternate wet and dry and 90 percent for the food parks. Following the aggregation of benefits, incremental costs not otherwise included in the models were added to the final flow of additional benefits. The economic analysis spans a period of twenty years. The economic net present value ranges from US$216 million (without carbon benefits) to US$232 million (with carbon benefits and a high

social price of carbon). The economic internal rate of return ranges from 19.9 percent to 20.6 percent in these respective scenarios. This shows that the project is very viable, especially given that some of the project benefits were not quantified. A sensitivity analysis shows that the project remains viable.

Paris Alignment

47. **The operation is aligned with the goals of the Paris Agreement for mitigation and adaptation**. With respect to mitigation risks, the improved agriculture practices proposed conform to CRA pillars and are universally aligned with little risk of the operation having a negative impact on India's low-GHG emissions development pathway. The operation will develop context-specific CRA technologies across agroecological zones and promote low carbon rice production through alternate wetting and drying and rice intensification technologies. The operation also supports increased value addition and improved energy efficiency along the value chain, which combined with productivity increases, will lead to reduced food loss and waste and reduced GHG emissions intensity. With respect to climate change adaptation, the project design explicitly includes promoting climate-resilient policies and strategies, strengthening the institutional and technical capacity of DoA to implement CRA, promoting sustainable land and water management practices, and enhancing weather information and crop advisory system to increase adaptive capacity and strengthen management of climate risks. By mandating the use of CRA practices in the rejuvenation of tree crops – alongside the PCGF – the project is seeking to simultaneously de-risk commercial lending and increase the resilience of farmers. Technical feasibility studies of the food parks will confirm the resilience of the primary production base and will also identify measures for promoting energy efficiency, waste management and elements of the circular economy as part of the mitigation agenda.

GHG Analysis based on estimates using EX-ACT

48. **Estimates for changes in GHG indicate an overall net reduction in emissions by the project,** mainly from the activities promoting CRA (subcomponent 1.1) and the alternate wet and dry rice production (subcomponent 1.2). The analysis was conducted using the Ex-Ante Carbon Tool (Ex-ACT) for the impact of subcomponent 2.2 on tree crop rejuvenation and estimates of reduction per hectare for subcomponents 1.1 and 1.2. For subcomponent 1.2, it is assumed that each hectare of rice adopting alternative wet and dry paddy production techniques would result in a reduction of emissions of 2 metric tons per hectare per year of CO2e, over two seasons. The analysis shows that, over a 20-year period (6 years of implementation and 14 years of capitalization), the project could reduce GHG emissions by 442,281 tCO2e, averaging -22,114 tCO2e per year. The reduction in emissions come from subcomponents 1.1 and 1.2, and in particular the expected reduction of methane gas from paddy rice production using intermittent drying. In contrast, subcomponent 2.2 results in additional emissions through the fertilizer use required for the replanting.

B. Fiduciary

49. **The agreed FM and Procurement arrangements are considered adequate to account for and report on project expenditures.** The FM and Procurement risk for the project is rated Substantial, given the innovative design of the project, which features the provision of sub-grants to several category of recipients/ beneficiaries, setting up PCGF and involves multiple PIUs, including regional PMUs. This risk is mitigated by designing sustainable fiduciary arrangements, providing continuous support for training, and handholding at the initial stage of implementation**.** The project Fiduciary arrangement framework will be laid out in the relevant FM and Procurement sections/ annexes of the PIM including specific manuals (Sub-Grants Manual and PCGF Operational Manual) setting out guidelines and procedures for sub-grants, PA and the PCGF.

Financial Management

50. **The Project activities will be pre-financed by the GoK's State budget.** A separate budget line (Externally Aided/ KERA Project) has been opened under DoA budget to provide for 100 percent funding (IBRD and state share) for the project based on approved budget estimates – Annual Work Plans. The project funds will flow through dedicated project bank accounts with all IAs following 'Central Pool and Zero Balance Account' system, duly supported by PMIS application for fund allocation and payments. All payment to vendors, suppliers and beneficiaries will be done electronically with minimal petty cash utilization. For Project sub-grants, project funds and beneficiary contributions under each Sub-Grant Agreement (GA) will be deposited in a dedicated bank account. Sub-Grant funds shall be released in tranches, based on compliance with the stipulations in the GAs, including submission of audited Utilization Certificates. The sub-grant selection screening will include financial viability criterion. For the PCGF, the operational policies and procedures will detail the fiduciary arrangements including the requirement of a dedicated bank account, instalment mechanism, audit norms and clauses for operation of PCGF beyond the project closure. Detailed manuals for the PCGF and the use of sub-grants under the Project will be prepared and both are disbursement conditions for these expenditure categories. Accounting under the project will observe cash basis, double-entry system using accounting software. All PIUs will be accounting centers and will be responsible for maintaining relevant financial records, with project accounts being consolidated by the PMU. For project Internal Audit, a single firm will conduct audit of PMU and all PIUs and present a consolidated report as per the terms of FM and Procurement manual. The project external audit will be conducted by the office of Accountant General Audit, Kerala and the reports will be submitted to the Bank within nine months of the close of the financial year (that is, by December 31). Further, a separate sub-grant/ PA audit by an external agency will be conducted to review financial and physical progress for all sub-grants disbursed under the Project, as per the provisions of the Sub-Grants Manual.

51. **The applicable disbursement method is Forecast-based Advance and reimbursements.** Disbursements would be made by the Bank based on quarterly Interim Unaudited Financial Reports (IUFRs), which would forecast the expenditure for two quarters and report the actual expenditure for the past quarter as per the agreed format. Each disbursement of the forecast based advanced shall be subject to prior review of the Bank and the standing advance shall be adjusted against the actual expenditure incurred on quarterly basis. Any forecast-based advances remaining un-adjusted (as expenditures) at the end of the project period would be refunded to the World Bank. The IUFR will be shared with the Bank within 45 days from end of the reporting period. Funding under Sub-Component 3.2 will be results based, disbursed against eligible expenditure. These expenditures will include actual sub-grants value and the associated administrative cost. Once the PBCs are met and duly verified, the project will initiate claims restricted to the cumulative eligible expenditures. For project sub-grant, funds transferred as per signed GAs and reported through IUFRs shall be considered eligible for disbursement with subsequent reconciliation with actual expenditures under the project. The sub-grant advances remaining un-adjusted (as expenditures) at the end of the project period would be refunded to the World Bank. Monitoring the end use of funds and compliance with the terms and conditions of the GA will be the responsibility of the PMU and the respective PIUs which has signed the GA. *Retroactive financing:* Payments made by the GoK in the one-year period before the signing of Legal Agreements for contracts awarded following World Bank procurement procedures will be eligible for retroactive financing expenditures.

Procurement

52. **Procurement activities will be carried out following the World Bank's Procurement Regulations for IPF Borrowers (Fifth Edition) September 2023.** Details of procurement activities will be specified in the Project Procurement Plan. The Project will be subject to the World Bank's Guidelines on Preventing and Combating Fraud

and Corruption in Projects Financed by IBRD Loans and International Development Association (IDA) Credits and Grants. Project Procurements will be carried out by the KERA PMU set up by DoA as the main Project Implementing Agency along with 3 implementing agencies, namely DoI (for procurement of Goods / Equipment and Consultancy Services), KINFRA (for procurement of Civil Works), KSUM (for procurement of Goods / Equipment and Consultancy Services) and KAU (for procurement of Goods / Equipment and Services via the KERA PMU). All Implementing Agencies follow the Stores Purchase Manual of the Kerala Finance & Stores Purchase Department and use the e-procurement platform of the National Informatics Center which is cleared by the Bank. The Stores Purchase Manual is largely aligned with the National Procurement Arrangements of the Bank's Procurement Regulations. The DoA has no experience of implementing World Bank funded projects, but their procurement capacity is augmented by deploying a competitively selected Consulting firm to support the KERA Project Preparation Team. KINFRA, a GoK Corporation established for development of Industrial Estates and associated Infrastructure is well acquainted with the procurement of Civil Works required for the project implementation. KSUM, the nodal agency of the GoK for promoting entrepreneurship and startups has adequate exposure to procurement of Goods and Consultancy Services. Support would be required, especially in the initial phase of project procurements given the likely complexities of envisaged Consultancy Services, Compliance with ESHS requirements, inappropriate market readiness and logistical issues as well as the involvement of multiple Implementing agencies and association with strategic partners. The Project Procurement Thresholds in the Procurement Plan are based on the Procurement Risk Assessment and will be reviewed during project implementation. The Bank's Standard Procurement Documents shall be used for all contracts subject to international competitive procurement and those contracts as specified in the Procurement Plan tables in STEP. National Competitive Procurement will comply with paragraphs 5.3 – 5.5 of Section V of Procurement Regulations and conditions in the Procurement Plan.

C. Legal Operational Policies

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Area OP 7.60	No

D. Environmental and Social

53. **The Environmental and Social risk of the project is rated "Moderate".** All environmental and social standards (ESSs), except ESS5 are relevant, including ESS9 on Financial Intermediaries. The DoA undertook screening and assessment of environmental and social risks and impacts associated with KERA project interventions, based on a desk review, field visits and extensive stakeholder consultations.

54. **Environmental: The environmental risk of the project is rated Moderate.** The potential environmental risks relate to small to moderate scale infrastructure works (food parks, cold storages, warehouses, etc.), repairs to small-scale irrigation structures/canal works (limited), water and energy consumption, and waste release (limited) from operation of processing facilities. In addition, the farm intensification interventions may trigger excess use of water and fertilizers, use of non-permissible/ hazardous pesticides, unsafe application and disposal methods, replacement of traditional varieties with hybrids, etc. The impacts and risks are expected to be predictable, limited, site-specific, and manageable through known and readily available mitigation measures,

which can be implemented through site-specific Environmental and Social Management Plans and integrated pest and nutrient management approach. The project/ client had prepared the Environment and Social Management Framework (ESMF), which includes the integrated pest and nutrient management approach, and measures for biodiversity management.

55. **Social: The social risk is considered Moderate.** The project does not involve land acquisition and physical and/ or economic displacement. Construction of food parks, agribusiness centers, common processing centers as well as repair/ rehabilation of government buildings and irrigation canals will be small to moderate in scale, and will happen within existing boundaries and sites owned by government departments. Interventions on land leasing and land collectivisation arrangments will largely include TA and global knowledge sharing, and risks related to land alienation or loss of land tenure are not anticipated. The project will be implemented in tribal clusters where engaging tribal communities through meaningful consultations, broad community support and social and culturally compatible project interventions will be important. Risk of exclusion of disadvantaged and vulnerable socioeconomic groups, especially scheduled caste, scheduled tribes, particularly vulnerable tribal groups, small and marginal farmers, tenant farmers, women farmers, farm labor and people with disability will be important. While the labor deployment will be smal to moderate, the majority of the construction works will be carried out by migrant labor hired by contractors, and risks related to labor influx will need to be managed. Given that the KERA project includes small to moderate civil works, the risk related to Sexual Exploitation and Abuse/ Sexual Harassment risk is assessed as low. Construction related safety risks to occupational and community health and safety will need to be managed through conventional risk mitigation measures.

56. **An ESMF, Stakeholder Engagement Plan and Environmental and Social Commitment Plan (ESCP) have been prepared and disclosed[1].** The ESMF also includes integrated pest and nutrient management plan, Labor Management Procedures, Indigenous Peoples Planning Framework as well as other appropriate tools and measures on environment and social risk mitigation. The ESCP has been negotiated and includes specific measures for environmental and social risk management during the project implementation, commitments on developing a CERC ESMF as well as an Environmental and Social Management System for the partial risk guarantee intervention.

57. **Gender: Women in Kerala face several challenges in establishing or managing businesses in agriculture and food sector.** Overall 23 percent of the MSMEs in Kerala are owned by women; however, the composition of enterprises supported by KINFRA show that only 5 percent of enterprises are women-led or have a woman director. It is a challenge for women entrepreneurs to run and expand their businesses due to a lack of: (i) access to formal financing to cover high upfront costs (only 3.1 percent of women-owned enterprises across India access financing from formal sources); (ii) access to training needed for developing business plans which specifically articulate the constraints of women-owned agribusiness MSMEs; and (iii) technical support to scale-up, market their goods and compete with larger and more established businesses. The project aims to enhance sustainability and viability of agribusinesses for women by providing them business and technical skills and tailored support to

[1] ESMF, SEP, ESCP were disclosed on Karshika Keralam website of the Government of Kerala on December 12, 2023 (https://keralaagriculture.gov.in/en/kera/) and the World Bank website on January 25, 2024 (see ESMF https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099012524130525902/p178254192ed730f31be91171abf0c81ff9; SEP https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099092024142526128/p1782541d4940d0c61827114ae709567856 and ESCP https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099092024141519929/p17825418782700871a0461dbdf729ec63b

develop business plans so that they can seek financing from the private entity. The gender-specific constraints and needs in establishing and running an enterprise will be encapsulated in their business plans, which in turn would strengthen their business case to secure financing through various sources, including commercial finance. Additionally, the project will support women-owned agribusiness MSMEs' access networks and extend mentorship support beyond the initial onboarding period for the participating women-owned MSMEs. The project will track women-owned participating agriculture and food MSMEs to access commercial finance.

58. **Citizen Engagement: Kerala has a strong institutional framework for government-citizen interface and social accountability of public services** through Panchayati Raj institutions and community-based organizations including women's neighborhood groups and livelihood collectives. The state also has a well-established system of decentralized, participatory development planning, community monitoring, citizen's feedback and grievance redressal system. The project will leverage these existing institutional mechanisms in the context of the project components and specifically focus on: (i) strengthening grievance redressal and citizen's feedback systems focusing on farmers and farmer/ livelihood collectives; (ii) building government capacity and systems to respond to smallholders, women and tribal farmers' information needs; (iii) use of concurrent monitoring and/ or citizen's satisfaction surveys in agriculture service delivery; and (iv) extension, advisory and communication activities targeting KERA's stakeholders. The project includes an intermediate-level indicator to measure the number of farmers satisfied with extension advisory services provided by the project.

59. **Use of Personal Data:** The PIM will include measures to ensure that the project activities involving collection, storage, usage, and/or processing of Personal Data are carried out with due regard to the Borrower's existing legal framework and appropriate international data protection and privacy standards and practices.

60. **Use of Drones:** The project may support the use of drones for agriculture-related activities. The complete scope of this activity is yet to be defined. Before drones are used or procured under the project, a risk assessment will be undertaken to ensure all mitigation measures are in place.

61. **Climate Co-Benefits**: The project recognizes the climate vulnerabilities of the state and its direct impact on the project outcomes and ultimately the economic and livelihood wellbeing of farmers. It has accordingly taken adaption and mitigation measures to promote resilience and reduce GHG emissions. The measures undertaken by the project are detailed in the Climate Co-Benefits Technical Note and summarized as follows. Under Component 1, the project will enhance climate resilience by promoting the adoption of CRA technologies and practices with demonstrable benefits for Kerala's farmers. The component will also reduce GHG emissions by: (a) strengthening the capacity of the state's extension and advisory service providers in contemporary CRA technologies to promote informed decision-making on more efficient and sustainable agricultural practices; (b) improving farmer's decision making on crop selection, planting times, and other agricultural practices through increasing the quality and availability of climate and weather data; and (c) supporting low carbon emission rice production. Under component 2, the project will reduce emissions by: (a) promoting CRA techniques such as minimum tillage, optimized fertilizer use, and efficient water management practices; (b) investing in energy efficient infrastructure and technology to reduce the carbon footprint of production; (c) building the capacity for farmer organizations and extension agents on climate-smart value chain development; and (d) promoting measures such as improved storage and handling to reduce food loss and waste leading to a substantial reduction in GHG emissions; (e) promoting shaded coffee production to reduce carbon footprint; (f) undertaking agroforestry on non-forested land; and (g) investing in land rehabilitation to increase carbon pools. Under component 3, the project contributes to overall reduction of the carbon footprint of agri-food MSMEs by: (a) promoting energy efficiency and improved waste management measures; (b) promoting energy-efficient

irrigation systems; (c) building capacity and training farmers in energy conservation in agricultural operations; and (d) promoting improved food storage and handling techniques to reduce food waste and associated emissions.

V. GRIEVANCE REDRESS SERVICES

62. Grievance Redress. Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank'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 Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org.

VI. KEY RISKS

63. **The overall project risk rating of the project is assessed as "Moderate".** Fiduciary risk and Institutional Capacity and Implementation and Sustainability risk are rated Substantial because of the project's approach to leverage several departments, the technical novelty of the interventions being supported by the project and the use of matching grants. These risks will be mitigated through an apex project steering committee chaired by the Chief Secretary and involving Secretaries from all concerned departments, and the establishment of implementing units within these departments with clear deliverables and accountability. Fiduciary risk will be mitigated through embedding fiduciary requirements into the project's implementation functions with a particular focus on the use of grants modalities. These measures will enhance effectiveness, transparency and accountability while simultaneously streamlining project procurement and complaint handling. It will also strengthen internal financial controls and promote accountable fund flow across all levels of project operation. Implementation support will be comprehensive, and the project will facilitate cross-learning with relevant projects elsewhere in India.

VII. RESULTS FRAMEWORK AND MONITORING

PDO Indicators by PDO Outcomes

Baseline	Closing Period
Promote commercialization	
Value of sales by FPCs and agribusinesses (Percentage)	
Nov/2024	Nov/2029
0	30
Commercial finance mobilized (Amount(USD))	
Nov/2024	Nov/2029
0	9,000,000
New jobs created in agribusinesses (Number)	
Nov/2024	Nov/2029
0	1,000
➢New jobs created - female (Number)	
Nov/2024	Nov/2029
0	200
Promote Resilience	
Farmers adopting CSA practices (Number)	
Nov/2024	Nov/2029
0	400,000
➢Female farmers adopting CSA practices (Number)	
Nov/2024	Nov/2029
0	100,000
Net GHG emissions per year (CO2 equivalent) (Metric tons/year)	
Nov/2024	Nov/2029
0	40,000

Intermediate Indicators by Components

Baseline	Period 1	Period 2	Closing Period
Component 1: Climate Resilience in Agriculture			
Participating farmers applying the climate-resilient technologies/ practices (Number)			
Nov/2024			Nov/2029
0			300,000
Area under climate-resilient ag practices (Hectare(Ha))			
Nov/2024			Nov/2029
0			100,000
New climate-resilient technologies introduced (Number)			
Nov/2024			Nov/2029
0			50
Farmers applying low-carbon practices in paddy (Number)			
Nov/2024			Nov/2029
0			45,000
Farmers satisfied with extension advisory services provided (Percentage)			
Nov/2024			Nov/2029
0			90
Area under low-carbon practices in paddy (Hectare(Ha))			
Nov/2024			Nov/2029
0			22,000
People benefiting from increased resilience of livelihoods, jobs or firms (Number of people) [CRI]			
Nov/2024			Nov/2029
0			400,000
➢People benefiting from increased resilience of livelihoods, jobs or firms - Female (Number of people) [CRI]			
Nov/2024			Nov/2029
0			100,000
➢People benefiting from increased resilience of livelihoods, jobs or firms - Youth (Number of people) [CRI]			
Nov/2024			Nov/2029
0			0
Component 2: Enhancing Small-holder Commercialization for Value Addition			
FPCs linked with agribusinesses (Number)			
Nov/2024			Nov/2029
0			150
Improved performance of FPC management (Number)			

Nov/2024			Nov/2029
0			120
Seedlings of climate-resilient varieties sold by certified nurseries (Number)			
Nov/2024			Nov/2029
0			22,500,000
Farmers replanting climate-resilient varieties (Number)			
Nov/2024			Nov/2029
0			70,000
Area replanted with tree crops (Hectare(Ha))			
Nov/2024			Nov/2029
0			35,000
Volume of GHG sequestration from tree crop replanting (Metric tons/year)			
Nov/2024			Nov/2029
0			TBD
Component 3: Strengthening Agribusiness and the Food System			
Number of tenants in supported food parks (Number)			
Nov/2024			Nov/2029
0			20
Increase in revenue of MSMEs (Percentage)			
Nov/2023			Nov/2029
0			30
➢Increase in revenue of MSMEs - female led (Percentage)			
Nov/2024			Nov/2029
0			30
MSMEs adopting improved "greening" measures (Number)			
Nov/2024			Nov/2029
0			200
New technologies incubated by project-supported agri-tech startups designed with inputs from farmers (Number) PBC			
Nov/2024	Nov/2025	Nov/2026	Nov/2027
0	50	100	150
Farmers and enterprises adopting technology developed by agri-tech startups (Number) PBC			
Nov/2024			Nov/2029
0			40,000
Women led participating agriculture and food MSMEs accessing commercial finance (Percentage)			

Nov/2024			Nov/2029
0			25
Number of beneficiaries employed (Number of people) [CRI]			
Nov/2024			Nov/2029
0			1,000
Component 4: Project Management			
Component 5: Contingent Emergency Response Component			

Performance-based Conditions (PBC)

Period	Period Definition
Period 1	CY2025
Period 2	CY2026
Period 3	CY2027
Period 4	CY2028

Baseline	Period 1	Period 2	Period 3	Period 4
1:New technologies incubated by project-supported agri-tech startups designed with inputs from farmers (Number)				
0	50	50	50	0
0.00	1,050,000.00	1,050,000.00	1,050,000.00	0.00
PBC allocation		3,150,000.00	As a % of Total PBC Allocation	55.97%
2:Farmers and enterprises adopting technology developed by agri-tech startups (Number)				
0	0	10,000	15,000	15,000
0.00	0.00	619,500.00	929,250.00	929,250.00
PBC allocation		2,478,000.00	As a % of Total PBC Allocation	44.03%

Monitoring & Evaluation Plan: PDO Indicators by PDO Outcomes

Monitoring & Evaluation Plan: PDO Indicators by PDO Outcomes					
Indicator Name	**Definition/Description**	**Frequency**	**Data source**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Farmers adopting CRA practices	Farmers with sustained adoption (i.e. net of any attrition) of climate-elated improved agricultural practices developed by and/ or conveyed through the project activities	Yearly	Survey-based data	Farmer survey	Survey contractor
GHG emission reductions from low carbon rice	The volume of GHG emissions reductions from paddy production among project beneficiaries	Yearly	Climate data from project MIS	Direct field observations as part of IRRI activities	PMU, IRRI
Increase in value of sales by FPCs and agribusinesses	Increase in the monetary value of all sales made by FPCs and agribusinesses	Yearly	Project implementation/ progess Reports on MSMEs and agribusinesses; and MSME and agribusiness survey data	Analyzing project implementation/progess reports on MSMEs and agribusiness	PMU
Additional commercial finance mobilized	Additional finance mobilized from commercial sources through the project interventions	Yearly	Project implementation/ progess Reports on MSMEs and agribusinesses; and MSME and agribusiness survey data	Analyzing project implementation/progess reports on MSMEs and agribusiness	PMU
New jobs created in agri-food MSMEs and agribusinesses	New employment in participating MSMEs (including the agri-tech startups) and employment in agribusiness located in common processing centers, mini agri-parks and agri-parks	Yearly	Project implementation/progess Reports on MSMEs; and MSME surrvey data	Project implementation/progess Reports on MSMEs; and MSME survey data	PMU; Survey contractor

Monitoring & Evaluation Plan: Intermediate Results Indicators by Components

Monitoring & Evaluation Plan: Intermediate Results Indicators by Components					
Indicator Name	**Definition/Description**	**Frequency**	**Data source**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Component 1: Climate Resilience in Agriculture					
Participating farmers applying the climate-resilient technologies/ practices	Participating farmers applying climate-related improved agricultural practices developed by and/ or conveyed through the project activities	Yearly	Project MIS	Project MIS	PMU
Area under climate-resilient ag practices	Area of land under improved agricultural practices developed by and/ or conveyed through the project activities	Yearly	Project MIS	Project MIS	PMU
New climate-resilient technologies introduced	New climate-related improved agricultural practices developed by and/ or conveyed through	Yearly	Project MIS	Project MIS	PMU

	the project activities introduced under the project				
Farmers applying low-carbon practices in paddy	Number of farmers applying low-carbon practices in rice production through project inventions	Yearly	Project MIS	Project MIS	PMU
Area under low-carbon practices in paddy	Area of land under low-carbon practices in rice production through project inventions	Yearly	Project MIS	Project MIS	PMU
Farmers satisfied with extension advisory services provided	Number of farmers satisfied with the extension advisory services provided through project interventions	Yearly	Survey-based data	Farmer survey	Survey contractor
People benefiting from increased resilience of livelihoods, jobs or firms (Number of people)	Farmers with sustained adoption (i.e. net of any attrition) of climate-elated improved agricultural practices developed by and/ or conveyed through the project activities	Yearly	Survey-based data	Farmer survey	Survey contractor
Component 2: Enhancing small-holder commercialization for value addition					
FPCs linked with agribusiness	Number of FPC successfully linked with agribusinesses	Yearly	Survey-based data	FPC survey	Survey contractor
Improved performance of FPC management	Improved performance of FPC management	Mid-line and endline	Mid-line and endline surveys data	Mid-line and endline surveys	FPC assessment tool
Seedlings of climate-resilient varieties sold by certified nurseries	Number of seedlings of climate-resilient varieties of coffee, cardamom and rubber sold through the project activities	Yearly	Project MIS	Project MIS	PMU
Farmers replanting climate-resilient varieties	Number of farmers replanting climate-resilient varieties of coffee, cardamom and rubber sold through the project activities	Yearly	Project MIS	Project MIS	PMU
Area replanted with tree crops	Area of land that has been replanted with cardamom/ rubber/ coffee through project interventions	Yearly	Project MIS	Project MIS	PMU
Volume of GHG sequestration from tree crop replanting	The volume of CO_2 equivalent sequestered by the tree crops that have been replanted through project interventions	Yearly	Project MIS	Project MIS	PMU
Component 3: Strengthening Agribusiness and the Food System					
Number of tenants in supported food parks	Number of signed leases by tenants in food parks developed under the project	Yearly	Agri-park survey data	Agri-park survey	Survey contractor
Increase in revenue of MSMEs supported	Increase in revenue of MSMEs supported under the project activities	Yearly	Project MIS	Project MIS	PMU
MSMEs adopting improved “greening” measures	Number of MSMEs using improved “greening” measures under the project activities	Yearly	Project MIS	Project MIS	PMU
New technologies incubated by project-supported agri-tech	Number of agri-tech startups incubated by KSUM through the tailored incubation process that requires feedback from farmers	Yealy	Project MIS	Analyzing project progess report	PMU

startups designed with feedback from farmers	on both technology and business model.				
Number of beneficiaries employed (Number of people)	New employment in participating MSMEs (including the agri-tech startups) and employment in agribusiness located in common processing centers, mini agri-parks and agri-parks	Yearly	Project implementation/progess Reports on MSMEs; and MSME surrvey data	Project implementation/progess Reports on MSMEs; and MSME survey data	PMU; Survey contractor

Verification Protocol: Performance Based Conditions

PBC 1. New technologies incubated by project-supported agri-tech startups designed with inputs from farmers (Number) Loan amount allocated: $3.150 million	
Formula	Baseline: 0 in Fiscal Year 2024 Target: Up to 150 agri-tech startups The formula calculates the total amount at a fixed rate of $30,000 per technology/start-up incubated of which $21,000 will be financed from the loan amount. The minimum payment required is $350,000 and up to the maximum allocated amount of $1,050,000 per period.
Description	This indicator measures the number of agri-tech startups that are supported under an incubation process adapted to better serve agri-tech startups and to connect them with smallholders in the state.
Data source/ Agency	KSUM reports.
Verification Entity	KSUM
Procedure	The verification process involves three main steps: (i) Reviewing the list of agricultural challenges: This step involves examining the list of specific challenges that agri-tech startups in Kerala are expected to address as included in the call for challenges. The list is agreed upon between the Department of Agriculture (DoA) and KSUM. (ii) Reviewing the sub-grant agreements: This step involves reviewing the sub-grant agreements between KSUM and the agri-tech startups, including the sub-grant amount provided to each start-up. (iii) Evaluating the incubation process: This step involves assessing the incubation process provided by KSUM, which must include direct consultations between the agri-tech startups and farmers in Kerala.

PBC 2. Farmers and enterprises adopting technology developed by agri-tech startups (Number) Loan amount allocated: $2.478 million	
Formula	Baseline: 0 in Fiscal Year 2024 Target: Up to 40,000 farmers and enterprises The formula calculates the total amount at a fixed rate of $88.50 per farmer of which $61.95 will be financed from the loan amount. The minimum payment required is $350,000 and up to the maximum allocated amount of $619,500 in period 2 and $929,250 in periods 3 and 4.
Description	This indicator measures the number of farmers adopting technologies developed by agri-tech startups incubated by KSUM.
Data source/ Agency	KSUM reports.
Verification Entity	KSUM
Procedure	(i) Reviewing the contracts between agri-tech startups and farmers/enterprises: This step involves assessing the contracts signed, including the number of beneficiaries. (ii) Reviewing the payments made: This step involves reviewing the payments made by farmers/enterprises to agri-tech startups for the technology provision.

ANNEX 1: IMPLEMENTATION ARRANGEMENTS AND SUPPORT PLAN

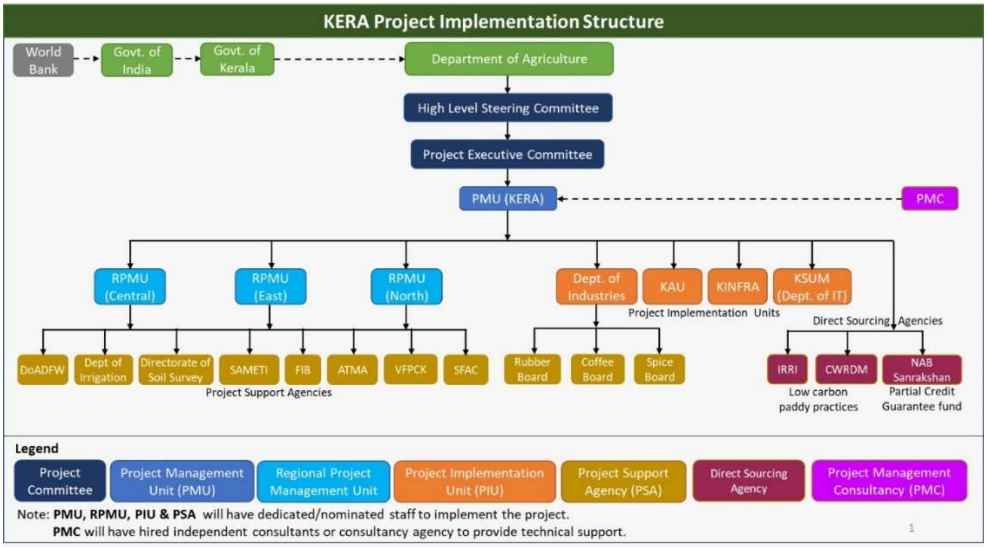
COUNTRY: Republic of India
Kerala Climate Resilient Agri- Value Chain Modernization (KERA) Project

1. **The project will be implemented by the PMU of the DoA of the GoK, with the following implementation structure.** At the state level, the project will be implemented by a PMU led by the Project Director under the overall guidance of the Agriculture Production Commissioner and Additional Secretary to the GoK, who also heads the DoA. This PMU will be responsible for the overall management of the project, including financial operations, budgeting, monitoring, procurement, and safeguards compliance. The PMU will be supported by four PIUs: KAU to implement activities related to CRA, the MSME Department within the DoI for supporting high-growth SMEs in the agri-food sector; and KSUM to incubate agri-tech startups; and KINFRA to develop food parks at strategic locations. The PMU will be further supported by a Project Management Consultancy on all technical and operational matters.

2. **To ensure governance, policy support, oversight, and effective monitoring, a HLSC has been established.** This committee, chaired by the Chief Secretary of the GoK, includes Principal Secretaries and Secretaries from all the relevant departments. Additionally, a Project Executive Committee has been constituted to supervise day-to-day planning and implementation of the Project. The Committee consists of departmental head of various line department, heads of project support agencies and PIUs. Technical services of IRRI and the Centre for Water Resource Development and Management will also be availed.

3. **The project will seek deputation of specialist from various agencies of the GoK for planning, implementing and supervising operations under different components.** For effective project management the project will establish strong functional units with deputation of officials from various line departments and hiring of experts from the market to undertake activities related to M&E, ESS, Procurement, FM, Knowledge Management and Communication etc.

Figure 2 Organogram of Project Implementation Structure



4. **At the regional level there will be three Regional PMUs to plan and coordinate project operations at the field level working closely with project beneficiaries primarily with the small holder farmers, their collectives, enterprises, and startups etc.** These Regional PMUs will use services of project support agencies of the GoK viz., the field offices if the DoA, State Agricultural Management and Extension Training Institute, Farm Information Bureau, Agriculture Technology Management Agency, Small Farmers Agribusiness Consortium, Commodity Boards (Rubber, Coffee, Spices), and Special Purpose Vehicles established for the management of the agri-parks to implement project activities. Field operations will be coordinated by the Project Executive Committee.

Implementation Support Strategy and Approach of the World Bank

5. **The World Bank's implementation strategy aims to efficiently support the client in achieving the PDO.** This support covers technical, fiduciary, and safeguard aspects, including identified risk mitigation measures. Communication with the project and stakeholders will be transparent and ongoing throughout the project duration. Implementation support will be periodic, focusing on critical project aspects that may require additional technical assistance initially. Diligence on technical, fiduciary, and safeguard matters will be maintained through: (i) regular progress reviews and timely interventions to address implementation challenges; and (ii) monitoring the submission of financial and progress reports.

6. **The World Bank's implementation support plan primarily involves:** (i) bi-annual Implementation Support Missions (ISMs); (ii) short thematic technical reviews as needed; (iii) desk reviews; (iv) a mid-term review; and, if necessary, (v) short missions for fiduciary and safeguard aspects. ISM activities encompass: (i) field visits to priority sites; (ii) meetings with various stakeholders; and (iii) comprehensive review and feedback on project progress and monitoring and evaluation reports. The World Bank's technical support team will comprise a diverse mix of skills and expertise drawn from various World Bank Global Practices and technical consultants to meet the project's requirements.

7. **Fiduciary support includes regular interactions, ISMs, and thematic reviews, if necessary.** ISMs will assess the project's financial management systems, internal controls, and actions taken to address any issues. Additionally, the World Bank's Environment and Social Safeguard team will ensure compliance with the Bank's operational policies and procedures applicable to the project. Safeguard support will be delivered through regular interactions, ISMs, and thematic reviews as needed.

Table 1 Resources Required for Implementation Support.

Time	Focus	Skills needed	No. of staff weeks	No. of trips
First 12 months	Implementation support to the PMU in the procurement for key contracts, including review of Terms of Reference (TOR) and designs, and initiating selected procurements and studies. Undertaking the baseline survey. Rolling out activities in selected locations. Mobilizing project beneficiaries and building their capacity.	Project management Procurement Financial management Environmental specialist Social development and Gender Monitoring and evaluation, management information systems Technical expertise	15–20 team lead weeks per year 3–4 staff weeks per year	3–4 trips
12–60 months	Offering operational assistance, gathering lessons, and supporting project expansion (scale-up) in later stages.	In addition to the above, technical expertise will be needed from in the second year.	15–20 team lead week/year 3–4 staff weeks/year	2 trips annually