CONCEPT NOTE

ON A PROPOSED {LOAN/CREDIT/GRANT}

IN THE AMOUNT OF 480 (US$M)

TO

Republic of India

FOR

Maharashtra Project on Climate Resilient Agriculture (P160408)

Vice President: Annette Dixon | Country Director: Junaid Kamal Ahmad | Senior Global Practice Director: Juergen Voegele | Practice Manager: Martien Van Nieuwkoop | Task Team Leader(s): Patrick Verissimo, Ranjan Samantaray

Note to Task Teams: The following sections are system generated and can only be edited online in the Portal.

BASIC INFORMATION

Project ID	Lending Instrument	Environmental Assessment Category	Team Leaders
P160408	Investment Project Financing	B - Partial Assessment	Patrick Verissimo, Ranjan Samantaray
Approval Date	**Bank / IFC Collaboration**	**Joint Level**	
24-Aug-2017	Yes	Complementary or Interdependent project requiring active coordination	
Practice Manager/Manager	**Senior Global Practice Director**	**Country Director**	**Regional Vice President**
Martien Van Nieuwkoop	Juergen Voegele	Junaid Kamal Ahmad	Annette Dixon

Proposed Development Objective(s)

To enhance climate-resilience and profitability of smallholder farming systems in selected districts of Maharashtra.

PROJECT FINANCING DATA

[✓] Counterpart Funding	[✓] IBRD	[ ] IDA Credit [ ] Crisis Response Window [ ] Regional Projects Window	[ ] IDA Grant [ ] Crisis Response Window [ ] Regional Projects Window	[ ] Trust Funds	[ ] Parallel Financing

For Loans/Credits/Others (US$M)

Total Project Cost :	600.00
Financing Gap :	0.00
Total Bank Financing :	600.00

Financing Source	Amount
Borrower	120.00

Of Which Bank Financing (IBRD/IDA):	480.00	International Bank for Reconstruction and Development	480.00
		Total	**600.00**

Borrower :	Republic of India		
Contact :	Rishikesh Singh	Title :	Director (MI), Department of Economic Affairs, Ministry of F
Telephone No :	91-11-23093542	Email :	rishikesh.singh74@nic.in
Implementing Agency :	Ministry of Agriculture, Government of Maharashtra		
Contact :	Vikas Chandra Rastogi	Title :	Project Director
Telephone No :	9892986111	Email :	rastogi.chandra@gmail.com

INSTITUTIONAL DATA

Practice Area (Lead)

Agriculture

Contributing Practice Areas

Climate Change, Trade & Competitiveness, Water

Private Capital Mobilized

No

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

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. Other	Low
10. Overall	Moderate

PREPARATION SCHEDULE

Preparation Schedule

Milestone	Original	Revised	Actual
AIS Sign off			Jun 27, 2016
Concept Review Meeting	Oct 20, 2016	Jan 05, 2017	
Begin Appraisal	May 15, 2017	Jun 05, 2017	
Approval	Aug 24, 2017	Aug 24, 2017	

Expenditures

Source of Funds	Preparation Expenses to Date (USD)
Bank Executed Trust Funds	

Team

Bank Staff

Name	Role	Specialization	Unit
Patrick Verissimo	Team Leader(ADM Responsible)		GFA12
Ranjan Samantaray	Team Leader	Agriculture	GFA12
Priti Jain	Procurement Specialist(ADM Responsible)	Procurement	GGO06
Tanuj Mathur	Financial Management Specialist	Financial Management	GGO24
Anupam Joshi	Safeguards Specialist	Environment	GEN06
Chaminda Rajapakse	Team Member	2030 Water Resources Group	CASWR
Deepak Singh	Team Member	Disaster Mitigation	GSU18
Erick C.M. Fernandes	Team Member	Climate Change and Natural Resources Management	GFA04
Genevieve Connors	Team Member		SACIN
IJsbrand Harko de Jong	Team Member	Water for Agriculture	GWA06
Jacqueline Julian	Team Member	Project Costings	GFA06
Jonathan d'Entremont Coony	Team Member	Climate Innovation Center	GTCID
Karishma Amod Gupte	Team Member	2030 Water Resources Group	CASWR
Leena Malhotra	Team Member	Adminstrative and Logistics Support	SACIN
Madhur Gautam	Team Member	Economics	GFA12
Marc Peter Sadler	Team Member	Climate Smart Agriculture	GFAGE
Martin M. Serrano	Counsel	Country Lawyer	LEGES
Sharlene Jehanbux Chichgar	Safeguards Specialist	Environment	GEN06
Shashank Ojha	Team Member	e-Governance	GTI09
Suryanarayana Satish	Safeguards Specialist	Social Development	GSU06

Extended Team

Name	Title	Organization	Location
Johan Van Der Riet	Agribusiness specialist	FAO-CP	
N.H. Ravindranath	Sr. Consultant-Climate		Bangalore,India

	Change and Forestry	
Saumya Srivastava	Consultant	New Delhi, India,
Sekhar Muddu	Hydrology consultant	

Note to Task Teams: End of system generated content, document is editable from here.

INTRODUCTION AND CONTEXT

A. Country Context

1. **India is one of the fastest growing economies in the world**, ranked among the top ten highest GDP countries, and is the world's second most populous country. During the past two decades, India's GDP grew at an average of 7 percent annually. Poverty incidence declined on average by 1.5 percentage points per year during 2005–10 and improvements in key development indicators have been remarkable. However, following years of impressive economic growth and poverty alleviation, India is now at a critical juncture in its paths towards becoming an economic powerhouse and is facing important development challenges and structural constraints to a more inclusive growth and a more sustainable development. India remains home to 263 million poor people (most of which reside in rural areas) living on less than US$1.90/day and the economic growth has not generated jobs fast enough to absorb labor out of agriculture and low productivity rural jobs. To address these challenges, the Government of India (GoI) through its 12th Five-Year Plan (FY2013-17) put forward an ambitious goal for accelerated economic growth, poverty reduction, job creation, and environmental management. The plan foresees during this period an annual GDP growth of 8.2 percent, a reduction in poverty rate by 10 percentage points, 50 million new jobs – and an annual growth in the agriculture and allied rural sectors of 4 percent.

2. **Climate change may impede socioeconomic development within India** and increasing investment in adaptation measures to reduce vulnerability will be essential to maintaining economic growth. India's rapid growth has increased its prominence on the global stage and drawn attention to its climate mitigation and adaptation efforts. The country has shown leadership in global efforts to limit climate change and is among the early countries to have ratified the Paris Agreement on Climate Change (in October 2016). Analyses of the country's historic climate data support the extent of the change taking place: an increase in mean annual temperature (0.56°C between 1901 and 2007), as well as a decrease in seasonal mean rainfall with more frequent extreme rainfall events. Looking ahead, temperatures are projected to increase further and at a faster rate than before (by 1.7-2.0^{o}C by the 2030s), coupled with an overall increase in monsoon rainfall (with an increase in geographic variability) and extreme precipitation events (with an increase in rainfall intensity). India shows an increasing trend in its per capita emission of GHGs, though current per capita levels are still among the lowest in the world (2.44 tCO_2 equivalent per capita in 2012, against global average of 5.5 tCO_2 equivalent). In absolute terms, India remains one of the largest GHG emitters, with its agriculture sector the second largest contributor (around 18 percent of the country's total GHG emissions).

3. **Agriculture sector growth is essential in achieving India's development goals**: the sector currently accounts for 14 percent of national GDP and is a source of livelihood for more than half of the population. More than two thirds of the country's poor live in rural areas, and their chance of getting out of poverty directly depends on the performance of agriculture and allied rural sectors. The success of ongoing massive rural-urban transformation will also depend on improved connectivity of rural areas to cities, enhanced agriculture productivity and value chains for agricultural products and off-farm job creation in rural areas, which would temper down current massive migrations to urban areas. The agriculture sector also has a major potential for reducing GHG emissions and improving environmental management through enhanced soil and water conservation and climate-resilient farm management practices.

4. **Over the past two decades, the agriculture sector has performed below its potential** and has not yet met the envisaged growth targets. In the 1990s and 2000s, the annual agriculture growth rate was around 3-3.5 percent, and dropped even below 2 percent per annum during 2013-15, due to low productivity, growing water and land scarcity, rising labor costs, and declining international commodity prices, exacerbated by the late onset of monsoon rainfall and increase rainfall intensity. While overall rainfall is projected to increase, its distribution over time and space is

likely to become much more erratic, thereby leading to increasingly frequent droughts and floods. Unless significant efforts to capitalize on the projected increase in rainfall are made to improve water conservation and soil moisture management, water scarcity at farm level will remain a key impediment to achieving higher levels of crop and water productivity.

5. **Going forward, five inter-related and strategic shifts are required to achieve the 4 percent annual growth target set by GoI for agriculture** and transform the sector into a modern food system: (i) a shift away from food grain production targets towards diversification into high-value horticulture and livestock products; (ii) a shift away from pure focus on physical productivity (yields) towards resilience and stability of agriculture to deal with the effects of climate change and short-term weather anomalies; (iii) a shift away from a focus on on-farm production towards value addition in the post-harvest segments of the food value chains; (iv) a shift away from a calorie focused production structure towards nutrition sensitive agriculture, and (v) a shift away from increasing irrigation water supply towards improved water use efficiency. The proposed project is designed to directly contribute to this structural transformation process by supporting several of those strategic shifts with a focus on building climate resilience in the agriculture sector in selected districts in the State of Maharashtra that are most vulnerable to climate change.

B. Sectoral and Institutional Context

6. **The State of Maharashtra is one of the economic growth engines of the country**: it is the top-ranked state in terms of contribution to the national GDP (14.4 percent, 2014-15) and has witnessed an average economic growth rate of over 8 percent per annum over the last decade. With 9.3 percent of country's population and 9.4 percent of the country's geographic area, Maharashtra is also the second largest state in India. Structurally, Maharashtra is more urbanized and industrialized compared to the rest of the country and economic contributions of the industries and of the services sectors are much larger than that of agriculture and allied sectors (which account for only 11 percent). However, the agriculture sector remains central to Maharashtra's economic and political landscape, and growth in the sector is critical for the state as over 50 percent of its population depends on agriculture.

7. **In Maharashtra, agriculture has grown at an annual average of 6.4 percent from 2004-05 to 2011-12**, but growth in the sector fluctuates heavily and is depending on highly erratic rainfall during any particular year and rainfall variability over time. The distribution of rainfall is highly uneven within the state and ranges from over 4,000 mm per annum in coastal areas to less than 400 mm in some of the most arid districts. Agriculture remains the highest user of freshwater, withdrawing more than 80 per cent of the surface and groundwater ("blue water") available to the state. Since the continuation of the State's strong economic growth performance would have to be supported by higher water availability in all three sectors of the economy, there is a need for Maharashtra to better manage its water resources and in particular to enhance the efficiency of the water used for agriculture and focus on increasing the availability and use by the agriculture sector of "green water" (rainwater stored in the soil as soil moisture). Severe consecutive droughts experienced in large parts of Maharashtra over the last two years have considerably affected the state's agricultural performance and social fabric in rural areas, and have prompted the highest-level state authorities to declare "drought-proofing" of agriculture a key development priority for Maharashtra.

8. **Maharashtra's agriculture is dominated by small and marginal farmers with an average farm size of 1.44 ha**. Most of the agricultural production is rain-fed, with less than 20 percent of the arable land under irrigation. Farmers' annual production covers two seasons: *kharif* crops planted at the onset of the monsoon rainfall and *rabi* crops planted at the beginning of the winter season. Due to the broad range of agro climatic zones and soil types encountered, the state's agricultural production is fairly diverse. Crop production is dominated by food grains, i.e. cereals (mostly rice, sorghum or *jowar*, maize) and pulses (chickpea or *gram*, pigeon pea or *tur*). For oilseed crops, soybean remains by far

the most important commodity. Cotton and sugarcane, whose production is relatively water-intensive, are the two cash crops most commonly found in Maharashtra's farming systems (the State is among the largest producers of cotton and sugarcane in the country).

9. **The area under cultivation for cereals has declined since 2000**, with a considerable drop in the production of sorghum (though naturally better adapted to dryer conditions than other cereals) and a shift from food grains towards cash crops has been observed, with an increase in the area for cotton and sugarcane. Since 2000, an upsurge in the production of high-value horticulture crops has been observed, and today, the State of Maharashtra has emerged as one of the country largest producers of fruits (mango, citrus, grapes, pomegranate) and vegetables (onion, tomato). Overall, crop productivity has increased over time but remains at relatively low levels (2013-14, non-drought year: sorghum 814 kg/ha; soybean 1,214 kg/ha; cotton 361 kg/ha). Yield gaps for several key crops are still significant, reflecting the need for a mix of sector policies and investments to promote research on climate-adapted varieties, irrigation for a more efficient on-farm use of water, and extension services for the adoption of climate-resilient agronomic practices and technologies – i.e. for building climate resilience in Maharashtra's farming systems.

10. I**n 2008, GoI released the National Action Plan on Climate Change (NAPCC)**, and directed the States to develop State Action Plans on Climate Change guided by and consistent with the structure and strategies of the NAPCC. The GoM took a pioneering step towards formulating the Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC) by commissioning a comprehensive vulnerability assessment study which included the task of generating model-based climate projections specific to the State's geography. The MSAAPCC seeks to address the urgent need to integrate climate change concerns into the State's overall development strategy, thus assisting in building long term climate resilience and enabling adaptation to the likelihood of risks arising from climate change. The MSAAPCC climate modelling results for 2030, 2050 and 2070, show that temperature and rainfall are projected to increase across the State of Maharashtra, with important regional variations – resulting, on balance, in potentially significant adverse impacts on agriculture performance.

11. **The annual mean temperature in Maharashtra is projected to increase by around 1.3-1.5^{o}C by the 2030s**; the projected increase in monsoon rainfall by the 2030s ranges from 13-30% across the state. These analytical findings from the MSAAPCC are consistent with the findings of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The effects of these longer term climate trends on sectors like agriculture or water, effectively signaling a shift in climatic conditions, will be further aggravated by the projected increase in the frequency of extreme climate events (droughts, hailstorms, floods, delays in the onset of monsoons, higher rainfall intensity) already experienced in Maharashtra over recent past, as illustrated by the 3 severe droughts that hit the state over the past 5 years.

12. **The GoI has designed a number of policy initiatives and programs** aligned with the recommendations from the NAPCC program and the state-level action plans, including the National Initiative on Climate Resilient Agriculture (NICRA) to promote the development of climate-resilient villages; the *Pradhan Mantri Krishi Sinchayee Yojana* (PMKSY) Program to promote efficient irrigation practices and improve water use efficiency; the *Jalyukt Shivar Abhiyan* (JSA) Program on watershed and drought management; the Integrated Watershed Management Program (IWMP) on natural resources conservation; as well as India's Intended Nationally Determined Contribution (INDC) as presented to the COP21 in Paris to address the adverse effects of climate change. Against this background, the GoM is committed to further support and implement those policies in Maharashtra and sees the proposed project as an opportunity to contribute to the implementation of policies in support of the climate agenda.

13. **Higher level authorities in the state of Maharashtra have recently embraced a new paradigm for the agricultural sector** which now needs to be mainstreamed across institutions and stakeholders. It is built around the recognition and understanding of climate change and climate variability as the "new normal"; this in turn, requires a structural shift in the approach to sustainable agriculture growth based on longer-term adaptive interventions (reforms, investments, capacity development) to build climate-resilience in agriculture – in addition to focusing primarily on shorter-term emergency responses to recurring natural disasters. The Bank is very well placed to provide value-added support to the GoM in establishing this new paradigm through its experience with climate-resilient agriculture elsewhere, its capacity to work multi-sectorally, and to apply cutting-edge knowledge at scale in support of changes in policies and strategies to promote climate adaptation and mitigation, and generate climate co-benefits.

C. Relationship to CPF

14. **The proposed project is fully consistent with the India Country Partnership Strategy (CPS)** for FY2013–17 to support poverty reduction and shared prosperity in India. In line with the pillar for *Transformation*, the project promotes inclusive rural growth, development and dissemination of new agricultural technologies, climate-resilient agriculture, enhanced market linkages for small and marginal farmers, and improved water and natural resource management (Outcome 2.4). Further, the proposed project will have a positive impact in terms of: (i) environmental protection by enhancing the management of soil and water resources, (ii) reduced greenhouse gas emissions by disseminating high efficiency micro irrigation systems, and (iii) promoting diversification into high value crops (Outcomes 2.5 and 2.6). The project will also contribute to the *Inclusion* pillar of the CPS by enhancing the livelihoods of small and marginal farmers through crop diversification, enhanced market access (Outcome 3.6), and by improving local communities' ability to manage droughts and floods through enhanced design and restoration of irrigation infrastructure with better flood protection features (Outcome 3.8).

15. **The project is fully aligned with the Bank's Climate Change Action Plan (CCAP)** which explicitly highlights climate-resilient agriculture and water management as key priorities for climate adaptation in the South Asia Region (SAR). CCAP also advocates that transformative action on climate change requires partnerships with client countries to mobilize additional capital for mitigation and adaptation action, which the project proposes to achieve with potential co-financing from the GoM as well as from the Green Climate Fund (GCF) through IFC's 2030 Water Resources Program. The project will directly contribute to WBG's commitment to increase the climate-related share of its portfolio from 21 to 28 percent by 2020 in response to client demand.

16. **The project is based on a multi sector approach** and will require close collaboration across the Bank's Global Practices and Units (Agriculture, Water, Trade & Competitiveness, Climate Change, and Disaster Risk Management) in the design and throughout implementation. Close collaboration during planning and implementation will be sought with thematically related on-going/pipeline projects and initiatives (e.g. Maharashtra Agricultural Competitiveness Project - MACP, P120836; India Climate Change Mitigation Action Support, P162119; National Groundwater Management Improvement Program, P158119). Collaboration with IFC is secured through the inclusion on the project team of technical staff from IFC's 2030 Water Resources Group (2030WRG) and efforts to develop co-financing arrangements with possible funding from the Green Climate Fund (GCF).

PROPOSED PDO/RESULTS

A. Proposed Development Objective(s)

17. The PDO is *to enhance climate-resilience and profitability of smallholder farming systems in selected districts of Maharashtra.*

18. **Direct project beneficiaries** will be small farmers (households with 1.0 to 2.0 ha of farm land) and marginal farmers (less than 1.0 ha), who will gain from knowledge and technology transfer, and access to assets to enhance climate resilience on their farms, as well as increased revenue from crop diversification and participation in emerging value chains. Farmer producer companies (FPCs) and small and medium agro-entrepreneurs (SMEs) will also benefit from the project through climate-resilient investments in value chain development, support with the promotion of backward and forward linkages, and access to business development and incubation services. The project will also directly benefit local institutions and agencies (e.g. agricultural research and extension, technical advisory services) through capacity development on climate resilience. State Agriculture Universities (SAU), various line departments, government agencies and other institutions at district and sub district level will also benefit through a strategic partnership with the project towards mainstreaming climate resilience in agriculture.

B. Key Results

19. The following Key Performance Indicators (KPI) are proposed for measuring the core outcomes of the project:
    a. KPI #1 - Resilience: Farmers adopting climate-resilient agricultural technologies [Corporate Results Indicator]
    b. KPI #2 - Resilience: Area provided with micro irrigation systems [Corporate Results Indicator]
    a. KPI #3 - Resilience: Average on-farm soil organic carbon content
    b. KPI #4 - Profitability: Average net returns to land and farm labor
    c. KPI #5 - Direct beneficiaries: Farmers reached with agricultural assets or services (by gender) [Corporate Results Indicator]

PROJECT CONTEXT

A. Concept

1. Description

20. **Project area**. The proposed project will be implemented in the 15 districts of the Marathwada and Vidarbha regions that have been most affected by the recurrent monsoon failures of recent years. These districts account for a total population of 30.2 million people and a project area of around 3.5 million ha. Out of a total of 18,000 villages in the districts selected, the project will cover 5,000 villages characterized by a high climate-vulnerability index and low HDI; this includes about 1,000 villages located in the Purna river basin tract and showing very high levels of soil salinity and sodicity. Managed spill-over effects are expected for a range project activities and outputs to villages not covered by the project. Most of the project area is located in Maharashtra's semi-arid agro climatic zones. The vast majority of rural households in the project districts are small and marginal farmers whose livelihood depends for more than 90 percent on rainfed agriculture.

21. Cropping patterns in the selected districts are dominated by cereals (mostly sorghum and millet), pulses and oilseeds (soybean). While cotton remains the main cash crop, more and more farmers are growing fruit trees to secure their farm income. Unlike in some other parts of Maharashtra where groundwater shortage has become an acute problem,

in the project area only 55 percent of the total groundwater potential has been harnessed. However, poor management of surface water and lack of *in situ* storage in the project area have aggravated the impact on agriculture from the severe consecutive droughts that have hit Maharashtra in the past couple of years.

22. **Project rationale and alternatives considered**. The proposed project results from a clear understanding at the highest level of authority in the state that Maharashtra needs a comprehensive, long-term and systematic approach to managing and coping with climate change and variability. In the past, emergency responses to increasingly frequent climate events have yielded only limited results: such short-term approach did not significantly boost agriculture sector performance, prevent further deterioration of the socio-economic fabric in rural areas (exodus, farmer suicides), or lead to an increase in farmer income and prosperity. Thus, given the climate projections that indicate severe impact on the agriculture and water sectors in Maharashtra under status quo, the new paradigm to addressing climate adaptation and mitigation in the agriculture and food system is essential.

23. In addition to the short-term disaster management approach, a policy-based project approach was considered to address the impact of climate change on agriculture. Such approach would aim at reforming policies, including those that encourage the rapid expansion of water-intensive crops resulting in the depletion of groundwater resources. This approach was not pursued, since the selected project area presents distinct agro-hydrological features (e.g. no rice is grown in the project area and the sugarcane grown in the selected districts represents less than 3 percent of the state-level production). Importantly, the key policies impacting the selected project area relate to markets, and on these, Maharashtra has been among the most progressive states in terms of implementing policy reforms. The remaining policies are beyond the State mandate, controlled by the central government, and these mostly relate to the distorting minimum support prices for selected commodities, which by and large are not grown in the project area. Also, a policy-based approach would not allow for demonstrating at farm-level that there are viable alternatives to existing cropping systems in Maharashtra.

24. Finally, a watershed-based approach was considered for the project, with a stronger focus on natural resources management. This approach was eventually discarded since it would not sufficiently focus on farm-level adaptation and mitigation issues nor would it provide the support for value chain development, a key part of the comprehensive approach needed to provide the market outlets and input supplies required to incentivize farmers to adopt resilient crops and agronomic practices.

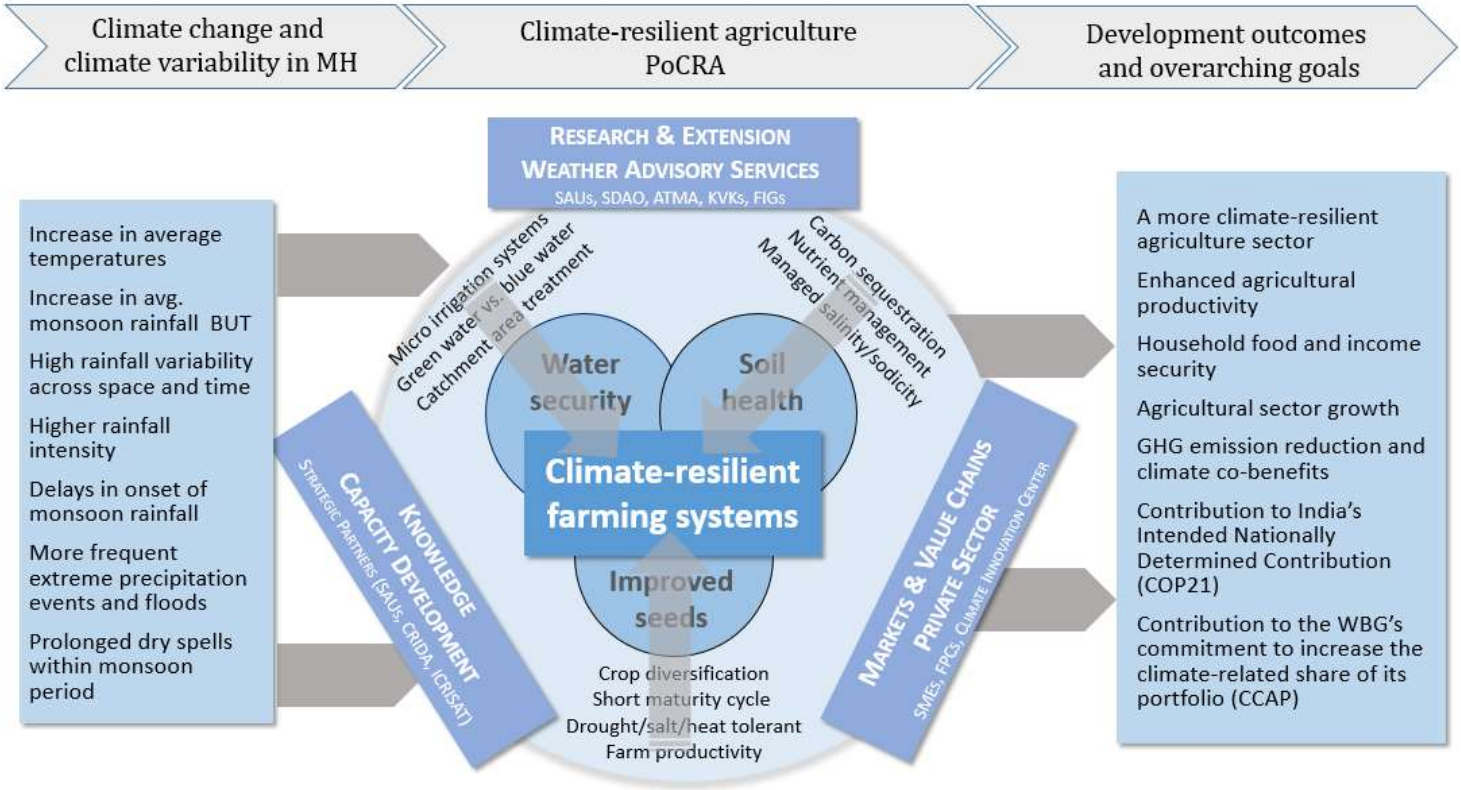
25. In line with GoM request, the proposed project, as represented in the graph below, is built around a comprehensive, multi sector approach that focuses specifically on building resilience in agriculture through the scaling up of tested technologies and practices, while generating the following interdependent triple win solutions:

    a. *enhanced water security at farm level* - through the adoption of technologies for a more efficient use of water for agriculture, and the increase in water storage capacity (surface and sub-surface) and improvement in water distribution structures to address on-farm water availability and reduce the risks associated with intra- and inter seasonal climate variability;

    b. *improved soil health* - through the adoption of good agricultural practices to improve soil fertility, soil nutrient management, and promote soil carbon sequestration; and

    c. *increased farm productivity and crop diversification* - through the adoption of climate-resilient seed varieties (short maturity, drought and heat resistant, salt tolerant) and market-oriented crops with a clear potential for income security derived from the integration of farmers in corresponding value-chains.

Strategic Overview, Thematic Linkages and expected Achievements of the PoCRA



26. **Sustainable pathways to resilience**. Enhancing climate-resilience in agriculture involves the integration of adaptation, mitigation, and other practices in agriculture that increase the capacity of the farmer and his/her production system to respond to various climate-related disturbances by resisting or tolerating the damage and recovering quickly. To ensure the sustainability of the comprehensive on-farm and off-farm interventions required to build resilience in agriculture, there is a need to strengthen institutions, in particular at the local level, and improve their capacity to plan for adaptation to evolving climatic conditions and induce a change in local practices.

27. In addition, the successful adoption of climate-resilient farming practices will largely depend on the farmer's perception of income gains from the new technologies, as profitability remains the most important incentive for change at farm level. To that effect, crop diversification, access to knowledge and farm assets needs to be accompanied by more market opportunities, which can be achieved through improved participation of organized smallholders in the corresponding value chains and the mobilization of private sector (e.g. agri business SMEs).

28. Finally, generating cutting-edge knowledge on climate change and its impact on key sectors such as agriculture and water is key to providing strong analytical underpinnings for policies on climate adaptation and mitigation – which still need better implementation in Maharashtra (and the rest of the country), despite the state being a frontrunner in India on the reform agenda for climate change.

29. **Leveraging financial resources**. Implementing climate-resilient practices at a scale to cover the targeted 5,000 villages in a saturation mode with watershed treatment and on-farm technologies requires an estimated total costs of well over US$2 billion. The tentative budget for the proposed project is US$600 million, with US$480 million from IBRD and US$120 million from GoI/GoM. This represents an average budget envelope of US$20,000 per village. A contribution from project beneficiaries towards technologies adopted and assets acquired from the project will be subsequently factored in, on the basis of the cost-sharing norms applied in other GoM programs and projects. Therefore, a major task during project preparation will consist in strategically prioritizing interventions planned in each cluster of around 10 villages, selecting results-based investments to be financed, and phasing in activities to be implemented in a given cluster.

30. Against this background, the GoM is seeking to leverage its own resources and the IBRD funding with complementary funding from the Green Climate Fund (GCF). IFC's 2030 Water Resources Group is currently supporting the GoM's efforts to access GCF grant funding in the range of US$250 million to scale up climate adaptation in Maharashtra rain-fed agriculture. During project preparation, Bank and 2030WRG staff will work as one project team and explore with counterparts possible co-financing arrangements between the IBRD funding and the GCF grant.

31. **Project overview**. The proposed project seeks to introduce transformational changes in the agriculture sector by scaling-up proven technologies and good agricultural practices that contribute to simultaneously building climate resilience and enhancing profitability of smallholder farming systems. The project will promote the transfer of technologies for climate adaptation and mitigation at farm level and will support targeted interventions and limited physical investments in the catchment area to promote the use of surface water over groundwater. To enhance farmer income, the project will support activities aimed at linking organized smallholders with agri-food SMEs and accessing new market opportunities enhancing their participation in commodity value chains.

32. Finally, for the sustainability of the comprehensive approach proposed to build resilience in agriculture, the project will enhance the capacity of institutions and agencies at various levels to mainstream resilience (in particular in agricultural services for smallholders), develop strategic partnerships with national and international entities, and help generate evidence-based knowledge to advance the policy agenda on climate change and vulnerability. To achieve the PDO and KPI targets, the project is designed around the four components described below.

Component A: Promoting Climate-resilient Agricultural Systems (US$ XXX million)

33. The objective of this component is to build climate-resilience in agricultural production systems through a series of activities at farm level, complemented by interventions in catchment areas. Mini watershed plans will be developed early to provide a road map for investment priorities and the implementation of related activities. This component will focus on: (i) scaling-up the adoption by farmers of climate-resilient agricultural practices aimed at improving soil health and water-use efficiency; and (ii) catchment area treatment to promote the use of "green water" for agriculture over "blue water", and improve the availability of water at farm level. This component contributes directly to the PDO by promoting the transfer of climate resilient technologies at farm level (KPI #1), supporting the development of micro-irrigation systems (KPI #2) and encouraging farmers to adopt practices that enhance soil health (KPI #3).

34. **Participatory development of mini watershed plans**. In line with the Maharashtra Groundwater Development and Management Act (2009, effective from 2013) which promotes the watershed as participatory planning unit, this component will finance the development of some 500 mini watershed plans, each covering a cluster of 8 to 12 villages and an area of around 5,000 ha. Mini watershed plans are comprehensive multi-year activity and local investment tools for planning and monitoring. They include a comprehensive resource mapping, a rapid appraisal of stakeholders

taking into account gender specificities, and participatory water budgeting to inform on possible investments in irrigation and drainage, and water resources management. Those plans will serve as a road map for the implementation of subsequent activities and investments under the proposed project.

35. **Technology transfer and climate-resilient agriculture practices for a sustainable soil and water management.** To enhance increase water productivity and achieve water security at farm level, the component will scale-up the adoption of technologies and practices aimed at maximizing the use of surface water for agriculture, at managing groundwater resources in a sustainable manner, and at getting "more crop per drop". To that effect, the component will finance the adoption of in-situ soil moisture conservation practices, and the expansion of micro irrigation systems (primarily drip and sprinkler irrigation), including water supply structures and drainage facilities. The component will also help improve on-farm water availability through selected investments at catchment level (as prioritized in the mini watershed plan) to increase surface and sub-surface water storage capacity. To that effect and in close coordination with the Chief Minister's Program on watershed and drought management (*Jalyukt Shivar Abhiyan*), the project will finance drainage line treatment, the improvement of water courses, the construction of new and desilting of existing water harvesting structures (e.g. farm and community ponds), and the construction of groundwater recharge structures. Agronomic practices promoted under this component in support of improved soil moisture management will include, among other, contour bunding, broad-bed furrow and conservation furrow cultivation. The component will also support efforts towards a more rigorous monitoring of the quality of the water available for agriculture.

36. To improve on-farm soil fertility and micronutrient management, the component will scale-up the adoption of climate-resilient agricultural practices aimed at: (i) increasing the soil organic matter content, and (ii) sustaining a viable agriculture on the naturally saline and sodic farm soils prevailing in parts of the project area. Conventional methods to address soil salinity and soil sodicity (i.e. land reclamation with widespread application of gypsum or lime) will be reviewed for their economic sustainability and financial viability in the local context, and used only where significant and long term net benefits can be expected. Good agricultural practices aimed at improving soil health have been successfully tested in other programs in Maharashtra and beyond (e.g. NICRA) and include biomass mulching, residue recycling, manure management, conservation tillage, in-situ moisture conservation and others.

Component B: Climate-resilient Post-harvest Management and Value Chain Promotion (US$ XXX million)

37. The objective of this component is to enhance climate resilience beyond farm gate and provide end-to-end solutions in selected commodity value chains. To ensure successful crop diversification, the component will help: (i) develop smallholder-inclusive value chains for climate-resilient commodities, and (ii) overcome constraints in the seed supply chain. In line with GoM priorities, this component will focus on Farmer Producer Companies (FPCs) as major drivers of change in the agri-food system. An increase in farm income remains the key driver of change and a pre-requirement for the adoption of the climate-resilient technologies and good agricultural practices promoted under Component A. Thus, this component will directly contribute to the PDO by creating opportunities for increasing the revenue of small and marginal farmers (KP #4) through crop diversification and their participation in selected value chains.

38. **Promoting Farmer Producer Companies**. This component will build on the outcomes of other GoM programs and projects that have focused on FPCs as agent of change (e.g. MACP). A rapid appraisal exercise, with mapping, profiling and capacity needs assessment of the 420 FPCs in the project area (most of them in early development stage), will provide the basis for a series of activities tailored to the growth potential of existing FPCs. The component will also support the development of farmer-group based organizations into entrepreneurial, market-oriented, financially sustainable companies with the capacity to perform selected value-adding activities and deliver a range of services

(e.g climate-related technical advisory services, training on climate adaptation and mitigation practices in post-harvest management). The component will support viable mechanisms to further consolidate and set up new business linkages for FPCs with private sector (e.g. exporters, seed companies, farm machinery, agro-input suppliers, and financial institutions). For the professionalization of FPCs, the project will explore a collaboration with IFC's Agribusiness Leadership Program and/or Business Edge Program. Eligible FPCs will also benefit from participating in the incubation program of the proposed Climate Innovation Center (see Component C).

39. **Strengthening emerging value-chains for climate-resilient commodities**. The selection of agricultural value chains for end-to-end solutions (from agricultural research to consumer markets) will be finalized by the PMU during project preparation. Pulses and oilseeds are emerging as potential priority commodities for end-to-end solutions. In addition, the component will support value-chains emerging in the project area following farmers' production diversification to include higher-value commodities, in particular fruit trees (more climate-resilient than annual crops given their deeper root system). The component will also support viable investments in product aggregation, handling, transformation and marketing (e.g. collection centers, grading and packaging units, cold storage facilities, ICT-based market information systems). Priority will be given to investments that promote the use of green technologies (including solar energy). Value-chain financing and specifically access to finance and financial services for value chain actors will be explored under this component

40. **Improving the performance of the supply chain for climate-resilient seeds**. The adequate supply of seeds with short duration, drought-, salinity- or heat-tolerant features, is a key priority for the GoM's in its strategy to build climate resilience in the agriculture sector. The seed industry in MH is largely segmented, with private seed companies mainly focusing on the high value, low volume seeds (e.g. cotton, sugar cane, GM and hybrid varieties), while public sector seed corporations dominate the market for low value, high volume seeds (e.g. cereals, pulses and oilseeds). The component will address the need for increasing the availability of seeds, given farmers' evolving demand resulting from the recommendations of the district-level contingency plans triggered by climate events (e.g. delays in onset of monsoon rains call for different crop mix). To address the shortage of breeder seeds, the component will assess the SAU's breeder seeds programs and support solutions aimed at enhancing their performance (including developing linkages with FPCs for seed multiplication). This component will also seek to support key actors in the seed supply chain such as the Maharashtra State Seed Corporation who plays a unique role in the production and distribution of climate-resilient certified seeds for small and marginal farmers (e.g. pulses and oilseeds). It will also finance the development of a limited number of seed processing and storing hubs in strategic locations of the project area.

Component C: Institutional Development, Knowledge and Policies for a Climate-resilient Agriculture (US$ XXX million)

41. The objective of this component is to ensure sustainability in the approach proposed for building climate resilience through a longer term adaptive management of agriculture, soil and water resources, by: (i) strengthening the capacity of existing institutions to design and deliver agro-technical and climate advisory services, (ii) establishing a Climate Innovation Center, and (iii) promoting an evidence-based policy dialogue on climate resilience. Successful implementation of the activities in this component will contribute to achieving the PDO by increasing the outreach of institutions and agencies promoting climate-resilient agriculture in the project area (KPI #5) and generating spillover effects to farming communities from other villages in the project area not covered by project activities.

42. **Sustainability and institutional capacity development**. To ensure the sustainability of the comprehensive approach on climate-resilient agriculture proposed in this project, this component will support the development and implementation of a capacity development program for district and local level stakeholders. This component will mainstream climate-resilience in the strategic objectives of institutions and agencies involved in the delivery of

services to small and marginal farmers. At district level, the project will work closely with the Superintendent District Agricultural Offices (SDAOs) and build their capacity to coordinate and monitor the implementation of the climate-resilience agenda on the ground. At state level, the project will develop partnerships with the SAUs and support existing programs for the development and field-testing of emerging agricultural technologies and practices for climate-adaption of dryland farming systems. The component will also promote knowledge and learning exchanges on climate-resilience with national/international entities such as ICRISAT, CRIDA, the Indian Institute of Science, the Indian Meteorological Department, the Australian Centre for International Agricultural Research (ACIAR), the Australian Water Partnership (AWP), and the Carbon Management and Sequestration Center (CMASC, Ohio State University).

43. **Maharashtra Climate Innovation Center (CIC)**. This component will finance the planning, launch and start-up phase for a CIC until it operates in a self-sustained manner. The CIC will support local private sector capacity – with focus on entrepreneurs and SMEs – to commercialize and deploy emerging technologies and business models in growing climate sectors (e.g. climate-resilient agriculture, water, energy) to provide local solutions to climate change. The CIC will offer services tailored to local needs and conditions among a suite of tools which includes: access to latest technology information and market intelligence, fee-based business advisory and other incubation/coaching support services, and tailored proof-of-concept grant and seed investment financing to prove and scale early-stage firms and concepts. The CIC will draw on local and international expertise to support the GoM with the review and formulation of policies and strategies relevant to climate change and climate resilient, in particular as linked to the agri-food sectors. During project preparation, the PMU will commission a feasibility study for the CIC; it will be followed up during early project implementation with the development of a detailed CIC business and financial plan to be submitted for approval to the relevant authorities. The CIC will be established with technical guidance from the Bank's Climate Technology Program.

44. **Knowledge and policies**. This component will finance a range of analytical studies aimed at updating and disseminating existing knowledge on a range of issues related to climate resilience and agriculture. Such studies will provide the analytical underpinnings to improve the policy and strategy framework required to further enhance resilience in the agri-food system in Maharashtra (and beyond). This component will support efforts towards a multi stakeholder dialogue on policies promoting climate resilience in agriculture, as well as direct payments to farmers for environmental services (e.g. soil carbon sequestration, groundwater conservation). This component will also look at reliable ways to quantify potential mitigation benefits from activities promoted by the project and aim at providing a pathway to carbon financing. The component will also finance the development of a state-of-the art climate and agro-hydrological model that supports policy-makers Maharashtra by: (i) making projections on the level of sustainable withdrawal of surface and groundwater in a given watershed under various climate and land use scenarios, (ii) generating suitability maps for Managed Aquifer Recharge (MAR), and (iii) assessing the magnitude of MAR in the project area.

Component D: Project Management (US$ XXX million)

45. **This component will primarily finance the project's incremental operating costs**. A PMU has been set up by the Department of Agriculture (GoM) and tasked with the overall management of the project, while ensuring smooth coordination of activity implementation by various agencies and strategic partners. Given the transformative nature of the project, institutional coordination within and across the relevant sectors is emerging as a critical task in developing an effective project implementation mechanism. The PMU will be responsible for compiling an annual Activity Plan and Work Program and develop the corresponding budget proposal to be submitted for approval to the Project Steering Committee.

46. The PMU will ensure that all project activities are implemented in line with the provisions in the official project documents; in particular, the PMU will be in charge of financial management, project procurement, and safeguards compliance. The component will support all activities related to project communication, public awareness and outreach, including the development of a comprehensive project web site. It will finance the services of specialized consultant firms to develop and implement a comprehensive project impact evaluation (including all surveys). Further, the project will promote the intensive use of ICT across components; to that effect, this component will finance both ICT goods and specialized consultant services. The project's M&E system will be ICT-based, enabling the PIU to access project information and data from the field in real-time. ICT will also be used to facilitate the feedback from project beneficiaries on project activities planned/under implementation (citizen engagement), and will be mainstreamed in the project's grievance and redress mechanism.

2. Overall Risk and Explanation

47. **The overall risk rating for the proposed project at concept stage is considered Moderate**. The main risks are: (i) coordination challenges of multiple implementation agencies; and (ii) weak capacity of implementing agencies to implement new and innovative aspects of the project, in particular those related to promoting of climate-resilient agriculture.

48. The institutional and capacity risks associated with coordination of multiple line departments and agencies during implementation will be minimized through retaining and utilizing the capacities created during the project preparation phase, in particular the PMU. PMU staff are fully informed about Bank's financial management requirements, in particular the flow of funds from the central level to the implementing agency at the local level. Notwithstanding extensive experience and capacities gained during project preparation, continued strengthening of capacities of the implementing agencies will be undertaken, as part of a comprehensive training and skills development plan under Component 4.

49. The involvement in project implementation of multiple departments and agencies that are largely independent from each other will require strong leadership and coordination by the nodal agency DoA and the PMU to achieve the objectives of the project. This will require special attention throughout the implementation period since those agencies and departments follow largely distinct flows of funds arrangements that include the use of existing in-country-systems (i.e. Treasuries) as well as the Bank arrangements. In addition, since the project will also finance the development of mini watershed plans, it is expected that project funds will flow to the fifteen project districts and to the village level, which will require establishing controls and measures to ensure compliance with Bank procedures applicable to the project. The guiding principle for the design of the financial management arrangements for this project will be the use of the country fiduciary systems to the extent feasible and to ensure timely service delivery. Given the above, project preparation will require a major dedicated effort and investments in mitigation measures for the project's fiduciary management.

50. **The integrated Fiduciary risk is rated as Substantial**. While the nodal agency is DoA, most of the Procurement activities are likely to be carried out at highly decentralized level. The roles and responsibilities of the sub-Districts (GPs) and Districts as well as the procurement framework will be discussed and agreed with the Bank during the early preparation stage. The PMU has hired a Procurement consultant who is familiar with Bank procurement procedures; given the complexity of procurement under the proposed project and the highly decentralized nature of the project implementation, the procurement capacity of the PMU will need to be strengthened. The Bank team will carry out a

detailed capacity assessment and ensure the provision of consistency and compliance, and that appropriate staffing and their capacity are on par with the fiduciary requirements in this project.

51. **Managing social and environmental impacts of project interventions**. The overall impact of the proposed project on the environment and rural livelihoods is expected to be positive. However, there is a possibility of short-term adverse impacts associated with some of the interventions such as strengthening and setting up rainwater harvesting structures, or promoting crop diversification. The safety of the water storage structure may be compromised if the works are not carried out with technical accuracy. Improved access to irrigation could lead to sharp intensification of cultivation, often resulting in high use of chemical fertilizers and pesticides. Furthermore, conservative way of thinking and low risk taking attitudes could lead to unacceptance of water saving technologies (e.g. drip and sprinkler) among farmers. In addition, farmers may discontinue the use of drip systems due to lack of proper maintenance. The farming community in the project area is highly diverse, with various distinct sub groups and that a sizeable share of them belongs to poor and vulnerable households. Each of these subgroups get affected differently and will likely have a differentiated capacity to respond and participate in the project. Further drought proofing will invariably demand a collective action. So, outreach activities and local participation as well as institutional linkages emerge as significant. An Environmental and Social Management Framework (ESMF) will be prepared to address these potential issues, and will include a Pest Management Plan.

52. **Gender**. The project design and approach will reflect the need for taking into account the gender dimension and risks associated with knowledge and technology transfer. Project will be designed to ensure that it provides equal opportunities for women to participate in project activities. Climate-resilient agricultural technologies will be screened to ensure that they are gender-neutral. Similarly, the identification of lead/contact farmers should be gender balanced. A comprehensive social assessment has been initiated as part of project preparation and is expected to result, among others, in a Gender Action Plan.

B. Economic Analysis

Project's development impact in terms of expected benefits and costs

53. The State of Maharashtra, with its rapidly expanding middle class of consumers, presents a considerably large and growing market for agri-food commodities, in turn providing significant opportunities for producers and SMEs in the agri-food system to increase production and income, while adapting to climate change and mitigating its impacts. The project will seek to capture these opportunities for beneficiaries through support for increasing crop productivity, generation of climate-resilient agricultural technologies, diversification into higher value crops, linking farmers to markets, and improving farmers' resilience to adverse climate effects.

54. The main benefits of the proposed project are expected to come from: (i) crop productivity increases through farmers' adoption of climate-resilient technologies; (ii) improved management of soil and water resources at farm and watershed level; (iii) diversification into climate-adaptive, higher-value agriculture; and (iv) improved post-harvest management and value-addition. The project will have important climate co-benefits coming from improved resilience to climate variability, in particular from the reduction in GHG emissions through on-farm carbon sequestration and the adoption of green technologies in agri-food processing. Finally, project activities supporting the post-production segments of commodity value chains are expected to create employment opportunities in rural areas.

Rationale for public sector provision/financing

55. The expected project benefits will have significant public goods dimensions. The project will benefit large numbers of rural communities consisting of predominantly small and marginal farmers. Also, strengthening the capacity of public agencies from various sectors operating at the watershed level, will help society improve the management of scarce soil and water resources and enhance environment. Further, the support to FPCs and collaboration with private entities (including on the scaling up of climate-resilient technologies) is expected to lead to sustained private sector investment, which in turn will spur broad economic growth and employment.

3. Value added of Bank's support

56. The Bank's support will add value to the project through: (i) mobilizing global knowledge and technical expertise, e.g. in areas like climate-resilient agriculture or inclusive commodity value chains; (ii) taking into account the long-standing experience in supporting the implementation of relevant projects in India and elsewhere; and (iii) leveraging external resources in support of countries climate adaptation and mitigation agenda (e.g. GCF).

Methodology/scope and next steps

57. A comprehensive economic and financial analysis (including quantification of NPV, EIRR, FIRR) will be carried out during preparation and appraisal to provide justifications on economic sustainability and financial viability of the project. The analysis will take into account benefits expected to accrue from a reduction in GHG emission. The methodology for GHG accounting in the project will be finalized during the preparation period.

C. Implementing Agency Assessment

58. Project activities will be implemented by the Department of Agriculture (executing agency) and other government agencies (including among others those covering water resources management (groundwater, small irrigation), agricultural extension and research, agri met services, soil science), strategic partners, Farmer Producer Companies and local service providers over a period of 6 years. DoA has implemented a number of projects co-funded by multilateral and bilateral donors, including the Bank. A PMU mapped to DoA/GoI with office in Mumbai and regional representations in Aurangabad and Akola will lead the project implementation and coordinate project activities among the agencies and institutions from the different sectors at ground level. The PMU has already been established to lead the project preparation and is led by a senior government official. The PMU will be responsible for overall management and coordination of project activities and will provide social and environmental safeguards, as well as procurement and fiduciary oversight to the project. The PMU will is fully staffed with senior technical specialists on deputation from the administration (e.g. for financial management) or hired consultants.

59. A complete review of the implementation capacity will be undertaken during preparation period once the implementation arrangements at the local level (which may involve various sector agencies) will be finalized and documented in a Project Implementation Manual (PIM) acceptable to the Bank. Similarly, all processes and arrangements for environmental and social safeguards compliance as well as for fiduciary management will be finalized and reviewed during the preparation period and documented in the PIM. To strengthen the capacity of the PMU, the technical specialists will be invited to attend training organized by the Bank on topics ranging from climate screening and GHG accounting to the new Bank's Procurement Framework.

60. A specialized consultant firm will be hired to support the PMU with all monitoring, evaluating and reporting aspects of the project. This third-party M&E agency will develop an ICT-based project M&E system developed around an agreed Results Framework (and that includes: (i) an M&E strategy regarding information requirements, tools and

methodologies for data collection, analysis and reporting; (ii) comprehensive M&E plan with clear roles and responsibilities with respect to data collection and reporting; and (iii) stakeholders analyses and other periodic assessments; baseline, midline and endline surveys; mid-term and ex-post evaluations, as well as rigorous project impact evaluations.