



**GREEN  
CLIMATE  
FUND**

**Meeting of the Board**  
27 February – 1 March 2018  
Songdo, Incheon, Republic of Korea  
Provisional agenda item 15

**GCF/B.19/22/Add.18**

6 February 2018

---

# Consideration of funding proposals – Addendum XVIII

## Funding proposal package for FP076

---

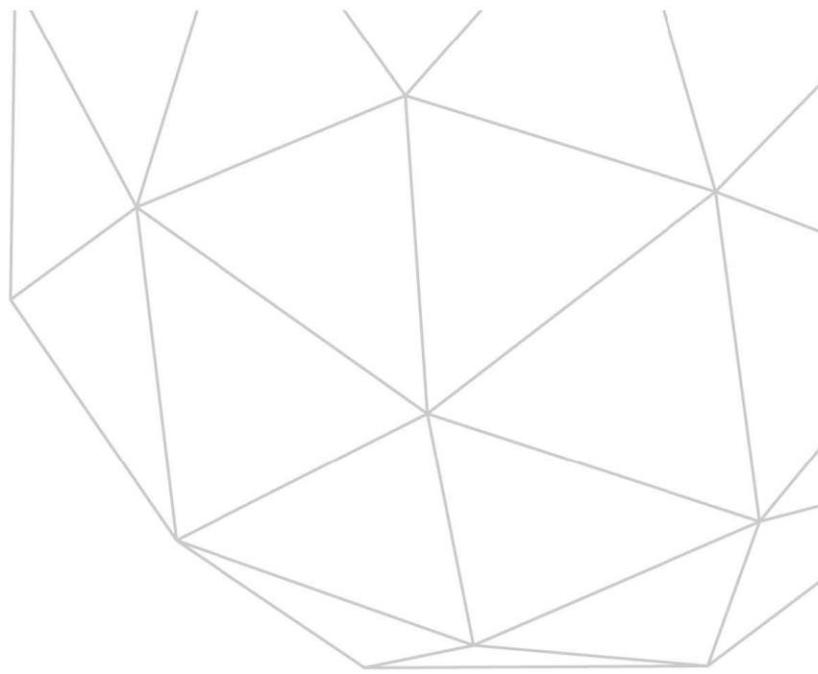
### **Summary**

This addendum contains the following three parts:

- a) A funding proposal summary titled “Climate-friendly Agribusiness Value Chains Sector Project”;
- b) No-objection letters issued by the national designated authority(ies) or focal point(s); and
- c) Environmental and social report(s) disclosure;



GREEN  
CLIMATE  
FUND



# Funding Proposal

Version 1.1

**The Green Climate Fund (GCF) is seeking high-quality funding proposals.**

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Climate-friendly Agribusiness Value Chains Sector Project

Country/Region: Cambodia

Accredited Entity: Asian Development Bank (ADB)

Date of Submission: June 2017

## Contents

Section A	<b>PROJECT / PROGRAMME SUMMARY</b>
Section B	<b>FINANCING / COST INFORMATION</b>
Section C	<b>DETAILED PROJECT / PROGRAMME DESCRIPTION</b>
Section D	<b>RATIONALE FOR GCF INVOLVEMENT</b>
Section E	<b>EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA</b>
Section F	<b>APPRAISAL SUMMARY</b>
Section G	<b>RISK ASSESSMENT AND MANAGEMENT</b>
Section H	<b>RESULTS MONITORING AND REPORTING</b>
Section I	<b>ANNEXES</b>

### ***Note to accredited entities on the use of the funding proposal template***

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

**Please submit the completed form to:**

[fundingproposal@gcfund.org](mailto:fundingproposal@gcfund.org)

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A.1. Brief Project / Programme Information		
<b>A.1.1. Project / programme title</b>	Climate-Friendly Agribusiness Value Chains Sector Project	
A.1.2. Project or programme	Project	
<b>A.1.3. Country (ies) / region</b>	Kingdom of Cambodia	
<b>A.1.4. National designated authority (ies)</b>	Ministry of Environment	
<b>A.1.5. Accredited entity</b>	Asian Development Bank	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> <b>International</b>	
A.1.6. Executing entity / beneficiary	Executing Entity (EE): <b>Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia</b> ; Implementing entities include MAFF, Ministry of Water Resources and Meteorology (MOWRAM), and Ministry of Rural Development (MRD). For signing the loan and grant agreements, the Ministry of Economy and Finance (MEF) will be the EE to represent the government of Cambodia. Beneficiaries include households, farmer water user communities, private sector and staff of financing institutions.	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro ( $\leq 10$ ) <input type="checkbox"/> Small ( $10 < x \leq 50$ ) <input checked="" type="checkbox"/> <b>Medium (<math>50 &lt; x \leq 250</math>)</b> <input type="checkbox"/> Large ( $> 250$ )	
A.1.8. Mitigation / adaptation focus	<input type="checkbox"/> Mitigation <input type="checkbox"/> Adaptation <input checked="" type="checkbox"/> Cross-cutting	
A.1.9. Date of submission	5 June 2017	
A.1.10. Project contact details	Contact person, position	Dr. Srinivasan Ancha, Principal Climate Change Specialist
	Organization	Asian Development Bank
	Email address	<a href="mailto:asrinivasan@adb.org">asrinivasan@adb.org</a>
	Telephone number	+63-2-632-4786
	Mailing address	6 ADB Avenue, Mandaluyong City, Metro Manila 1550 Philippines
<b>A.1.11. Results areas (mark all that apply)</b>		
<u>Reduced emissions from:</u> <ul style="list-style-type: none"> <li><input type="checkbox"/> Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)</li> <li><input type="checkbox"/> Low emission transport (E.g. high-speed rail, rapid bus system, etc.)</li> <li><input type="checkbox"/> Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)</li> <li><input checked="" type="checkbox"/> Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)</li> </ul>		
<u>Increased resilience of:</u> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)</li> <li><input checked="" type="checkbox"/> Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.)</li> <li><input checked="" type="checkbox"/> Infrastructure and built environment (E.g. sea walls, resilient road networks, etc.)</li> <li><input type="checkbox"/> Ecosystem and ecosystem services (E.g. ecosystem conservation and management, ecotourism, etc.)</li> </ul>		
A.2. Project / Programme Executive Summary		

Please provide a brief description of the proposed project/programme, including the objectives and primary measurable benefits (see [investment criteria in section E](#)). The detailed description can be elaborated in [section C](#).

- The project aims to reduce climate change vulnerability and greenhouse gas (GHG) emissions of four agricultural value chains in Cambodia, enhance resilience and productivity of target crops, and increase agricultural competitiveness and household incomes in the project areas. The project will operate in four vulnerable provinces, which have a history of agricultural losses due to extreme climate events and where main transport corridors are already available to link production to markets, namely **Kampong Cham and Tbong Khmum provinces** along the Greater Mekong Subregion (GMS) southern corridor, **and Kampot and Takeo provinces** along the south-coastal corridor (please refer to map in Annex 8). The project aims to enhance infrastructure resilience to climate change and “last mile” connectivity, enabling transformation of transport corridors into economic corridors.
- The GCF resources, along with the Asian Development Bank (ADB) and the government funds, will be used to invest in (i) climate smart agribusiness value chain infrastructure, (ii) capacity strengthening in climate friendly agriculture, and (iii) enabling environment for sound agribusiness policy. The project will improve climate resilience at each stage of the value chain<sup>1</sup> by investing in critical infrastructure<sup>2</sup>, and support intensification of production and commercialization of rice, maize, cassava and mango in a changing climate. The project will create an enabling policy environment that addresses climate risks to promote long-term sustainability and enhance profitability for farmers and agribusiness enterprises.
- The primary measurable benefits, corresponding to the GCF’s six investment criteria, are as follows:
  - a. First, the project will reduce GHG emissions by at least 240,000 tons of CO<sub>2</sub> equivalent by 2024, through promotion of renewable energy and introduction of biodigesters, while increasing household incomes for 390,000 direct beneficiaries. An additional 3.25 million tons of CO<sub>2</sub> equivalent will be reduced from implementation of climate smart agriculture (CSA) practices such as reduced tillage, laser land levelling, water, nutrient and pesticide management, and restoration of soil cover in agricultural landscapes.
  - b. Second, the project will contribute to a transformative impact through: (i) introduction of policies and standards for the creation of an enabling investment environment in climate-smart agribusinesses; (ii) an increase in institutional capacity to support climate-resilient agriculture and maintain climate-proof infrastructure; (iii) the deployment of technologies promoting CSA and information and communication technologies (ICTs); and (iv) changes in behaviour of stakeholders regarding potential benefits of private and public partnerships (PPPs).
  - c. Third, the project will create economic, social and environmental co-benefits, such as a 15% increase in yields; improving water use efficiency (by 5-10%) and energy savings (~20%) of at least 50 agribusiness units as well as a 10% reduction in post-harvest losses; investing in climate-proof infrastructure to provide more sustainable access to markets; installing 12,000 biodigesters and 6,000 compost huts to improve household air quality and benefiting productivity while reducing GHG emissions from fuel-wood and avoiding methane release to the atmosphere from stored manure; building capacity of men and women on the use of climate information services and CSA practices along the whole value chain.
- This project targets the needs of the most vulnerable populations, including those residing in flood prone or drought-prone areas, women (at least 150,000) and rural communities. The project targets the agricultural sector, which has suffered extensive losses in terms of crops and infrastructure during previous extreme climate events.
- The project is fully aligned with the country’s national priorities in climate change adaptation and mitigation and will build on best practices and lessons learned within the country and the GMS. The project is economically viable with economic internal rates of returns (EIRRs) of at least 14% for various subprojects.

### A.3. Project/Programme Milestone

Expected approval from accredited entity’s Board (if applicable)	31/05/2018
Expected financial close (if applicable)	30/12/2024
Estimated implementation start and end date	Start: 1 July 2018                      End: 30 June 2024
Project lifespan	6 years

<sup>1</sup> The value chain stages include: input supply, production, post-harvest, processing, transportation, marketing and trade, and consumption.

<sup>2</sup> Critical infrastructure includes irrigation infrastructure (tertiary canals and water retention ponds), production infrastructure (testing, processing and transformation), energy infrastructure (renewable), post-harvest (storage facilities), and roads (rural and feeder roads) – along with their related management systems.

### B.1. Description of Financial Elements of the Project / Programme

A detailed financial model and sensitivity analysis, including key assumptions, is included in Annex 3. The selected financial instruments (a mix of concessional loans and grants) have been determined to constitute the best possible mechanisms by which to channel significant investment into much needed infrastructure rehabilitation, while leveraging private sector participation through the creation of an enabling environment.

Output	Activity	Amount (for entire project) (rounded)	Currency	Amount (for entire project)	Local currency (KHR)	GCF funding amount	Currency of disbursement to recipient
<b>Output 1: Critical agribusiness value chain infrastructure improved and made climate resilient</b>	Activity 1.1 Rehabilitating water management infrastructure to climate resilient condition	44,145	<u>thousand USD</u>	NA	NA	9,884	USD
	Activity 1.2 Upgrading agricultural cooperative value chain infrastructure	9,612	<u>thousand USD</u>	NA	NA	0	USD
	Activity 1.3 Improving connectivity to cooperatives and markets through climate resilient farm road networks	38,290	<u>thousand USD</u>	NA	NA	8,294	USD
	Activity 1.4 Strengthening infrastructure for agricultural quality and safety testing	5,158	<u>thousand USD</u>	NA	NA	0	USD
	Activity 1.5 Promoting renewable energy for value chain improvement	13,594	<u>thousand USD</u>	NA	NA	4,878	USD
<b>Output 2: Climate smart agriculture and agribusiness promoted</b>	Activity 2.1 Deploying climate resilient varieties	3,876	<u>thousand USD</u>	NA	NA	2,785	USD
	Activity 2.2 Strengthening capacity in climate friendly production practices and technologies	9,280	<u>thousand USD</u>	NA	NA	7,090	USD
	Activity 2.3 Promoting farm mechanization and extension	692	<u>thousand USD</u>	NA	NA	0	USD
<b>Output 3: Enabling environment for climate friendly agribusiness enhanced</b>	Activity 3.1 Formulating climate friendly agribusiness policies and standards	1,203	<u>thousand USD</u>	NA	NA	722	USD
	Activity 3.2 Promoting green finance and risk sharing mechanisms	2,094	<u>thousand USD</u>	NA	NA	1,444	USD
	Activity 3.3 Supporting climate risk management through information and communication technologies (ICT)	4,055	<u>thousand USD</u>	NA	NA	3,524	USD
Project management	Project Management	7,239	<u>thousand USD</u>	NA	NA	1,343	USD

	Financing charges	2,149	<u>thousand USD</u>	NA	NA	36	USD
Total project financing		141,390	<u>thousand USD</u>	NA	NA	40,000	USD

A detailed breakdown of cost/budget by expenditure type and disbursement schedule is included in the Annex 5.

### B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
<b>(a) Total project financing</b>	<b>(a) = (b) + (c)</b>	141,390,000	<u>USD</u>		
<b>(b) GCF financing to recipient</b>	(i) Senior Loans	10,000,000	<u>USD</u>	(32) years	(0.25) %
	(ii) Subordinated Loans	.....			
	(iii) Equity	.....			
	(iv) Guarantees	.....			
	(v) Reimbursable grants	.....			
	(vi) Grants	30,000,000	<u>USD</u>		

Cambodia is a least developed country (LDC) as per UN classification and remains highly dependent on concessional funds for public investments in infrastructure and human capital. Up to 80 percent of the country's population live in rural areas, and about 75 percent remain below or marginally above the poverty line (US\$1.25 per person per day), leaving them vulnerable to economic, social and environmental shocks. Even the smallest shock can send this population group back into poverty. Borrowing by the government is limited to activities designed to leverage significant economic growth, or to long-term investment in infrastructure needed for economic growth.

Cambodia is highly vulnerable to both climate variability and climate change because of its low capacity to adapt and its heavy reliance on climate-sensitive sectors such as water resources and agriculture. Livelihood activities and economic sectors dependent on these resources have traditionally been highly sensitive due to the country's unique geographic conditions and hydrological system. In countries such as Cambodia, where infrastructure standards are weak, the average costs of addressing climate resilience in rural infrastructure are estimated to be between 20 and 30% of base costs. Additional resources from GCF are, therefore, required at the best available levels of concessionality to harness full resilience and GHG mitigation benefits in the targeted value chains. The proposed use of GCF funds is highlighted at the end of the description of each activity.

The project financing plan has been designed to direct ADB loan proceeds for those activities that are expected to generate income, more rapidly and more directly; whereas GCF Loan proceeds are for activities that involve some risk and some income generation, but for which immediate results may not be visible. The GCF loan is used for only two out of 11 project activities. They are "rehabilitating water management infrastructure to climate resilient condition" and "Improving connectivity to cooperatives and markets through climate resilient farm road networks".

The GCF grant proceeds are targeted mainly towards activities that (i) deliver resilience outputs (e.g. climate resilient crop varieties, climate friendly agricultural production technologies and practices, ICT services to support climate risk management, etc.) that have the potential to be scaled up and scaled out; (ii) promote renewable energy use (bioenergy and solar energy) to reduce the carbon footprint of the value chain; (iii) address key barriers for enhancing adaptive capacity of vulnerable populations and ecosystems; and (iv) strengthen technical capacity of institutions, farmer groups and other stakeholders on climate friendly agriculture, agribusiness and farm mechanization.

The GCF grant proceeds will be separated from the lending lines. ADB will have three separate agreements with the government, with three separate accounts for ADB loan, GCF loan and GCF grant

	with separate disbursement streams. ADB loan, GCF loan and GCF grants are disbursed simultaneously depending on the time of implementation of activities.						
	Total requested (+ii+iii+iv+v+vi)	40,000	USD <u>Options</u>				
(c) Co-financing to recipient	<b>Financial Instrument</b>	<b>Amount</b>	<b>Currency</b>	<b>Name of Institution</b>	<b>Tenor</b>	<b>Pricing</b>	<b>Seniority</b>
	<u>Loan</u>	90,000,000	<u>Thousand USD</u>	ADB*	32 years	1-1.5%**	<u>senior</u>
	<u>In-kind</u>	7,612,000	<u>USD</u>	Government*			<u>Options</u>
	<u>In-Kind</u>	3,778,000	<u>USD</u>	Beneficiaries			<u>Options</u>
							<u>Options</u>
	Lead financing institution: Asian Development Bank						
	* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution. An extract from the approved Country Operations and Business Plan is attached as Annex 4.						
	**The ADB loan will have a 32-year term, including a grace period of 8 years; an interest rate of 1.0% per year during the grace period and 1.5% per year thereafter.						
(d) Financial terms between GCF and AE (if applicable)	In cases where the accredited entity (AE) deploys the GCF financing directly to the recipient, (i.e. the GCF financing passes directly from the GCF to the recipient through the AE) or if the AE is the recipient itself, in the proposed financial instrument and terms as described in part (b), this subsection can be skipped.						
	<b>Not applicable</b>						
	If there is a financial arrangement between the GCF and the AE, which entails a financial instrument and/or financial terms separate from the ones described in part (b), please fill out the table below to specify the proposed instrument and terms between the GCF and the AE.						
	<b>Financial instrument</b>	<b>Amount</b>	<b>Currency</b>	<b>Tenor</b>	<b>Pricing</b>		
	Choose an item. ....		<u>Options</u>	( ) years	( ) %		
	Please provide a justification for the difference in the financial instrument and/or terms between what is provided by the AE to the recipient and what is requested from the GCF to the AE.						
	<i>Not applicable</i>						

**B.3. Financial Markets Overview (if applicable)**

How market price or expected commercial rate return was (non-concessional) determined? **Not applicable**

Please provide an overview of the size of total banking assets, debt capital markets and equity capital markets which could be tapped to finance the proposed project/programme. **Not applicable**

Please provide an overview of market rates (i.e. 1-year T-Bill, 5-year government bond, 5-year corporate bond (specify credit rating) and 5-year syndicate loan). **Not applicable**

Provide examples or information on comparable transactions. **Not applicable**

## C.1. Strategic Context

Cambodia is an agrarian country, with its economic growth largely reliant on the agricultural sector. Over 80% of the population lives in rural areas and most of them depend on rainfed agriculture for living. Climate variability, especially water availability due to erratic precipitation patterns, has posed constraints to agricultural productivity, and these impacts are expected to significantly increase due to projected climate change.<sup>3</sup> The latest National Water Status Report of MOWRAM confirms that the frequency and intensity of floods, droughts and windstorms has increased since 1989, when national weather and climate data began to be reliably recorded (MOWRAM 2014). Observed impacts of climate change trends in recent years have manifested by more intense rains over shorter periods leading to floods, delayed onset of the rainy season (preventing any early wet season crops), longer dry seasons and more intense El Niño related droughts, and unexpected dry periods during the rainy season, untimely rains spoiling ready to harvest or drying crops, such as rice and maize.<sup>4</sup> Key historical trends include:

- Mean annual temperature has increased by 0.8°C since 1960<sup>5</sup>. The frequency of hot days<sup>6</sup> and hot nights has increased significantly since 1960 in every season and the average number of 'hot' days per year has increased by 46<sup>7</sup> since 1960. Conversely, the average number of 'cold' days per year has decreased by 19 (5.2% of days) since 1960, and the number of 'cold' nights per year has decreased by 46.
- Mean annual rainfall does not show consistent increase or decrease since 1960 (an estimated 0.2% decrease per year)<sup>8</sup>. From 1960, the proportion of rainfall that falls in heavy events has increased at a rate of 0.67% per decade.
- The frequency of extreme weather events (floods and droughts) has increased since 1987, with 9 recorded events between 1987 and 1999, and 19 events since 2000<sup>9</sup>. Also, the number of provinces affected by each event has been increasing. For example, the 2011 flood affected 4 provinces, but the 2013 flood affected 20 provinces. Likewise, drought in 2004 affected 5 provinces but the 2016 drought affected all 25 provinces of the country.

Recent climate vulnerability assessments show that "Cambodia will experience changes in temperature and rainfall patterns by 2050 with significant ramifications for communities and ecosystems.<sup>10</sup> Mean annual temperature is projected to increase by 0.4°C to 1.3°C by the 2030s, 0.7°C to 2.7°C by the 2060s, and 1.4°C to 4.3°C by the 2090s. Frequency of "hot days" is annually projected to occur on 14-49% of days by the 2060s, and 20-68% of days by the 2090s, marking a substantial increase in the frequency of hot days from the baseline of 12.2% of days in 1970-1999. Rainfall is projected to increase, particularly during wet seasons, offset by a decrease of rain in the dry seasons. Rainfall projections from different models have been consistent in showing increases in rainfall, particularly increases in wet season rainfall from June to August (-11 to 31% by 2090) and September to November (-8 to +42% by 2090), but will be partially offset by projected decreases in December to February (-54 to +36%).

High risks of floods and drought, combined with poverty and low adaptive capacity, make Cambodia one of the most vulnerable countries in the world.<sup>11</sup> The agriculture sector, particularly cropping, is already highly sensitive to climate variability: for example, an increase in temperature of 1°C might result in 10% decline in rice production and increase in pests, making rice farming not viable for many farmers, leaving them with fewer options and less income. Although Cambodia is considered a "water rich" country with a renewable water resource amounting to 32,695 m<sup>3</sup>/person/year, only 15% of the cultivated rice area in Cambodia is irrigated, in comparison to 28% in Thailand and 33% in Viet Nam. It

<sup>3</sup> GSNCS 2015. Cambodia's Second National Communication under the United Nations Framework Convention on Climate Change. General Secretariat, National Council for Sustainable Development/Ministry of Environment, Kingdom of Cambodia, Phnom Penh.

<sup>4</sup> IFAD, Cambodia: Environment and Climate Change Assessment, 2013.

<sup>5</sup> UNDP Climate Change Country Profiles. C. McSweeney, M. New, G. Lizcano et al., (2010). The UNDP Climate Change Country Profiles: improving the accessibility of observed and projected climate information for studies of climate change in developing countries. Bulletin of the American Meteorological Society, 91, 157-166.

<sup>6</sup> Idem. UNDP Climate Change Country Profiles. 'Hot' day or 'hot' night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season.

<sup>7</sup> Idem. UNDP Climate Change Country Profiles: The increase in frequency over the 43-year period between 1960 and 2003 is estimated based on the decadal trend quoted in the summary table

<sup>8</sup> T. Heng Chan, 2015. Observed and projected changes in temperature and rainfall in Cambodia.

<sup>9</sup> Source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, [www.emdat.be](http://www.emdat.be).

<sup>10</sup> See USAID, Mekong Climate Change Impact and Adaptation Study for Lower Mekong Basin, November 2013, Bangkok, Thailand [http://www.mekongarcc.net/sites/default/files/cambodia\\_june2014-press-small\\_0.pdf](http://www.mekongarcc.net/sites/default/files/cambodia_june2014-press-small_0.pdf), Agricultural development and Climate Change: The case of Cambodia, CDRI Working Paper 65, Phnom Penh 2011; Cambodia Climate Change Strategic Plan 2014 -2023, National Climate Change Committee, Phnom Penh 2013; Climate Change: Vulnerability and Impact Assessment, SNV, Phnom Penh 2014; See also World Bank, 2011, Vulnerability Risk Reduction and Adaptation to Climate Change in Cambodia, available here [http://sdwebx.worldbank.org/climateportal/doc/GFDRRCountryProfiles/wb\\_gfdr climate change country profile for KHM.pdf](http://sdwebx.worldbank.org/climateportal/doc/GFDRRCountryProfiles/wb_gfdr climate change country profile for KHM.pdf); Cambodia Agriculture in Transition: Risks and Opportunities, World Bank Economic and Sector Work, Report No. 96308-KH, Washington 2015

<sup>11</sup> Cambodia is ranked 8th most vulnerable on the Maple Croft Climate Change Vulnerability Index 2015.

is among the Southeast Asia countries with the least share of irrigated versus rain-fed agriculture, which makes 85% of rice cropping area in Cambodia fully exposed to changing rainfall patterns.

Cambodia's economy grew consistently during the past 10 years due to improved macroeconomic stability and public financial management reforms. Gross domestic product (GDP) grew at annual rates of about 7.0%, reaching \$18.05 billion in 2015.<sup>12</sup> The national poverty rate was reduced from 50.2% in 2002 to 17.7% in 2012 but 40% of the population remains vulnerable.<sup>13</sup> The agriculture sector accounted for 29% of GDP in 2014, with crop production contributing 59.4% of the sector's GDP. The gross value addition for agriculture increased from KR5,596 billion in 2004 to KR9,087 billion in 2013. However, overall agricultural sector growth slowed from 5.4% in 2009 to 0.24% in 2015 respectively,<sup>14</sup> mainly due to extreme weather events such as floods and droughts. Low and decreasing yield, combined with high levels of post-harvest losses affect Cambodian producers' ability to set competitive pricing for agriculture commodities in regional and global markets.

Cambodia's agricultural value chains, besides being highly vulnerable to impacts of climate change, are not yet well developed in comparison with neighboring countries such as Thailand and Viet Nam, and with respect to domestic as well as export markets due to critical infrastructure gaps and a range of capacity and policy constraints. Production and distribution costs are high, largely due to high energy and transport costs, and profits are hampered by high rates of post-harvest losses (~15–20%). Although over 60% of inhabitants are engaged in farming, with women accounting for 70%, agriculture sector investments have not yet translated into sufficient local benefits. Farming remains mostly subsistence-based and rain-fed, with low productivity. In addition, labor shortage in rural areas has increased due to migration to urban areas, which in turn led to rise in agricultural wages by 206% between 2005 and 2013. Private sector investment remains low due to an unfavorable agri-business environment. Stringent quality and food safety standards are constraining Cambodian farmers' access to competitive markets, while a lack of access to effective processing technology leads to low levels of value addition for Cambodia commodities. Consequently, despite strong market demand, value chains in Cambodia remain fragmented, leading to sub-optimal efficiency with poor geographic reach, and low transmission of retail prices to the producer.

**Opportunities.** Recognizing these challenges, the government's agriculture sector strategic development plan (2014–2018) aims to enhance competitiveness of the agriculture sector through improvements in productivity (intensification), diversification and commercialization. Measures include (i) expansion of extension services, improvement of seed quality to respond to markets, and better post-harvest technology; (ii) creation of enabling environment for the private sector and adoption of Good Agricultural Practices; (iii) strengthening of policies for increasing agricultural business and export and improving product quality and standards (e.g. sustainable rice platform); (iv) strengthening of analysis capacity for the National Agricultural Laboratory (NAL); (v) rehabilitation of infrastructure of state farms and agricultural development centers; (vi) implementation of the strategy and action plan for climate change adaptation and mitigation; and (vii) promotion of private investment in agriculture through public-private partnerships. The government also aims to promote biogas and bioenergy consumption,<sup>15</sup> a priority in Cambodia's Nationally Determined Contribution (NDC).<sup>16</sup>

The government is fully committed to becoming an integral part of the ASEAN Economic Community (AEC) for the free market of goods, services and skilled labor, with expectation that there will be a borderless ASEAN community by 2030. Improved regional integration has resulted in increased investments in transport connectivity and trade facilitation. To reap the benefits of expanded markets, it is imperative for Cambodia to strengthen its agricultural competitiveness. Investing in climate smart and sustainable infrastructure, strengthening the policy environment and addressing capacity gaps at all levels is vital to ensuring the continued viability and competitiveness of the agriculture sector. For example, intensified crop production through adoption of climate smart agriculture practices and climate resilient varieties, improved production and post-harvest infrastructure, and access to markets will enhance food security and poverty alleviation, reduce post-harvest losses substantially and help farmers to better cope with climate change while also reducing GHG emissions. Likewise, integration of bioenergy and other renewable energy options can enhance the overall competitiveness of value chains through reduced energy costs while reducing emissions. Similarly, farm mechanization combined with agribusiness operational and management skills, especially through agricultural cooperatives, can help in addressing labor shortage. Farm cooperatives also provide a mechanism to encourage farmers to work together to enhance their bargaining power, product trading, and farming incomes.

<sup>12</sup> Food and Agriculture Organization. 2015. *Cambodia Socio-economic Survey 2015*, Phnom Penh.

<sup>13</sup> World Bank. 2015. *Cambodia Agriculture in Transition: Opportunities and Risks*, Washington DC.

<sup>14</sup> National Institute of Statistics. 2016. Phnom Penh.

<sup>15</sup> Royal Government of Cambodia, 2014. *Cambodia Climate Change Strategic Plan (2014 – 2023)*, Phnom Penh.

<sup>16</sup> Royal Government of Cambodia, 2015. *Cambodia's Intended National Determined Contribution*, Phnom Penh.

With GCF support, Cambodian agriculture and agribusinesses can become more climate resilient with a lower carbon footprint and realize comparative and competitive advantages for economies of scale and continuity of supply to break into new markets and achieve import substitution, while ensuring the sector competitiveness in a changing climate. The support from GCF complements key objectives of the government's agriculture sector strategic development plan and the Industrial Development Policy.

## C.2. Project / Programme Objective against Baseline

This project is part of an overall program designed to reduce climate change vulnerability and GHG emissions of agricultural value chains, thereby increasing the productivity and competitiveness of the agriculture sector in three low income countries (Cambodia, Lao PDR and Myanmar) of the Greater Mekong Subregion (GMS). Each project will work in areas connected by the GMS transport corridor, and is designed to achieve the objective of enhanced climate resilience while also contributing to reducing the carbon footprint of the value chains. Each project addresses identified gaps in terms of climate smart production capacity, infrastructure, and policy, with a view to leading to the professionalization of agribusinesses and the long-term viability of selected value chains.

### Baseline scenario

In the baseline scenario, Cambodia faces increasing climate change vulnerability and in its efforts to increase production, increasing GHG emissions from the agriculture sector. Low capacity and insufficient access to technologies, compounded by an inadequate policy environment, maintain producers in a situation of high vulnerability to climate risks and leads to a gradual decline in agricultural livelihoods.

**Climate vulnerability:** Given that 80% of the population in Cambodia derives its livelihood from agriculture, the degree of exposure to climate extremes and long-term climate changes is high.<sup>17</sup> In recent years, Cambodia experienced severe losses in the agricultural sector due to floods. For instance, in August 2011, heavy rains and overflow of the Mekong river impacted 18 of the 24 provinces of Cambodia and destroyed crops and communal infrastructure, including national, provincial and rural roads, irrigation schemes, rural water supply, schools and health centers, amounting to at least \$ 624 million in damages and losses.<sup>18</sup> Droughts are also recurring, with a trend towards accentuation of the severity of water shortages during dry and wet seasons.<sup>19</sup> Based on data of the past 20 years, losses in agricultural production were mainly due to flooding (about 62%) and drought (35%)<sup>20</sup>. 2015-2016 saw the country suffering from a 1-in-35 year drought, with drastic reductions in rainfall (over 50%) and severe impacts on yields and, as a result, food security. Low yields, coupled with natural disasters and a lack of access to water during dry periods, contribute to temporary food shortages. A mapping of food security concluded that seven provinces are classified as severely to extremely food insecure, and an additional seven as moderately insecure. Adaptive capacity among rural populations and national institutions remains low and many households have been locked into a cycle of debt caused by borrowing money as a coping strategy during natural calamities and emergencies. It has been estimated that the negative impacts of climate change led to a 10% loss in the GDP in 2015.<sup>21</sup>

There are several institutional, technical, financial, informational and policy-related barriers to address climate change vulnerability. However, efforts to address climate vulnerability have been stepped up with the launch of the National Adaptation Program of Action in 2006, followed by the Climate Change Strategic Plan in 2013. Work is underway to develop the National Adaptation Plan (NAP). The Government of Cambodia is implementing a number of projects designed to pilot adaptation technologies, increase adaptive capacity and address key adaptation priorities, including: the Cambodia Climate Change Alliance (CCCA) with EU funding, whose objectives are to strengthen governance of climate change issues; the project "Reducing vulnerability of Rural Livelihoods through sub-national planning (UNEP), or the project to strengthen climate information and early warning systems (UNDP) and Pilot Program for Climate Resilience (PPCR) of Climate Investment Funds. The government has identified several priority actions to reduce vulnerability in its recent Intended Nationally Determined Contribution (INDC).

The RGC is also working with the Mekong River Commission (MRC) to address transboundary climate change issues. Other baseline programming, undertaken with the support of bilateral and multilateral partners, is designed to address fundamental bottlenecks to development, including through infrastructure investment (e.g. Rural Road Network

<sup>17</sup> Nang Phirun, Sam Sreymom, Lonn Pichdara and Ouch Chhuong (June 2014), *Adaptation Capacity of Rural People in the Main Agro-Ecological Zones in Cambodia*, CDRI Working Paper Series No. 93 (Phnom Penh: CDRI).

<sup>18</sup> ADB, 2012. Flood damage Emergency Reconstruction Project (RRP 46009): Preliminary Damage and Loss Assessment, Manila.

<sup>19</sup> Bert Coerver and Elga Salvadore, UNESCO-IHE, Drought Analysis, Cambodia, 2016.

<sup>20</sup> RGC, Second National Communication to the UNFCCC, 2016.

<sup>21</sup> <http://www.khmertimeskh.com/news/26780/10--of-gdp-lost-to-climate-change/>

Improvement Project with ADB support), smallholder poverty reduction and agricultural diversification (e.g. IFAD and ADB), or energy development.

**Greenhouse gas emissions.** The agriculture sector is expected to grow at an annual rate of 5% to meet national economic growth and export targets, as well as to contribute to the population's food security needs. At the same time, Cambodia has 57% forest cover, which the government endeavors to increase and maintain, to ensure livelihoods for forest-dependent communities and future generations. However, the pressure on natural resources and land is high. The latest available GHG inventory suggests that Cambodia was an overall net carbon sink in 2000; in 2000, total emissions of the two main GHGs (CH<sub>4</sub> and N<sub>2</sub>O) from agriculture reached 21,112 GgCO<sub>2</sub>-eq. Rice cultivation accounted for 68% of emissions, enteric fermentation for 16% and agricultural soils for 11%.<sup>22</sup>

Approximately 75% of households in Cambodia use firewood for cooking, 8% use charcoal and 16%, liquid propane gas.<sup>23</sup> An estimated 88% of fuel wood comes from forests, which leads to forest degradation and deforestation, with resulting loss in carbon sinks. It is estimated that 77% of the wood in Cambodia is non-renewable and the usage of this for cooking leads to substantial GHG emissions, such as long life CO<sub>2</sub> and short lived ones such as black carbon.<sup>24</sup> Black carbon is a particularly strong contributor to climate change as it has a global warming potential of 2,421 times to that of CO<sub>2</sub> over a 100-year period. In addition, a substantial part of the fuel wood is collected, which is both a drudgery and a significant time expenditure, especially for women, while purchased wood on the other hand, is a burden on the limited households' revenues. Although most of the energy used for cooking comes from wood, the overall energy consumption of charcoal is larger (38,371 Terra Joule (TJ) versus 33,720 TJ in the energy balance). The difference results from relying on inefficient charcoal kilns from which only 24% of the wood energy is transferred to charcoal while 76% is lost. In the target project provinces, Kampong Cham, Kampot, Takeo, and Tbong Khmum, the Food and Agriculture Organization of the United Nations' (FAO) wood fuel integrated demand supply overview mapping (WISDOM)<sup>25</sup> showed that there is a wood fuel deficit. Under a business as usual scenario, the carbon footprint of the agriculture sector is expected to increase, as Cambodia continues to pursue production increases, value addition through expansion and enhanced processing and trade.

Efforts to address GHG mitigation in agriculture sector include projects implemented with GEF support (e.g. Scaling up of Renewable Energy Technologies in Cambodia (IFAD) or Reduction of GHG emissions through promotion of commercial biogas plants (UNIDO)). These projects are relatively small in scope and aim at piloting or demonstrating potential technologies, rather than leveraging impact at scale. Some projects are aimed at enhancing carbon sequestration, mainly through afforestation and sustainable forest management.

### Key barriers

In order for the country to achieve its growth objectives in the agricultural sector in a climate friendly manner, and to meet its commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement, a number of barriers must be addressed, which are accentuating and perpetuating climate change vulnerability, hindering sector competitiveness, and undermining the performance of the sector as a whole.

#### a) Critical infrastructure deficits

**Cambodia's lack of infrastructure** is largely due to its history of conflict, low population density and limited economic capacity to invest in infrastructure. At the production stage, inadequate number of irrigation schemes to allow for sufficient water availability, especially during drought, is a major constraint. The existing schemes have been designed with now outdated climate parameters and need to be upgraded. Inadequate maintenance, due to limited operations and maintenance (O&M) resources among farmer user groups, has led to the deterioration and gradual abandonment of irrigation schemes, and a return to single season rainfed cropping, with lower yields. Post-harvest drying is practiced using inadequate means, such as tarpaulin or concrete bases, which leads to quality, safety and phytosanitary issues. Storage structures are still rudimentary, leading to inefficiencies in the value chain and post-harvest losses.

In addition, climate change events are contributing to increasing post-harvest losses, as higher humidity levels and rainfall during harvesting seasons are preventing proper drying of crops. For example, rice crops with a higher level of moisture (over 14%) are of lower quality, tend to rot faster and fetch lower prices. Furthermore, the lack of climate-resilient roads linking villages and communes to the main transport corridors accentuate the sector's low competitiveness and restricts access to neighboring markets. For example, rural roads represent 22.7% of Cambodia's national road network, of which only 5% are paved, and most of which are routinely impacted by extreme events such as torrential rainfall, extreme heat

<sup>22</sup> RGC, Second National Communication to the UNFCCC.

<sup>23</sup> National Institute of Statistics and Ministry of Planning, 2015, *Cambodia Economic Survey*, Phnom Penh.

<sup>24</sup> United Nations Framework Convention on Climate Change, Executive Board 77 Meeting: Annex 4 (MOE proposed and endorsed).

<sup>25</sup> FAO 2007: <http://www.fao.org/fileadmin/templates/FCIT/PDF/WISDOM.pdf>

and droughts. Furthermore, high energy costs (or lack of access to energy sources) at the processing stage, and high transportation costs reduce the potential value addition and profit that farmers can expect to make from their production, and act a crosscutting barrier. Higher production prices, combined with lower quality output, mean that agriculture is not yet a profitable sector. This general infrastructure deficit is increasingly exacerbated by climate change impacts. Unfortunately, the rate of national investment in agricultural infrastructure (\$150-200 million per year) is insufficient to address the development needs, let alone to meet the additional cost for making the existing and new critical infrastructure resilient to climate change impacts. For example, the cost of infrastructure development is expected to increase by over 13% on average to make the infrastructure low-carbon and climate-resilient. [cf. ADB publication “Meeting Asia’s infrastructure needs” <https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf>]

**b) Inadequate capacity and policy environment for the development of resilient agri-business**

Although over 60% of inhabitants are engaged in farming, with women accounting for 80%, agriculture sector investments have not yet translated into substantial local benefits. While some progress has been made in strengthening the Provincial Departments of Agriculture (PDA) in various provinces, including through ADB support, weaknesses remain among PDA staff regarding the provision of support to farmer groups and to developing agri-businesses. Capacity constraints among farmer groups and cooperatives are also preventing the successful operation of drying and storage infrastructure, and this is contributing to perpetuating post-harvest losses, low produce quality and therefore, low prices and diminished income. The Provincial Departments of Water Resources and Meteorology (PDWRAM) of the selected provinces, in charge of overseeing irrigation infrastructure also has limited capacity in delivering adequate support to the establishment, operation, monitoring and evaluation of Farmers’ Water User Communities (FWUC). Although several irrigation schemes have been established, the number of functioning schemes remains severely limited. For example, out of 2,790 irrigation schemes in the inventory of Ministry of Water Resources and Meteorology (MOWRAM), the number of functioning or partially functioning FWUCs is estimated at 88, which highlights the lack of capacity of FWUCs to properly operate and maintain existing infrastructures.

Production methods are outdated and not consistent with emerging climate conditions, and natural resources management, both on-farm and off-farm, is inadequate. This leads to the degradation of the resource base, which reduces yields and product quality. There is also a need to promote technologies that can allow farmers to sustainably increase productivity while reducing labor and production costs, including energy, across the entire value chain.

Farmers also lack access to extension, and to reliable and accurate agronomic and climate information services to innovate in climate-smart practices and to cope with climate shocks. For example, a recent assessment of climate services’ capacity ([http://www.unisdr.org/files/33988countryassessmentreportcambodia\[1\].pdf](http://www.unisdr.org/files/33988countryassessmentreportcambodia[1].pdf)) notes that Cambodia was lagging in terms of observation network and forecasting technologies as well as human resources and institutional capacity. With current state of physical, human and financial resources, the existing services cannot meet the rapidly growing needs (e.g., weather forecasting, early warning systems) of different socio-economic sectors, particularly agriculture as it faces more rapid climate change and climate uncertainty. Cambodia’s meteorological and hydrological network originally included 20 Synoptic stations (including climatological), 200 rainfall stations, and 80 manual and 12 automated hydrological stations. Among synoptic stations, 8 were automatic weather stations (AWS) and 12 stations were manual (conventional analogue systems). Several AWS ceased functioning after 1 to 2 years of operation due to lack of maintenance and insufficient training as well lack of operation funds.

In view of the above, ADB is strengthening meteorological and hydrological network through three separate projects: (i) Under ADB Loan 3125: Flood Damage Emergency Reconstruction Project – Additional Financing, 8 AWS and 10 Hydromet stations were already established. (ii) Under ADB Loan 3289: Uplands Irrigation and Water Management Sector Project, 15 hydromet stations and 15 AWS are being established. (iii) Under ADB Loan 2970: GMS Flood and Drought Risk Management and Mitigation Project, 7 Hydromet stations and 11 AWSs are being built. The project aims to make use of such infrastructure in delivering appropriate information. Currently, means of climate information dissemination are currently limited to TV, radio and newspapers and notifications through local authorities. These are not effective for rapid onset events and often reach users too late. Adapted agro-meteorological advisories based on latest information and communication technologies (ICT) are still lacking, such as for example improved seasonal outlooks, enhanced 5 and 10-day bulletins, or crop specific forecasts and analytics. These services are either not produced, delivered at insufficient levels of granularity and reliability, or not reaching the end users<sup>26</sup>.

In addition, there is a lack of economic incentive for environmental and ecological stewardship among farmers. Most of the agricultural residues are used as fuel for cooking or burnt in the open, leading to increased carbon emissions.

<sup>26</sup> See for example Strengthening of hydro-meteorological services in Southeast Asia - Country Assessment Report for Cambodia, 2013, UNISDR and E-agriculture platform for Kampong Cham Province, ADB, 2016.

Firewood use for household and industrial needs contributes to deforestation and leads to watershed degradation, with adverse impacts across the agricultural sector in terms of increased run-off, water losses, erosion and landslides, flooding damage, and an overall decrease in water availability during dry seasons, further limiting productivity potential.

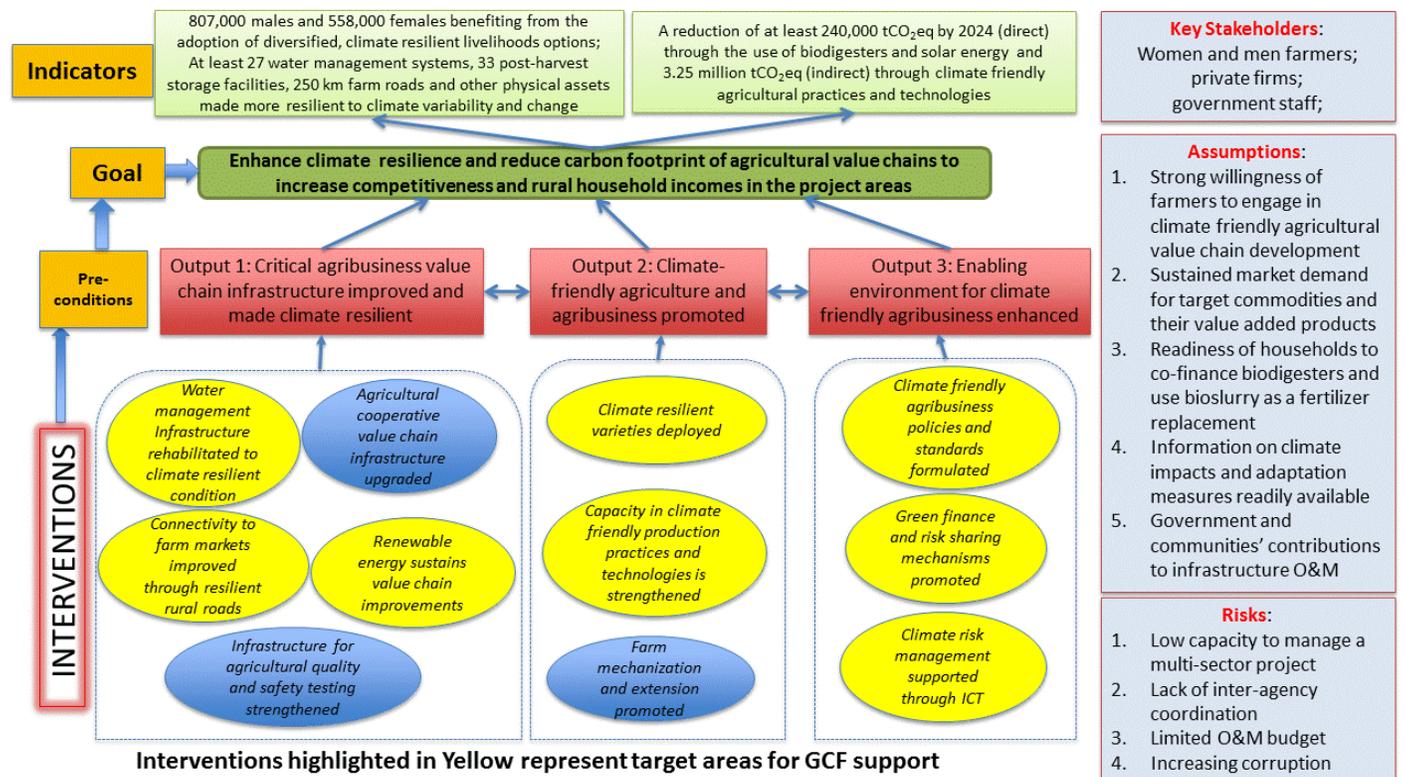
With consideration to the infrastructure, capacity and policy barriers and baseline scenario of current and projected climate change impacts explained above, the objective of the project is to reduce climate change vulnerability and greenhouse gas (GHG) emissions of four agricultural value chains, enhance climate resilience and productivity of target crops, and thereby increase agricultural competitiveness and rural household incomes in the project areas. The project will seek to address the abovementioned barriers in an integrated approach that combines investments in infrastructure, production assets, and capacity at all levels. The project expects to make a significant contribution to reducing vulnerability to climate change and GHG emissions from the agricultural sector in Cambodia.

### C.3. Project Description

The Climate-Friendly Agribusiness Value Chains Sector Project (CFAVCP) is structured across three complementary outputs, namely:

- Output 1: Critical agribusiness value chain infrastructure improved and made climate resilient
- Output 2: Climate smart agriculture and agribusiness promoted
- Output 3: Enabling environment for climate friendly agribusiness enhanced

A theory of change diagram representing the main goal, pre-conditions and necessary interventions needed to achieve those pre-conditions is given below:



The project will improve climate resilience and reduce carbon footprint of each stage of the agricultural value chain by investing in climate resilient agricultural production and post-harvest infrastructure, supporting production intensification and commercialization of rice, maize, cassava and mango, and by promoting the use of low-carbon technologies at various stages in the value chain. The project will support these investments by building capacity of all value-chain stakeholders and contributing to the creation of an enabling policy environment for agribusinesses, which will promote long-term environmental sustainability and enhance profitability for farmers and enterprises. Expected end of the project results are:

- Enhanced climate resilience of 27 water management systems, 33 post-harvest storage facilities built or upgraded to climate resilient standards, 50 climate friendly agricultural cooperatives and other physical assets (e.g., at least 250 km resilient rural roads), and release of three additional climate resilient varieties of crops;

- GHG emissions reduced by 240,000 tons<sup>27</sup> of CO<sub>2</sub> equivalent through promotion of renewable energy (and by at least 3.25 million tons from adoption of climate friendly agricultural practices over time);
- 5-10% water savings, 20% energy savings, and 10% in post-harvest losses; and
- At least 15% increase in yields for rice, maize, cassava and mango, benefitting at least 390,000 farmers directly and 975,000 indirectly (total beneficiaries: 1.365 million).

### Project outputs and activities:

#### Output 1: Critical agribusiness value chain infrastructure improved and made climate resilient.

Under this output, the project will invest in improving climate resilience and reducing carbon footprint of critical infrastructure along the whole value chain. At the production stage, climate-resilient irrigation and water management structures will be established and / or rehabilitated to increase crop yields. At the production and post-harvest stages, renewable energy will be introduced to optimize on-farm resources, and climate-proofed storage units will be built to improve resource efficiency, reduce post-harvest losses, and enhance quality and value chain linkages. At the processing stage, energy efficient processing facilities will be built. Finally, climate-resilient rural roads will be constructed to link villages to markets and transport corridors. The proposed interventions will encourage the private sector to work more closely with the producers and agricultural cooperatives through public-private partnership (PPP) arrangements. Women and other vulnerable groups will be proactively involved in the identification, selection, and implementation of agribusiness investments and women-led agro-enterprises will be explicitly supported.

Within this output, several subprojects have been identified and feasibility analyses completed for three representative subprojects. Each subproject will be the subject of a selection process and further feasibility assessment and design (see Section C7 on implementation arrangements) prior to inclusion in the project's annual plan. Selection criteria and envisioned procedures for subproject development, implementation and monitoring are listed in the project administration manual (PAM).

#### **Activity 1.1: Rehabilitating water management infrastructure to climate resilient condition**

The lack of irrigation systems, surface and ground water extraction infrastructure restricts most farmers to a single rain-fed crop per year, while poor on-farm water management is constraining production. High rainfall variability and expected changes in rainfall regimes from climate change are expected to exacerbate this situation. The project will rehabilitate and modernize **at least 27 irrigation and water management systems** to climate resilient condition, which will increase water availability for crop production in at least 15,000 ha, making at least 25,000 households more resilient to climate shocks or slow onset climate changes.

Of the existing 426 on-farm water catchment ponds in target provinces, most lack efficient operations and maintenance. Many of the ponds are silted, and dry up early during the dry season. **The project will therefore seek to construct or rehabilitate at least 800 on-farm water catchment ponds and small reservoirs.** Rehabilitation of existing ponds and reservoirs will include performing de-silting works, and upgrading standards to withstand changed climate patterns and projected climate changes, including overflow and flood control mechanisms, increased depth for added storage, and restoration of the vegetation in the immediate landscape, using fruit trees or other high value species (e.g. for fodder production). Distribution systems will also be upgraded. Each pond will be used for supplementary irrigation not only for the target crop but also for more intensive horticulture and tree crop production, and will be sited to collect surface run-off. Designs will also include sediment traps to avoid excessive sedimentation, and reduce maintenance requirements. Ponds will secure the water supply for the wet season rice crop and other cash crops such as watermelon and mung bean to be planted after the harvest of wet season rice. With the proposed irrigation scheme, farmers will be able to grow two rice crops per year with flexibility in early wet season rice production and supplemental irrigation for wet season rice production, as well as to extend cropping areas using more stable irrigation water in early wet season rice and secure water for other cash crop in dry season. (see Annex 2a for detailed feasibility assessment of the representative Trapaing Run Reservoir).

In addition, **laser land leveling and drip irrigation systems will be introduced at farm level** to effectively prepare the land and manage water resources. These practices will increase field irrigation and water use efficiency, while reducing emissions and reducing labor costs. The promotion of laser leveling will contribute to a reduction in water use and a reduction of seed broadcasting application rates leading to less wastage of seeds. The project expects to disseminate the technology, including equipment and training – and related mechanization workshops to allow for local maintenance and repairs (please refer to section F2 regarding technical assessment). Interventions related to introducing drip irrigation

<sup>27</sup> This is a conservative estimate that accounts only for direct emissions reductions from the implementation of energy-related measures such as biogas and solar energy. Please refer to Annex 3B for details.

systems will focus on mango. Mango crops are dependent on rain, therefore late rains or lack of rain have an impact on yields, fruit quality (juice content, size) and flavor. Erratic rainfall also reduces the likelihood of achieving two crops rather than one crop in 12 months, even with successful floral manipulation. In addition, while higher temperatures reduce flower fertility, irrigation will reduce orchard ambient temperature, therefore balancing out the impacts on the crops. While few mango farmers irrigate their crops, the yields are low - fluctuating from 10-15 tons per hectare, with only 20% of yields delivering high-grade exportable fruit. Introducing drip irrigation for mango production will improve the quality of the fruit, increase yields, and reduce the value chain's sensitivity to climate change and climate variability (Please refer to Annex 2b for detailed feasibility study).

ADB loan financing for the Activity amounts to \$34.038 million. In addition, \$5.276 million of GCF loan funds and \$4.608 million GCF grant funds will support the upgrade and climate-proofing of the selected infrastructure, as per climate projections related to rainfall, evapotranspiration, run-off and temperature at the 2050 horizon. Total financing for the Activity will be \$44.145 million, inclusive of the government cofinancing.

**Activity 1.2: Upgrading agricultural cooperative value chain infrastructure**

The increasing frequency of extreme events such as floods, exacerbated by climate change, poses a serious challenge to sustainability of post-harvest operations in target provinces. Currently the drying, storage, and processing facilities at agricultural cooperatives are rudimentary and are highly vulnerable to impacts of climate change. In addition, the lack of inclusion of poorer small-scale farmers in value chain development prevents them from transforming their traditional production and supply practices into commercial demand-driven processes. The main constraint to effective and lasting linkages between processors, traders and small farmers is that the latter do not produce sufficient quantities of high quality produce. Processors and traders therefore obtain their supply from larger, more equipped farmers, leaving smallholders outside of the trading cycle. Furthermore, yields and quality of produce are impacted by multiple variables, including access to sufficient inputs (e.g. seeds, soil and water), application of adequate production practices and technologies for pest management and fertilization, and the conditions of post-harvest storage. At present the drying process is undertaken on the ground, over tarpaulin and storage structures, if they exist, are rudimentary. For instance, in case of cassava chips, a stable product is attained when the moisture content is below 14%, as anything higher leads to black spot and molds, as well as a reduction in the starch percentage. In terms of cleanliness, gravel and dirt in the sample can be problematic for the traders and processors. If not processed within 4 days, the roots of fresh cassava will deteriorate. Humidity and high temperatures in storage negatively impacts the quality of the product, and can also encourage the appearance of insects, pests and diseases. In addition to poor post-harvest management, infrequent and unexpected rainfall increased the exposure of harvested crops to humidity, leading to the development of aflatoxins produced by certain molds, and resulting in food safety threats to the whole food chain.

The project will support agricultural cooperatives to integrate adaptation measures in post-harvest infrastructure investments, including through the construction of climate-proofed post-harvest units for cleaning, drying and storage. In addition, the cooperatives will use energy-efficient technologies, thereby reducing GHG emissions. For the agricultural cooperatives to benefit from the project's support, they will be required to meet strict criteria, such as willingness and readiness to integrate climate-resilient and low carbon technologies within their cooperatives at every stage of the value chain (including renewable energy use). The storage units will reduce post-harvest losses, improve the grain or cassava chip sample and its moisture content, and ensure a better price by providing delivery flexibility to processors within the value chain. Storage units will be climate-proofed to take into consideration emerging climate conditions and anticipated climate extremes and their impacts (droughts, floods, pests). This will include providing for improved aeration, drainage and runoff management, humidity control, pest control, and waste management. In addition, solar power will be introduced within the stores for ventilation and drying, lighting and powering management systems. Energy efficient technologies will also be implemented in the infrastructure for drying, processing and storage to reduce carbon emissions from fuel wood currently used to operate these facilities. The improvements in stocking rates and quality of produce after harvests will encourage processors and buyers to form closer linkages with cooperatives as it will stabilize supply and demand and therefore pricing issues relating to the availability and oversupply of the product, as well as offer continuity of supply. (Please refer to Annex 2c for detailed feasibility study.)

ADB loan financing for the Activity amounts to \$9.042 million. Total financing for the Activity will be \$9.612 million, inclusive of the government cofinancing.

**Activity 1.3: Improving connectivity to cooperatives and markets through climate resilient farm road networks**

Improved farm roads are vital for enhancing agricultural competitiveness as they provide basic inputs for all-round socioeconomic development through creating conditions for better access and connectivity of farmers to markets and services. Farm roads also stimulate and expand non-farm activities in rural areas by accelerating and enhancing production and consumption linkages that will eventually multiply employment opportunities for the poor. Current farm

road infrastructure in target provinces is highly vulnerable to impacts of climate change. For example, a two-week flooding in 2011 caused losses and damage of nearly \$600 million to rural infrastructure, especially farm road networks.

Upgrading and climate proofing of farm road networks, as per climate projections related to rainfall, evapotranspiration, run-off and temperature in the 2050 horizon, is thus crucial to maintain farmers' connectivity to markets, and to link farms to storage and drying units at agricultural cooperatives. Therefore, **the project aims to improve climate resilience of farm roads and tracks of at least 250 km**, using appropriate design standards and construction materials (depending on the traffic volumes and community needs).

Several climate resilient design features (e.g., adjusting side slope, paving road surface, cross drainage improvement, scour checks) were considered: Of these (i) increasing embankment heights; (ii) providing cross drainage; (iii) selecting embankment materials suitable for increased permeability and (iv) green planning (bioengineering) to protect from erosion and landslides were considered for road sections that are exposed to higher risk of damage due to flooding. Regarding increased embankment heights, an average 0.2 m design height above the conventional road design height has been adopted. However, this will be reconfirmed during the detailed design stage based on detailed hydrological data. As for cross drainage, the preliminary design has considered the adequacy of existing structures (pipe and box culverts, and small bridges of single span) and has included readjustments with additional structures for strengthening cross drainage. This again will be reconfirmed during detailed design while refurbishing the existing structures for their optimal use. For embankment materials, laterite has been cost optimal, again to be reconfirmed during detailed design, especially for road sections that are exposed to higher risk of damage due to flooding.

In addition to improving climate resilience of farm roads in target provinces, the project will strengthen capacity of the Ministry of Rural Development (MRD), and the Provincial Departments of Rural Development (PDRD) to develop guidelines for improving climate resilience of rural infrastructure. In cooperation with MRD, the project will also build capacity of civil engineers in design, construction, maintenance and climate proofing of rural road networks. Operations and maintenance costs will be jointly borne by the MRD and the communities.

Within this Activity, the GCF funds will be used to support climate-proofing of farm roads so that they resist the climate shocks anticipated under climate change scenarios. ADB loan financing for the Activity amounts to \$29.996 million. In addition, \$4.668 million of GCF loan funds and \$3.606 million of GCF grant funds will support the upgrade and climate-proofing of the roads. Total financing for the Activity will be \$38.290 million, inclusive of the government cofinancing. The GCF financing amounts to 21.6%, including grant financing of 9.4% of the total investment under this activity.

#### **Activity 1.4: Strengthening infrastructure for agricultural quality and safety testing**

The challenges in quality and safety of produce apply to export markets as well. Cambodia faces a major challenge due to its lack of infrastructure for agricultural testing at the national level to ensure food quality and safety in line with international standards. This is currently preventing farmers from exporting their products. Under this Activity, the project will support **the newly inaugurated Plant Biotechnology Laboratory (PBL) of the National Agricultural Laboratory (NAL)** through (i) establishing genetically modified organism (GMO), plant toxins, bio-fertilizer and organic fertilizer testing capacity; (ii) supporting ISO 17025 accreditation; (iii) developing tissue culture protocols for cassava and banana; and (iv) assisting in the laboratory commercialization process to achieve partial cost recovery. The project will supply analytical testing equipment for GMO analysis and bio-fertilizer and organic fertilizer testing, the supply of tissue culture equipment and materials that will include making the tissue culture laboratory aseptic and the supply of growth media, etc. and plantlet weaning facilities, as detailed in the procurement plan (Annex 11). Pesticide residue rapid test kits for field-testing and desktop testing equipment for plant toxins will also be supplied. Quality and safety testing infrastructure will be upgraded at the NAL to test 1,500 samples. The long-term strategy is to gain ISO 17025 accreditation, not only for the tests supported by the project, but also those tests in which the NAL feels that accreditation can be achieved. The other targets are for the PBL to generate revenue at least \$75,000 per annum in year 6 and to license tissue culture technology to two private sector companies. On matters of biosafety and biotechnology policy and standards, as well as upgradation of the laboratory infrastructure and capacity, MOE biosafety experts will be involved. ADB loan financing for the Activity amounts to \$4.302 million. Total financing will be \$5.158 million, inclusive of the government cofinancing.

#### **Activity 1.5: Promoting renewable energy for value chain improvement**

Energy costs in Cambodia are among the highest in the region, and contribute to reduced competitiveness of agricultural value chains. Under this Activity, the project will develop integrated systems for managing agricultural waste and residues in rice, maize, cassava and mango value chains to enhance competitiveness, create reliable energy supply, reduce GHG emissions and environmental risks, and contribute to energy independence. In addition, firewood use remains widespread, especially in the rural areas of the target provinces. This creates a cycle of forest degradation and increased carbon emissions. In the four target provinces, wood scarcity is already being felt, due to over-use of resources. Lack

of access to reliable and renewable energy sources hampers agricultural growth and value addition. Key barriers to accessing renewable energy sources, including biodigesters, include the lack of technical knowledge on the design and operation of units, the costs of equipment and investment required, and some perception-based cultural reticence, which the project will address in an integrated manner, through training, demonstration, awareness raising, and the development of sustainable financing mechanisms, including green finance options. The reliance on traditional fuels also has environmental, social and human costs: World Health Organization estimated that 14,729 premature deaths occur annually in Cambodia alone, which could be attributed to household air pollution from combustion of solid biomass fuels (IHME, 2015). With 80% of the Cambodians cooking with biomass and often using inefficient stoves, the situation has become critical as trends indicate that demand for charcoal is increasing.<sup>28</sup> It is estimated that the use of a biodigester, at household level, can reduce the need for fuelwood for cooking and lighting by 90%.

**The project will deploy rural renewable energy infrastructure by installing 12,000 biodigesters and 6,000 compost huts at household level within the area of target cooperatives, while harnessing the fertilization potential of bio-slurry in target provinces.** This will be conducted in line with the NBP, including norms and practices designed to ensure adequate subsidization. Biogas will be produced using agricultural wastes as well as manure, benefitting health and productivity of 90,000 persons, including 43,353 women, due to improved household air quality and time saved from not having to collect fuel wood for cooking. Beneficiary households will be required to provide cofinancing prior to the installation of the digesters. The four selected provinces for the project are endowed with a relatively high animal population (860,000 cattle and 550,000 pigs) and represent around 27% of the total biodigester potential of whole Cambodia. The National Biodigester Program (NBP) estimated biodigester potential for the country as 1 million. So far the total number of installed biodigesters NBP reached 25,383 country-wide in 2016 (of which 2,835 in Kampong Cham, 34 in Tbong Khmum, 3,515 in Kampot and 4,101 in Takeo), far below the anticipated target and well beneath the country's potential<sup>29</sup>. The total biodigester potential has been estimated at 268,000 units in the four target provinces, but the project will support only 12,000, subject to meeting strict selection criteria such as counterpart funds, memberships in agricultural cooperatives, etc.

The project also considered household energy consumption, customer satisfaction (especially with regard to saving time spent on collection of firewood, air quality benefits due to reduced indoor air pollution) and potential grid expansion over the next 5 years. The project will also explore opportunities for biogas production from commercial livestock enterprises and small town sustainable solid waste management during project implementation. By investing in biodigesters, the project will contribute to the replacement of agrochemical fertilizers by bio-slurry (biodigesters' effluent), which will optimize resources, improve yield, reduce fertilizer use and GHG emissions, while also improving farmers' health by reducing exposure to agrochemicals and to smoke from cooking with fuel wood. Investing in bio-digesters will also reduce pressure on forest resources for fuel wood, therefore reducing the deforestation rate while contributing to reducing GHG emissions.

As noted under Activity 1.2, the project will also promote the use of solar energy within post-harvest and processing units at agricultural cooperatives and provincial agricultural development centers in order to assist with value addition. The solar energy deployment at agricultural cooperatives and provincial agricultural development centers is expected to play a strong catalytic role in the development of solar market in rural Cambodia. The quality of solar systems will be ensured through using certified companies and products.

For this Activity, the GCF will contribute \$4.878 million (grant) to support the use of renewable energy for reduced emissions while the ADB contribution will be \$2.054 million. The total cost of the output will be \$13.594 million, inclusive of government and beneficiary co-financing.

## **Output 2: Climate smart agriculture and agribusiness promoted**

Under this output, the project will support the upgrading of the targeted value chains by increasing access to climate resilient varieties and by disseminating, at scale, the best available production technologies and practices for climate friendly production of crops. Through this output, the project expects to reach 40,000 farmers through training, technical capacity building, technology transfer, and to set up supportive technologies and mechanisms. The output will also introduce resource-efficient practices, and strengthen capacity for productivity and quality improvement, reduction of post-harvest losses, and marketing.

### **Activity 2.1: Deploying climate resilient varieties**

<sup>28</sup> ADB (2009): Status and Potential for the Development of Biofuels and Rural Renewable Energy: Cambodia: <http://www.adb.org/sites/default/files/publication/30309/biofuels-cambodia.pdf>

<sup>29</sup> Government of Cambodia, National Biodigester Program, please refer to <http://nbp.org.kh/ProgrammeArea.aspx>

Under this Activity, the project will address the cross-cutting constraint of availability in improved varieties and breeds. **The project plans to support the Cambodian Agricultural Research and Development Institute (CARDI) to deploy climate-resilient rice and maize varieties, including seed production and multiplication**, in collaboration with the International Rice Research Institute (IRRI). The varietal characteristics will include tolerance to higher temperatures, salt water, drought, prolonged submergence as well as the release of three additional climate-resilient varieties of rice and maize with shorter cropping cycles. CARDI already has over 200 climate resilient lines that can be trialed within a 5 to 6 year-program that includes continued selection, agro-climatic adaptation, climate resilient trait evaluations, yield comparisons as well as farmers' and processors' evaluations. Field adaptation trials will be carried across the country to determine agro-climatic adaptation. International technical assistance support will be provided to CARDI to develop a commercialization program with recommendations on the legal framework to establish intellectual property rights and partial cost recovery for the institution. The use of climate resilient varieties will be an essential aspect of upscaling climate smart agriculture practices introduced under Activity 2.2.

Within this Activity, the GCF will contribute \$2.785 million grant to support the identification and multiplication of climate-resilient seed materials and varieties, including materials that are resilient to flooding, droughts, salinity and pests and diseases. ADB contribution will be \$0.794 million loan and the total cost of the output will be \$3.876 million, inclusive of government co-financing.

### **Activity 2.2: Strengthening capacity in climate friendly production practices and technologies**

Farming in Cambodia remains mostly subsistence-based and rain-fed due to limited irrigation infrastructure, and low yields are compounded by outdated production tools and practices. The lack of access to reliable extension services and the absence of climate information services prevent farmers from not only developing into professional agricultural cooperatives, but also from effectively coping with climate change. CSA training has been limited to date in the project areas, despite that the current good agricultural practice training incorporates some CSA techniques. Aspects related to the management of off-farm landscapes and micro-watersheds are also not fully disseminated, perpetuating a state of low environmental awareness, environmental degradation, and decreasing yields. CSA, combined with investments in rural infrastructure and inputs offers significant potential to increase yields to a profitable and sustainable level. For example, the combination of sound CSA practices with improved germplasm has the potential to increase yields for premium aromatic rice to 4.5t/ha, aromatic rice 5.5t/ha and white rice 6t/ha, for maize 8-10t/ha and for cassava above 40t/ha, while CSA combined with drip irrigation in mangoes can increase yields by 30%.

Under this Activity, **the project will support the deployment of a farmer-oriented training program on CSA, reaching at least 40,000 farmers** (of which at least 40% will be women), focusing on the rice, cassava, maize and mango value chains. Government officials from the Provincial Departments of Agriculture (PDAs), agricultural cooperative boards and their members, as well as farmers and water user communities will receive both formal training and on-farm demonstrations on the following topics:

- (i) CSA practices, including laser land leveling, alternate wetting and drying, sustainable agricultural waste management, rational use of inputs (water, energy fertilizers, and pesticides), agro-forestry and soil cover maintenance techniques, anti-erosive landscaping, as well as other modern practices that result in reduction of GHG emissions from cropping, and the practical applications relating to standards compliance;
- (ii) CAMGAP and sustainable rice platform (SRP), in relation to record keeping. The project will prepare training manuals and materials for SRP standards for sustainable rice cultivation, for CSA, and for CAMGAP for tropical fruit.
- (iii) Agricultural cooperative management and business development plans including book keeping, accounting and the importance of the access to crop value chains and marketing;
- (iv) Management and operation of provincial agricultural development centers and mechanization workshops for government staff (see Activity 1.3);
- (v) Management, operation and maintenance (O&M) of drying and storage units for maize, rice and cassava as well as all other infrastructure; and
- (vi) Uses of climate information and climate services.

The technical assistance will be delivered through a competitively recruited service provider. To the extent possible, the services of international institutions, such as IRRI, FAO and the International Water Management Institute will be taken. The project will include training for farmer groups, such as FWUCs and cooperatives, on the management of natural resources both on-farm and off-farm, with a view to restoring the immediate landscape in and around project sites.

For this Activity, the GCF will contribute \$7.090 million (grant) to support adoption and wider dissemination of climate friendly technologies and practices to farmers, and improved climate services. The total Activity costs, including ADB contribution of \$1.480 million and government cofinancing, will reach \$9.281 million.

### **Activity 2.3: Promoting farm mechanization and extension**

In target provinces of the project, there are insufficient training facilities that would allow for extension workers to become fully versed on climate friendly practices and phytosanitary standards, and this lack of skills prevents the sector from reaching higher productivity. To support the ongoing delivery of extension services on climate friendly agriculture, **the project will establish or improve four Provincial Agricultural Development Centers (PADC) and four Provincial Agricultural Engineering Workshops at provincial levels.** This will create resource and training centers for service provision, and to support linkages among technical service providers, agribusinesses and farmers. The project will finance the building of a PADC in Takeo, Tbong Khmum and Kampong Cham provinces and the rehabilitation of the existing extension/agricultural development center in Kampot. Technical assistance will be provided to manage the training facilities.

Training provided by the Centers will include Climate-Smart Agriculture technologies and practices, techniques promoted by the Sustainable Rice Platform and the Cambodia Good Agricultural Practice (CAMGAP) standards, as well as farm management topics such as operating of agricultural cooperatives, FWUC accounting, bookkeeping and business planning, together with agricultural machinery and equipment repair, operation and maintenance. **The project will also support the construction of three mechanization workshops**, including classrooms in Kampot, Kampong Cham and Tbong Khmum and commissioning a new workshop and classroom in Takeo. **Technical assistance will be provided for agricultural engineering design and fabrication, repair, operation and maintenance.** Equipment and tools for the repair and maintenance of agricultural production and processing equipment will be supplied. The equipment and tools for the manufacture and assembly of agricultural production and processing equipment, together with the supply of design, training and classroom equipment to the provincial workshop units will also be provided.

The total Activity costs, including ADB contribution of \$545,000 and government cofinancing, will reach \$691,700.

### **Output 3: Enabling environment for climate friendly agribusiness enhanced**

Under this output, the project will invest in the creation of an enabling policy and regulatory environment for agribusinesses, the identification of opportunities for private sector engagement in climate change mitigation and adaptation, and provision of improved climate information services to allow farmers to plan their cropping season. This output will facilitate harmonization of standards, public-private partnerships, and green financing.

#### **Activity 3.1: Formulating climate friendly agribusiness policies and standards**

In Cambodia, there is a need for agribusiness to achieve competitive advantage, to realize economies of scale and continuity of supply, and to break into new markets. To facilitate competitiveness and growth among agri-businesses, enabling conditions must be set. For instance, in Cambodia, MAFF and the Ministry of Commerce (MOC) have not yet developed a comprehensive policy for agribusiness. Any agribusiness policy would provide stability in the sector to encourage private investment (including “green” investment) and should fully integrate climate change concerns, to imprint a climate friendly vision for businesses in the sector. The policy should promote both mitigation and adaptation opportunities and socially appropriate best practices. **The project’s support to climate friendly agriculture and agribusiness policy development** will involve technical assistance towards:

- (i) identification of measures to remove barriers for private sector investment in climate friendly agribusiness;
- (ii) identification of investment strategies for the public sector to enhance climate smart agribusiness growth;
- (iii) promotion of the development of climate-friendly infrastructure so that Cambodia’s agribusinesses have a comparative and competitive advantage with their regional counterparts; and
- (iv) creation of institutional and legal frameworks conducive to supporting and assisting climate-smart agribusiness, particularly with respect to regulations, taxes, business registration, licenses and the multiplicity of government institutions involved in the sector. The project will seek to identify reforms required to ease freedom to do business while promoting adequate social, environmental and climate-related standards, and to improve efficiencies in logistics and administration.

In developing specific policy recommendations on climate smart agriculture and agribusiness, the project will support MAFF to lead an inter-ministerial and development partner coordination mechanism, especially with MOC, MRD and MOE among ministries, and International Fund for Agricultural Development (IFAD), FAO, USAID and Australia’s DFAT among development partners. This coordination mechanism is to ensure synergies and avoid overlaps with other initiatives, and contribute to policy harmonization across the government. The coordination mechanism will also ensure

that various projects do not produce different guidelines or policy tools on the same topics. The project will also provide support to the technical working group on climate change in agriculture, forestry and fisheries (TWG-CCAFF) to promote policies to facilitate the adoption of CSA.

In terms of climate-related agricultural standards, the International Organization for Standardization (ISO) is currently developing ISO 14080 towards climate neutrality in different operations and ISO 26000 to consider climate change adaptation. **The project will support developing climate-conscious standards for agribusiness operations aimed at climate neutrality and effective adaptation.** For standards that have been drafted already, the project will support a technical review followed by public consultation to determine impact for the eventual endorsement by the National Standard Council (NSC), with a view to align the standards with the Cambodia Standard (CS) mark. For the standards that are yet to be drafted, working groups will be formed to develop the first draft, followed by technical committees for the review of the drafts, and by public consultation, with the eventual endorsement by the NSC. The project will support activities related to certification and compliance that concerns climate change issues and human health and welfare in line with corporate social responsibility (CSR) guidelines. This includes support to good agricultural practices (GAP) for mangoes, developing a CAMGAP standard for fair trade, organic production, tropical fruit, and support to the SRP. All standards are aimed at strengthening environmental protection and, for those compliant, allow entrance in specific value chains demanding such standards. The CSR and SRP standards are expected to go further in ensuring worker health and safety as well as guaranteeing that there is no child or bonded labor, and ensuring workers have a living wage and an equitable share of the profits within the supply chain.

The GCF contribution to this Activity will be \$722,000 in grants, while the ADB will contribute \$410,000. The total cost of the Activity is \$1.203 million, including government cofinancing. GCF funds will be used to support the development of climate-relevant standards and policies, as well as for dissemination of such information.

### **Activity 3.2: Promoting green finance and risk sharing mechanisms**

Private sector participation in agribusiness value chains in Cambodia is currently low, due to a difficult business environment in the target provinces. Linkages between producers and processors or traders remain weak. There currently exists a framework for PPPs, which ADB has supported. However, the current framework, legal and institutional setting, is not conducive to green investment. Furthermore, there are no adequate risk-sharing mechanisms between government, local producers and the private sector, meaning that smallholders are often left bearing a disproportionate amount of risk. This limits innovation and the potential upscale of innovative climate friendly technologies. The project will seek to make recommendations to fill these current gaps based on lessons learned and feasibility assessments from previous and ongoing projects, and to introduce innovative mechanisms that can be applied in the project sites.

Under this Activity, the project will support dialog between public and private sector stakeholders at the national level by **convening an inter-ministerial committee and promoting the establishment of crop-centric PPP forums for each value chain** (cassava, maize, rice and mango), both of which will meet twice a year. After each forum is held, the IMC would meet to review the points raised in crop forums and respond to the recommendations. The project will also support the revision and updating of the PPP framework, and its associated regulatory instruments, with attention paid to addressing unforeseen climate externalities associated with private sector development.

To further encourage climate-friendly private sector engagement and to orient the market towards “greening” the value chains, **the project will strengthen the capacity of financial institutions to devise and channel climate-friendly agribusiness investments.** This will build on the Mekong Sustainable Finance Working Group and the Micro-Finance Institutions (MFI) Client Protection Principle to help Cambodian financial institutions develop environmental and climate screening criteria and tools to guide their lending activities. Coordination and lessons sharing will also be pursued with the Association of Banks in Cambodia (ABC), which has recently launched the Cambodian Sustainable Finance Initiative (CSFI), an effort to develop sustainable finance principles and announced plans to work towards integrating environmental and social safeguards and lending standards into their business decisions. CSFI is supported by USAID, Pact, Wildlife Conservation Society (WCS) and Mekong Strategic Partners, in partnership with the National Bank of Cambodia and MOE. CSFI is aimed at developing and strengthening finance sector safeguards and risk management standards related to social and environmental impacts which are potentially created through the private sector.

The project will complement CSFI activities by providing training and capacity building for commercial banks and microfinance institutions in targeted areas on (i) identification, benefits and opportunities of green financing, especially through environmental and climate risk screening criteria; (ii) awareness of green climate financing principles, operations and requirements; (iii) integration of green climate finance criteria into credit application and reporting procedures; and (iv) reporting on green finance. This training is expected to reduce the risk aversion of commercial banks, while also

strengthening linkages, trust and shared understanding between lenders, borrowers, and input and services providers regarding climate friendly agribusiness investment opportunities.

The project will also seek to reduce the financial risks associated with impacts of climate change, particularly those borne by small producers, through creating an enabling environment for **risk sharing mechanisms such as weather index based crop insurance (WICI)**. Because penetration of crop insurance in Cambodia is extremely low, the project will first examine financial and regulatory constraints in developing the insurance market, and will then identify mechanisms to overcome such barriers.

The project will build on the work of the Cambodian Centre for Study and Development in Agriculture (CEDAC), which is preparing a new generation of insurance products incorporating lessons learned from the first pilot. It will also explore inclusion of cassava and maize to rice among the portfolio of insurable crops. In addition, the project will explore supporting the establishment of a contingency fund by providing matching funds. The fund could be operated based on agreed procedures by a consortium of cooperatives and financial institutions. Interest earned from the fund could be utilized to match the cost of insurance premium and used for medium frequency and medium impact disaster events, while the weather index systems would cover only catastrophic events, therefore helping to reduce insurance premium. The feasibility of other value chain financing options such as warehouse receipt financing schemes may be looked into. In this case, credit facilities and guarantee schemes would only be made available for activities that meet specific climate screening criteria.

The project will also consider supporting small scale piloting of financing instruments that have potential to drive investments to scale in Cambodia, based on previous experience in ADB projects and on advisory provided by the Global Innovation Lab for Climate Finance.<sup>30</sup> Some examples include: (i) the Agricultural Supply Chain Adaptation Facility (ASCAF)<sup>31</sup>: this is a mechanism in which a partner financial institution (e.g., a Rural Development Bank, which is being encouraged to lend to cooperatives) can share some of the contract farmers' credit risk through first-loss guarantee for example. (ii) Climate-smart Lending Platform<sup>32</sup>: The long-term goal of the Platform is to mainstream CSA metrics into the credit scoring systems of financial institutions without concessional backing in order to improve agricultural lending portfolio resilience to climate change, and to create strong incentives for farmers to adopt CSA practices and harnessing private finance.

Within this Activity, the GCF grant will finance \$1.444 million to support technical assistance towards the creation of enabling environment for climate-friendly financing and the exploration of risk sharing mechanisms such as crop insurance, while ADB's contribution will amount to \$507,000 focusing on public-private partnerships and training of financial institutions.

### **Activity 3.3: Supporting climate risk management through information and communication technologies (ICT)**

In order to support the enabling environment for deployment of low-carbon climate resilient value chains, **the project will strengthen capacity of local stakeholders to use improved information and communication technologies and agro-meteorological services**. It will include provision of training to MAFF on the formulation and dissemination of dynamic or updated crop calendars, the formulation and distribution of advisories for slow-onset climate events such as droughts, improved delivery of seasonal climate forecasts, as well as early warnings for extreme rainfall events.

The project will pilot the implementation of an ICT platform in Kampong Cham province to facilitate adoption of more energy-efficient and water use efficient measures, climate friendly agriculture practices and farm credit services. The project will support the acquisition and collection of climate and crop data to support crop modeling, as well as the design of tools and guidelines for managing climate risks at farm and landscape levels, linked to the ICT platform and to the training on CSA to be provided to farmers. In addition, climate services and data sets required to establish weather-based crop insurance schemes (see Activity 3.2) will also be obtained, contributing to climate risk sharing awareness raising and the creation of an enabling environment for private sector investment into the agricultural sector. Under this Activity, ADB will contribute \$183,000 in loan financing, while GCF will contribute \$3.524 million in grants. The total cost of the Activity, including government co-financing is \$4.055 million.

## **C.4. Background Information on Project Sponsor (Executing Entity)**

<sup>30</sup> <http://climatefinancelab.org/>

<sup>31</sup> For more details: <http://climatefinancelab.org/idea/agricultural-supply-chain-adaptation-facility/>

<sup>32</sup> For more details: <http://climatefinancelab.org/idea/climate-smart-finance-smallholders/>

The Executing Entity for this project – the Ministry of Agriculture, Forestry and Fisheries (MAFF) – has the vision to contribute to poverty reduction, ensure enough and safe food for all people, through modernization of agricultural sector based on a new approach and with changed scope and pace for accelerating agricultural economic growth, and sustainable natural resources management and conservation. It has many technical institutions: General Directorate of Agriculture (GDA), General Directorate of Rubber (GDR); General Directorate of Animal Health and Production (GDAHP); Forestry Administration (FA), and Fisheries Administration (FiA). MAFF has the following functions:

- Develop and implement agricultural development policy to improve the standard of living of the people.
- Participate in the formulation of land reform and land use policy
- Orientations and plans for the development of all sectors of agriculture
- Conduct monitoring and evaluation of the implementation of policies and activities for agricultural development
- Monitor the development of the natural resources of the agricultural sector and facilitate the exploitation of natural resources to meet the needs. Of the country and respect for ecosystem
- Defining regulations on the management, preservation of natural resources of the agricultural sector, and monitoring of implementation
- Evaluate and train human resources for agricultural development by raising the level of technical knowledge and understanding.
- Provide technical support and technical advice to farmers to improve production and productivity of agriculture.
- Identify principles and follow up implementation, enhance and improve the functioning of relevant association organizations.
- Study and disseminate scientific, technical, and economic information in all sectors of agriculture
- Introduce land development work and improvement of land quality and use of agricultural land, plant varieties, varieties, animals, and medicines Agriculture meets the geographical conditions of the region to ensure high yield and balance Natural environment
- Co-operate and cooperate with foreign, international, non-governmental organizations for the development of all sectors of agriculture
- Participate in promoting and promoting investment, exporting agricultural products and food
- Participate in the work of the Mekong River Basin in accordance with the duties of the Ministry
- Participate in costing and marketing of agricultural products
- Collect state budget or cooperate with the Ministry of Economy and Finance in collecting state
- Safe food inspection of all agricultural products ranging from planting to final stages of primary processing.

Since 2005, ADB, the World Bank and other development partners have been carrying out joint country portfolio reviews in Cambodia to address common issues across the portfolios. This review provides the platform for discussing governance issues at project implementation level and engaging all stakeholders to implement the GGF, which has been adopted by all ADB-funded projects since 2008.

#### **MAFF's ADB Project Implementation Track Record**

ADB has been working with the MAFF for many years. Since 2009, in addition to the Tonle Sap Poverty Reduction and Smallholder Project, the following ADB-financed loans and grants have been approved, with MAFF acting as the executing agency or implementing agency:

- Loans 3006/3007: Climate Resilient Rice Commercialization Sector Development Program (approved in 2013, ongoing)
- Loan 2376: Tonle Sap Lowlands Rural Development Project (2010- 2017, rated successful)
- Loan 2873: Trade Facilitation: Improved Sanitary and Phytosanitary Handling of GMS Trade Project (approved in 2013, ongoing)
- Grant 0241-CAM: GMS Biodiversity Conservation Corridor Project (approved in 2010, ongoing)
- Grant 0426-CAM: GMS Biodiversity Conservation Corridor Project Additional Financing (approved in 2015, ongoing)
- Loans 2672/2673 and Grant 0220: Water Resource Management Sector Development Program (approved in 2010, ongoing)

In addition, MAFF implemented several other projects of development partners such as the World Bank, JICA, KOICA, and China. MAFF is one of the pilot ministries to receive ADB support on public financial management program that helps to improve the budget preparation, monitoring and oversight. Training and capacity support has been provided to help MAFF improve the quality of its budget proposal, budget implementation, internal audits and the availability of information for external audits. Projects funded by ADB and other development partners have been audited by external independent auditors. Regarding procurement, Cambodia Resident Mission (CARM) has provided annual training for procurement

since 2011, and organized quarterly “procurement clinics” jointly with the World Bank and JICA since 2013. Staff of MAFF and other agencies, have regularly participated in these activities.

### C.5. Market Overview (if applicable)

In general terms, Cambodia’s excess production of four target crops has been traditionally exported to neighboring countries and the European Union (EU). However, in recent years, a change in phytosanitary rules and trade regimes has meant that Cambodian production can no longer meet the quality requirements for entry into European markets. The loss of this market is being partially compensated by a new trade agreement with China, where demand for raw produce remains high. However, demand is also increasing for value-added products, such as for example rice noodles and flour, cassava chips, dried or puréed mango, and maize-based feed, which the current value chains cannot yet provide. In efforts to support the agricultural commodity exports, the Royal Government of Cambodia articulates its agriculture policy in the Rectangular Strategy II by zero tax for all agricultural crops exports.

**Rice:** Cambodia reached self-sufficiency in rice in 1990 and became a net exporter of rice and paddy in 1995. Per MAFF statistics, Cambodia rice production in 2014 - 2015 was 9.3 million tons, which includes dry season crop production of 2.18 million tons and a wet season crop production of 7.14 million tons with an average yield of 3.1 tons per hectare. Compared to 2007, production has increased by 38.61%, yield has increased by 17.46% and cultivation area has increased by 18.16%. The domestic demand is 49.6% of the total production resulting in a surplus of 4.71 million tons indicating a significant export potential. Cambodia’s milled rice has duty-free access to EU markets and relies on those markets, with 62% of exports destined for Europe. The Country has a preferential duty to the USA and Canada, the latter is approximately \$12 per ton. However, Cambodian production is no longer meeting phytosanitary standards required by these markets, such as pesticide content, humidity levels and other controls, resulting in large amount of unsold excess production. There is no official data on cross border trade to Vietnam and Thailand, however based on traders’ estimate, Cambodia exported more than 2 million tons of paddy per annum in-between 2012 -2015. The milled rice export was 538,396 tons in 2015. Cambodia rice production is estimated to increase 10% by the year 2020 amounting to 10 million tons. The domestic demand is expected to be 5 million tons resulting in 5 million tons of surplus for export. The cross-border trade to Thailand and Viet Nam is estimated to reach 3 million tons of paddy and 1 million tons of milled rice. The farm gate price of paddy dropped in 2015/2016 with the reduction of price by 8% for fragrant variety (from KR 1,250/kg (\$313/ton) in 2014/2015 to KR1,150 /kg (\$288/ton) in 2015/2016) and by 12% for IR66 variety (from KR820/kg (\$205/ton) in 2014/2015 to KR750/kg (\$188/ton) in 2015/2016). The decrease in the farm gate price is due to lower demand in Thailand and Viet Nam and the domestic miller’s limited capacity to buy the local paddy during the time of harvest.

**Maize:** Production increased rapidly between 1995 – 2013 due to improved productivity and the expansion of the cultivation area. However, the area under cultivation decreased 41% from 239,748 ha in 2013 to 143,517 ha resulting in reduced production from 926,846 tons in 2013 to 549,607 tons in 2014. This was due to the fall in market price and demand from Thai and Vietnamese buyers. The average on-farm price for grain of maize dropped in 2015 – from KR1,140/kg (\$283/ton in 2014 to 930/kg (\$231/ton) in 2015. It is estimated that the annual demand for Cambodia maize will decrease due to increasing domestic production in Thailand and Viet Nam. The USDA reported that Viet Nam imported 2.3 million tons in 2013/2014, with the forecast of reduced import of 1.8 million tons in 2015<sup>124</sup>. There is no official data of Cambodia maize export to Thailand and Viet Nam, but traders’ estimate suggests 80% of Cambodian maize is exported to these two countries. It is difficult to forecast future of Cambodia’s maize production due to uncertainty of market demand Thailand and Viet Nam. However, considering high growth rate of 7% per annum for demand of animal feed in Southeast Asia market, Cambodia’s maize production is estimated to increase 20-30% in next 5 years. Cambodia has the potential to increase its production to one million tons per annum if the country can access international markets directly without relying on Thailand and Viet Nam markets as cross border trade. This would imply sales of raw materials as well as feed and other transformed products. The average on-farm price for maize in 2015 was KHR 930 per kg (\$231/ton) for grain and KHR 500 per kg (\$124/ton) of cobs. The average delivery price was KHR1, 060/kg (\$263/ton) for grade 1 and KHR700 (\$174) ton) for grade 2.

**Cassava:** Production has been increasing rapidly since 2007 due to the expansion of the cultivation area under the Economic Land Concessions (ELC). The production increased by 91% between 2010-2014 compared to 2007- 2010. In 2014, national cassava production increased significantly to reach more than 11.94 million tons of fresh roots (from 521,459 ha), an increase of 180% compared to production in 2010. The increase in production was a direct result of farmers switching to cassava production due to fall in maize price. The current cassava yield of 20 - 30 tons per hectare could increase up to 45 tons per ha, if planted on virgin soil. Cambodia is currently mostly exporting fresh cassava tubers through border trade to Thailand and Viet Nam. There are 6 starch processors in Cambodia but only 3 factories are in

operation, processing about 1% of total national production. Cambodia cassava is expected to increasingly find access to global markets reducing dependence on Thailand and Viet Nam. Since the start of export of dry cassava chips for ethanol production to China in 2013, export has gradually increased; 60,000 tons in 2013, 150,000 tons in 2015, and 200,000 tons in 2016, respectively. By 2020, Cassava production may reach 14 million tons of fresh root per annum, and export of dry chips to China is estimated to reach 500,000 tons per annum. The export to Thailand and Viet Nam is also likely to increase, if Cambodia can address the issues of transport and logistics. The cassava market price increased between 2013 and 2015, but it dropped in 2016 due to lower demand in Thailand and Viet Nam. The cassava price was \$62.5/ton for fresh root and \$185/ton for cassava chips in 2013, which increased to \$67 and \$189 respectively in 2015. In 2016, price dropped to \$60/ton for fresh root and \$138/ton for chips.

**Mango:** Cambodia produces more than 250,000 tons of mango fruit per year, with average yields of 15 tons/ha/annum. Mangoes are exported to Thailand (~20,000 tons in 2015) and Viet Nam (~35,000 tons in 2015) through border trade as fresh fruit (predominantly the variety Keo Romeat). Mango fruit market prices are relatively consistent across the country with differences only related to varying transport costs and variety. MAFF has signed a MOU (memorandum of understanding) on relating to a Mango SPS Protocol with Government of the Republic of Korea on 9 December 2015. The MOU will help Cambodian farmers/traders supply mangoes to a new export market in Republic of Korea, but Cambodia mangoes will need to satisfy Republic of Korea's quality standards. It is estimated that Cambodia's mango production could increase by 20% in next 5 years. Depending on processing capacity and ability to meet SPS protocols, Cambodia could potentially export mango to new markets such as China and Japan as well. The average on-farm price for fresh mango fruit in 2015 was KR1,000/kg (\$246/ton) and wholesale price was KR1,500/kg (\$370/ton). High quality mango (Grade A) for export to Thailand and Viet Nam commanded a higher price of KR3,500 per kg (\$864/ton). However, in 2013 and 2014, on-farm price dropped as low as KR400/kg (\$100/ton) due to lower demand in Thailand and Viet Nam.

### C.6. Regulation, Taxation and Insurance (if applicable)

Applicable permits and licenses for this project include:

- Construction permits to be delivered by MAFF, MOWRAM and MRD, in line with current regulations and in cooperation with provincial authorities;
- Environmental impact assessments and management plans will be developed in line with ADB and the government's legal requirements. Initial environmental examinations (IEEs) for representative subprojects have been produced. IEEs include environmental management plans (EMPs) and monitoring plans. Detailed EMPs and assessments will be produced prior to implementation for each subproject;
- Licenses for the creation and operation of processing plants, agri-food business, repair workshops and any other private sector enterprises will be obtained by project beneficiaries as part of normal business applications. The project will support beneficiaries in obtaining the licenses required by the Ministry of Commerce, Ministry of Industry and Handicraft and Ministry of Health where relevant.
- Seed certification and germplasm quality assurance will be ensured under the framework of the Law on Seed Management and Plant Breeders rights (2009), which foresees that new or introduced varieties must be registered with the Ministry of Industry and Handicraft, after the application has been evaluated by MAFF under the distinctiveness, uniformity and stability (DUS) protocol. The General Department of Agriculture (GDA) of MAFF is responsible for seed certification and a fee is paid for the certification, the quality assurance requires seed testing and recommendations to the seed supplier on correct labeling.

**Taxes:** The government will finance taxes and duties for all project goods, equipment, and services through exemption. GCF funds will also benefit from such exemption. ADB and GCF contribution includes taxes and duties for civil works.

**Insurance:** Firms contracted by MAFF-PMU will be required to have the necessary insurance policies. The Government has agreed to follow ADB Procurement Guidelines, including conditions on insurance. ADB standard contract templates will be used for the contracting of goods and services.

### C.7. Institutional / Implementation Arrangements

#### Project Administration Manual (PAM):

The PAM describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with the policies and procedures of the government and Asian Development Bank (ADB). The PAM includes (i) project description, (ii) implementation plans and procedures, (iii) project management arrangements, (iv) costs and financing, (v) financial management, (vi) procurement and consulting services, (vii) environmental and social safeguards, (viii) gender and social dimensions, (ix) performance monitoring, evaluation, reporting and

communication, (x) anticorruption policy and accountability mechanism. It also includes references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

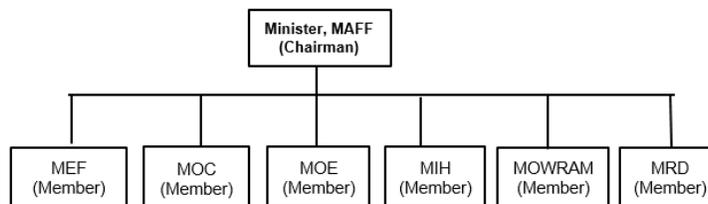
MAFF, in coordination with MOWRAM and MRD, and their provincial departments are wholly responsible for the implementation of the project, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation, including compliance by MAFF, MOWRAM and MRD of their obligations and responsibilities for project implementation, in accordance with ADB's policies and procedures. After ADB Board approval of the project's report and recommendations of the President (RRP), changes in implementation arrangements are subject to agreement and approval pursuant to relevant government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval, they will be subsequently incorporated in the PAM.

**Executing entity (EE) and implementing agencies (IAs):**

MAFF is the EE, in close coordination with MOWRAM and MRD. The General Directorate of Agriculture, CARDI, General Directorate of Animal Health and Production (GDAHP), the General Department of Technical Affairs of MOWRAM and the General Department of Technical Affairs of MRD will be implementing agencies (IAs). The IAs will be responsible for monitoring project progress and evaluating project outputs. Monitoring and evaluation, including for climate change indicators, shall be in accordance with the project design and monitoring framework (DMF). MEF will represent the government in signing the ADB and GCF loan and grant agreements.

**Project Steering Committee (PSC):**

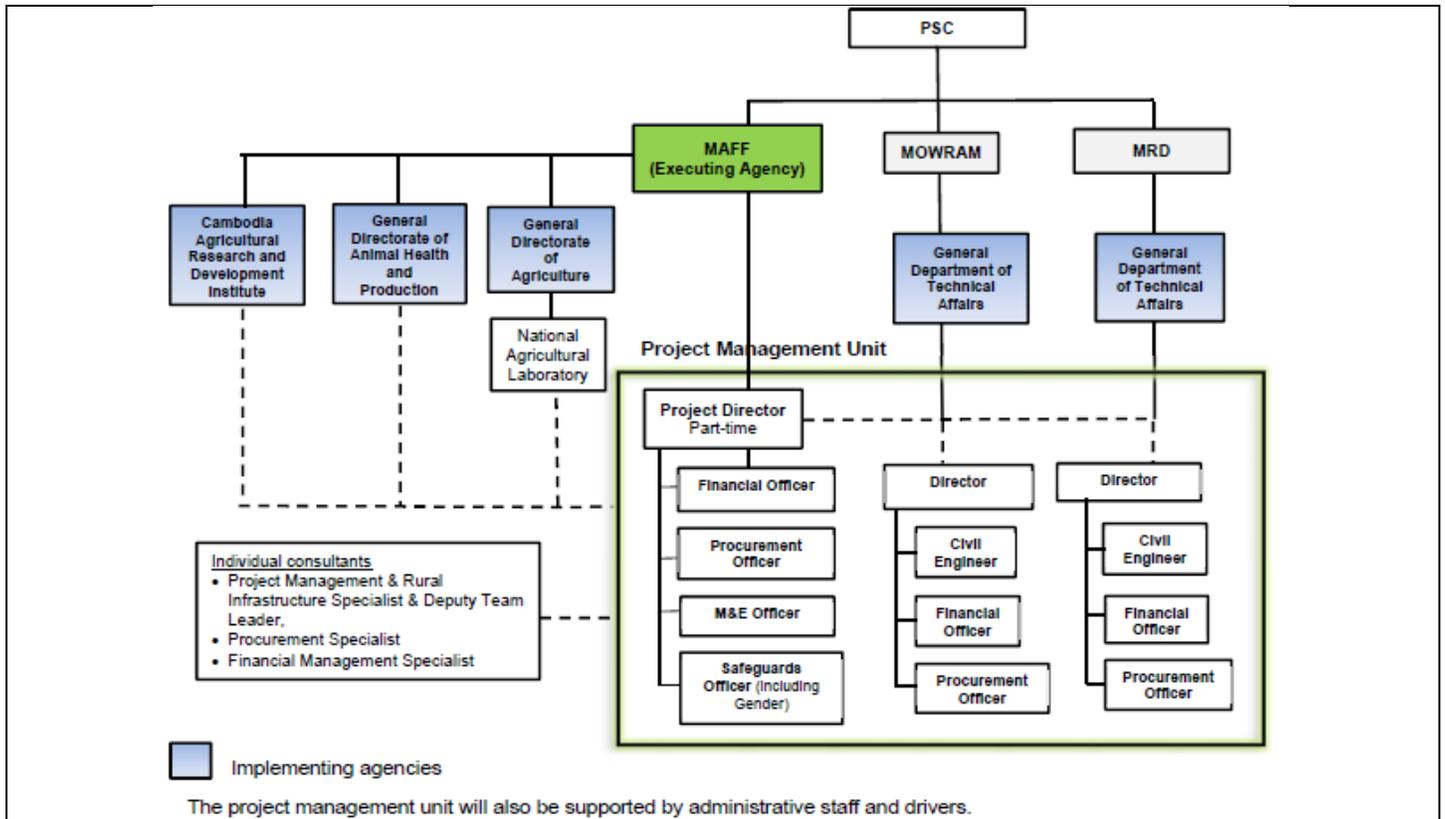
The PSC, chaired by the Minister of MAFF and comprising representatives (at the level of Under Secretary of State or above) of the MEF, MOWRAM, MRD, MOC, Ministry of Industry and Handicrafts (MIH) and Ministry of Environment (MOE), will provide oversight, coordination and policy guidance in all aspects of project implementation, except land acquisition and resettlement which is the responsibility of the Inter-Ministerial Resettlement Committee (IRC). Other ministries may be invited to attend as observers when specific issues of their concern are for discussion. The figure below represents the composition of the PSC.



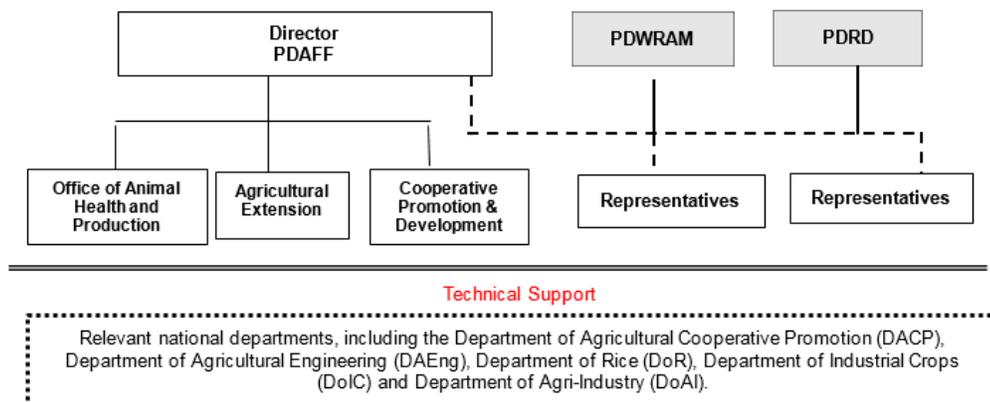
\*Members will be at the level of Under Secretary of State or above.

\*\*Other ministries may be invited to attend as observers when specific issues of their concern are for discussion.

**Project Management Unit (PMU):** A PMU, chaired by the Under Secretary of State as project director and assisted by a project manager and comprising additional four staff each from MAFF (financial officer, procurement officer, safeguards officer and M&E officer), MOWRAM (Director, irrigation/civil engineer, financial officer, and procurement officer) and MRD (Director, civil engineer, financial officer, and procurement officer), will be responsible for overall project management, procurement and financial management. The PMU updates the project implementation progress to the project steering committee. Three consultants (rural infrastructure specialist and team leader, financial management and procurement specialists) will support the PMU. The project implementation structure at national level is summarized in figure below.



At provincial level, the Provincial Departments of Agriculture, Forestry and Fisheries (PDAFF), Provincial Department of Water Resources and Meteorology (PDWRAM) and Provincial Department of Rural Development (PDRD) will be key agencies working with guidance and technical support from relevant national departments. A provincial project implementation unit (PPIU) will be established in each of the four target provinces. The PPIU will be chaired by the director of PDAFF, and comprising representatives of PDWRAM and PDRD, and PDAFF staff related to Cooperatives, Agricultural Extension, and Animal Health and Production. PDWRAMs will be responsible for coordinating all field activities with FWUCs, while PDRDs will be responsible for all farm roads and connectivity to agricultural cooperatives. The project implementation structure at provincial level is summarized in figure below.



The project implementation consultants (PIC) and other technical specialists as well as service providers including government staff as resource persons will carry out a range of capacity building and training activities, as well as pilot demonstrations and detailed engineering designs. ADB will Monitor the progress of project implementation on a regular basis as well as on behalf of GCF. It will ensure that the donor fund flows to the project are achieved in a timely and efficient manner. It will also conduct review missions and provide oversight on the activities defined in the project administration manual to ensure that all procurement is in compliance with ADB procedures. Insofar as public institutions

are concerned, the project will involve planning, budgeting and technical departments beyond the PMU to support the climate change mainstreaming efforts. Likewise, Climate change focal points from the respective ministries – MAFF, MOWRAM, MRD – and the Ministry of Environment (MOE) will be involved in the climate change action monitoring and review process. The management roles and responsibilities of various organizations responsible for project implementation at national and provincial levels is summarized in the table given below.

Implementation Organizations	Management Roles and Responsibilities
Ministry of Agriculture, Forestry and Fisheries - executing entity	<p>MAFF will:</p> <ul style="list-style-type: none"> <li>(i) Ensure the project is implemented successfully in accordance with the Financing Agreements and manage the associated fiduciary risk;</li> <li>(ii) Ensure that the project through the PMU is well managed and that the project performance is monitored through implementation up to completion and required project reports are generated and submitted to the concerned parties;</li> <li>(iii) Delegate sufficient powers to the PMU team members to ensure that it is able to operate its affairs with a minimum of disruption and interference;</li> <li>(iv) Ensure that the PMU team remains intact, as far as possible, during the whole project implementation period;</li> <li>(v) Ensure that all performance management requirements agreed to with the Financiers are strictly followed; and</li> <li>(vi) Ensure that the targeting criteria and implementation arrangements of the project activities are strictly followed.</li> </ul>
Project steering committee	<p>Chaired by Minister of MAFF with representatives from MEF, MOWRAM, MRD, MOC, MIH and MOE. In order that decisions are made quickly it is recommended that the various PSC members will be the rank of Secretary of State. The PSC may invite other persons and agencies to discuss specific agenda items, when required. The PSC will:</p> <ul style="list-style-type: none"> <li>(i) ensure interagency cooperation at national level;</li> <li>(ii) review and advise on policy issues and implementation constraints;</li> <li>(iii) ensure integration with other donors and government related development activities;</li> <li>(iv) meet at least twice a year and monitor implementation progress;</li> <li>(v) approve annual work-plans and budgets;</li> <li>(vi) set up a multi-departmental procurement committee for the project; and</li> <li>(vii) provide overall guidance on project implementation.</li> </ul>
Project Management Unit	<p>A PMU, chaired by the Under Secretary of State as project director and assisted by a project manager and comprising additional four staff each from MAFF (financial officer, procurement officer, safeguards officer and M&amp;E officer), MOWRAM (director, irrigation/civil engineer, financial officer, and procurement officer) and MRD (director, civil engineer, financial officer, and procurement officer), will be responsible for overall project management, procurement and financial management. Three consultants (team leader, financial management and procurement specialists) will support the PMU. The PMU will be responsible for:</p> <ul style="list-style-type: none"> <li>(i) Reporting to the PSC on the project implementation progress;</li> <li>(ii) Day-to-day project implementation, planning and budgeting, disbursement, monitoring and reporting;</li> <li>(iii) Facilitating disbursement and withdrawal applications;</li> <li>(iv) Coordinating activities and report progress to the PSC and ADB;</li> <li>(v) Liaising with the national and provincial implementing agencies and initiate and coordinate effective communication between all project stakeholders, and provide guidance and coordination to the implementing agencies;</li> <li>(vi) Consolidating annual work plans, financial management and procurement plans including preparation of annual forecast of contract awards and disbursements;</li> <li>(vii) Conducting monitoring and compliance of environmental and social safeguards, including gender action plan;</li> <li>(viii) Establishing and implementing PPMS;</li> <li>(ix) Carrying-out administrative, technical and financial management and reporting at national level;</li> </ul>

	<ul style="list-style-type: none"> <li>(x) Measuring, monitoring and evaluating the performance in delivering development impact against established performance targets and goals of the project;</li> <li>(xi) Establishing and managing of the main advance account, submission of withdrawal applications to ADB, retention of supporting documents, and overseeing subaccounts;</li> <li>(xii) Procuring goods and services, and recruiting consultants following ADB procedures to assist in project implementation, preparing of feasibility studies; preparing detailed design; supervising of construction; and safeguards monitoring; and</li> <li>(xiii) Submitting of progress reports, annual audit report and financial statements and project completion report.</li> </ul> <p>Land acquisition and resettlement, if any, will be the responsibility of the IRC.</p>
MEF	<ul style="list-style-type: none"> <li>(i) Allocation and timely release of counterpart funds;</li> <li>(ii) Communicate with ADB for any amendments in the allocation of the loan/grant amount;</li> <li>(iii) Recruitment of a firm for annual audit of project accounts; and</li> <li>(iv) The General Department of Resettlement to be responsible for resettlement issues that relate to project interventions.</li> </ul>
Implementing agencies	<p>The CARDI, GDAH, the General Department of Technical Affairs of MOWRAM, and the General Department of Technical Affairs of MRD will be implementing agencies. Specific Roles and responsibilities of the IAs are as follows:</p> <ul style="list-style-type: none"> <li>(i) National Agricultural Laboratory: (a) provide laboratory equipment specifications; (b) implement GMO, plant toxin and organic fertilizer testing; (c) achieve ISO 17025 accreditation; (d) develop TC protocols; and (e) adapt procedures for partial cost recovery of services;</li> <li>(ii) Department of Agricultural Engineering: (a) support to provincial engineering workshops; (b) technical support to capacity and training of farm mechanization O&amp;M, tool fabrication; and (c) promotion of engineering workshop service provision;</li> <li>(iii) Department of Agricultural Cooperative Promotion: (a) support to the establishment, management and operation of storage units; (b) capacity and training in agribusiness, business plan development and bookkeeping; and (c) identification and prioritization of AC for project support (infrastructure and capacity building);</li> <li>(iv) The General Directorate of Animal Health and Production: (a) oversee the biodigester program; (b) biodigester standards development; and (c) bio-slurry utilization; and</li> <li>(v) Cambodia Agricultural Research and Development Institute: (a) climate resilient maize and rice variety development, trials, demonstrations in collaboration with IRRI; (b) seed production, multiplication and distribution; and (c) commercialization of the seed business.</li> </ul> <p>For MOWRAM and MRD, responsibilities will be:</p> <ul style="list-style-type: none"> <li>(i) Day-to-day project implementation, planning and budgeting, disbursement, monitoring and reporting;</li> <li>(ii) Facilitate disbursement and withdrawal applications;</li> <li>(iii) Coordinate activities and report progress to the EA;</li> <li>(iv) Elaborate annual work plans, financial management and procurement plans including preparation of annual forecasts of contract awards and disbursements related to the PMU's scope of work;</li> <li>(v) Conduct monitoring and compliance of environmental and social safeguards, including gender action plan;</li> <li>(vi) Implement PPMS by measuring, monitoring and evaluating the performance in delivering development impacts against established performance targets and goals of the project, related to the PMUs scope of work;</li> <li>(vii) Carry-out administrative, technical and financial management and reporting at national level;</li> <li>(viii) Establish and manage the sub-account, submission of withdrawal applications to ADB, retention of supporting documents, and overseeing sub-accounts;</li> <li>(ix) Procure goods and services and recruit consultants following ADB procedures to assist in project implementation related to the PMU's activities; and</li> </ul>

	<p>(x) Submission of progress reports, annual audit report and financial statements and project completion report.</p>
<p>Provincial Project Implementation Units</p>	<p>At provincial level, the PDAFF, PDWRAM and PDRD will be key agencies working with guidance and technical support from relevant national departments. A PPIU will be established in each of the four target provinces. The PPIU will be chaired by the director of PDAFF, and comprising representatives of PDWRAM and PDRD, and PDAFF staff related to cooperatives, agricultural extension, and animal health and production. PDWRAMs will be responsible for coordinating all field activities with FWUCs, while PDRDs will be responsible for all farm roads and connectivity to agricultural cooperatives. More specifically and within the scope of the subprojects, the PPIUs will have responsibilities detailed below:</p> <ul style="list-style-type: none"> <li>(i) Assist in the implementation of CSA to include the revision of a cropping calendar and cultivation schedule on the basis of the improved water supply and confirm seasonal water requirements based on the existing climate data and hydrological studies;</li> <li>(ii) Assist in the identification of beneficiary households, under the rehabilitated irrigation system, who are interested in aggregating their land plot for laser land leveling and enhance mechanization;</li> <li>(iii) Assist in the extension of land leveling as a tool to improve water use efficiency; and</li> <li>(iv) Assist the FWUC to gain access to improved inputs.</li> </ul> <p><u>For on-farm water management (pilot drip irrigation and water catchment ponds):</u></p> <ul style="list-style-type: none"> <li>(i) Assist in the identification of pilot drip irrigation sites and water catchment ponds and ensure compliance with the eligibility criteria;</li> <li>(ii) In coordination with training advisers, develop a suite of capacity building programs related to on-farm water management, the use of water catchment ponds, climate smart agriculture, CAMGAP and sustainable rice platform as well as skills training in mechanization;</li> <li>(iii) The PDAFF will organize and arrange field days and training days at the site in conjunction with the private sector service provider;</li> <li>(iv) The PDAFF will seek guidance from the DAEng on the technical and infrastructure aspects of the pilot drip irrigation scheme and water catchment ponds;</li> <li>(v) Work with mango farmers to form a mango producer groups or a cooperative and promote joint marketing initiatives; and,</li> <li>(vi) Assist the PMU M&amp;E consultants in monitoring the impact from the subproject investments by carrying out annual impact monitoring surveys of beneficiary farmers and other value chain stakeholders.</li> </ul> <p><u>For agricultural cooperative storage units:</u></p> <ul style="list-style-type: none"> <li>(i) In association with project training advisers assist in the development of a suite of capacity building programs related to rice, maize, cassava and mango post-harvest management and storage and agribusiness development;</li> <li>(ii) Coordinate with JICA agricultural cooperative business orientation work to ensure the training is compatible with the existing training manuals;</li> <li>(iii) The PDAFF will organize and arrange open days to the cooperatives to demonstrate the work undertaken;</li> <li>(iv) The PDAFF will have an oversight on the technical and infrastructure aspects of the storage unit construction;</li> <li>(v) The PDAFF will seek guidance from the Department of Agricultural Cooperative Development on developing accountancy procedures line with the Law on Agricultural Cooperatives; and</li> <li>(vi) Assist the PMU M&amp;E consultants in monitoring the impact from the subproject investment by carrying out annual impact monitoring surveys relating to storage unit management and operation, trading progress and make recommendations for improvement.</li> </ul>

	<p>For the off-farm water management subprojects:</p> <ul style="list-style-type: none"> <li>(i) Provide necessary data (rainfall data, water basin studies etc.) and support to the design engineers;</li> <li>(ii) Review the cost estimates and the bill of quantities to ensure all items are included in the overall subproject cost estimates and that cost norms applied are adequately representative for the completion of works;</li> <li>(iii) In consultation with MOWRAM, issue technical confirmation that the design is appropriate to the local circumstances of the subproject and conforms with MOWRAM design standards;</li> <li>(iv) Respond to questions issued by the PMU on technical matters in relation to the proposed design;</li> <li>(v) Assist in the identification and recruitment of suitably qualified design engineers and contractors to carry out the work;</li> <li>(vi) Supervise the quality assurance supervision to be performed by the consulting engineer during construction of the subproject;</li> <li>(vii) Prepare fortnightly progress reports on construction progress for submission to MOWRAM and the PMU;</li> <li>(viii) Assist in the formation of FWUCs and provide necessary training to operate and manage the irrigation system, as well as oversee the major maintenance tasks beyond the capacity of the FWUCs; and</li> <li>(ix) Prepare the annual budget to be submitted to MOWRAM for the operation and maintenance of the water management and irrigation schemes.</li> </ul> <p>For farm roads and cooperative storage unit market connectivity:</p> <ul style="list-style-type: none"> <li>(i) Determine the requirements for feeder farm road improvements at each of the proposed 50 storage units to be constructed; and</li> <li>(ii) Identify interventions required to make the rural roads climate resilient and monitor the work to ensure quality and on-time completion.</li> </ul> <p>For biodigesters and bio mass management:</p> <ul style="list-style-type: none"> <li>(i) Supervising and reviewing design engineers work and following up and monitoring field implementation; and</li> <li>(ii) Managing capacity building activities particularly for O&amp;M and use of compost huts, and consolidating and reporting project benefits monitoring and evaluation.</li> </ul>
ADB	<ul style="list-style-type: none"> <li>(i) Monitor the progress of project implementation on a regular basis as well as on the behalf of the other lenders/donors;</li> <li>(ii) Ensure that the GCF and ADB fund flows to the project are achieved in a timely and efficient manner;</li> <li>(iii) Conduct review missions; and</li> <li>(iv) Provide oversight on the activities defined in the project Procurement Plans to ensure that all procurement is in compliance with ADB procedures.</li> </ul>

### Selection of subprojects

Within the four provinces, a number of infrastructure subprojects under output 1 have been identified by the design consultants, primarily related to (i) irrigation and water management infrastructure, including (a) irrigation systems; (b) surface water catchment ponds; (c) pilot drip irrigation systems, (ii) agricultural cooperatives; (iii) rural connector roads; and (iv) biodigesters. For example, a total of 27 irrigation subprojects have been pre-screened to ensure consistency with eligibility criteria including ADB and the government's social and environmental safeguards.

For all subprojects, the first stage of the feasibility process is the recruitment of national consultants for the preparation of the feasibility study and detailed design. The feasibility study for each subproject will include a survey, technical

specification criteria, social and gender safeguards, land compensation and resettlement, environment and economic feasibility. The studies will be reviewed by the PIC and if satisfactory will be passed onto the IA for further scrutiny and through the PMU and then on to ADB for no objection. If unsatisfactory the national consultants will be asked to revise the feasibilities, if practical. Once there is no objection from ADB the subproject will be presented to the PSC for endorsement and then if approved the design will then be undertaken. In case a candidate subproject does not meet the eligibility criteria, it will be replaced by the next priority candidate subproject from that respective province under the list of eligible subprojects identified is exhausted. If candidate subprojects not listed are considered, they will be examined and screened with the support from an independent consultant acceptable to both ADB and the executing entity EE, and submitted to ADB for approval. Once the feasibility studies have been approved, the national consultants will prepare the detailed design. Detailed design of subprojects will take due account of projected climate change impacts and incorporate design features that enhance resilience of the interventions.

The provincial line agencies will assist the national consultants in carrying out the necessary surveys and the relevant line agencies as well as the PIC will provide technical support to the national consultants as required. Provincial technical specialists of the PPIU will also assist in providing local knowledge and facilitate the feasibility. The detailed designs will be reviewed by the relevant line agencies to ensure compliance with standards and regulations of the government. Once approved by the relevant technical line agencies, resettlement action will be initiated if required. The PIC will review the detailed design to ensure compliance with appropriate standards and resettlement as well as the environmental management plan (EMP) with ADB safeguards statement. The PMU will review and approve the detailed design and then initiate the bidding process.

**The selection criteria applied for various infrastructure subprojects under output 1 are listed below:**

**Activity 1.1: Rehabilitating water management infrastructure to climate resilient condition**

Critical design features contributing to climate resilience include (i) enhanced storage capacity; (ii) improved regulation of flow rates, including adequate flow capacity of regulators and other structures to prevent or reduce scour; (iii) improved water allocation within the command area, including division of the command area into compartments to allow for orderly cultivation of a part of the area in case of water shortage; (iv) concrete lining of distribution canals to reduce the seepage losses; (v) enhanced flood resilience; and (vi) improved drainage and salinity control (in affected areas).

In addition, climate resilience in infrastructure interventions are enhanced by the following measures: (i) high over-all efficiencies (High output per m<sup>3</sup> of water); (ii) optimal balance between water demand and water availability; (iii) limited reliance on pumping; (iv) predictable and reliable water allocation over time and within the scheme; and (v) effective cooperation between farmer water user groups (FWUGs) in terms of sharing knowledge about management options, covering both cultivation and water management.

**1.1a: Irrigation and water management subprojects**

- (i) The subproject is an existing small to medium scale irrigation system with good balance between water demand and raw water availability;
- (ii) The command area of the subproject should be sufficient to demonstrate climate change adaptation measures (improved technical design, enhanced water use efficiency, good agricultural practices, and improved water use governance), and to ensure that the subproject would be more climate resilient than now.
- (iii) The subproject identified should have strong political and community ownership in terms of commitment to implement climate change adaptation measures and ensure effective operations and maintenance (O&M);
- (iv) The subproject is not supported by other ongoing or proposed development projects financed by ADB or other development partners;
- (v) A farmer water user group (FWUG) or farmer water user community (FWUC) already exists or there is evidence of high potential to establish a FWUG or FWUC;
- (vi) The subproject should involve rehabilitation of both primary canals and distribution canal networks (secondary and tertiary canals) to ensure that water reaches the farms, with minimum water loss;
- (vii) The subproject has low irrigation efficiency and low water productivity, and scope for improvement, with sufficient water resources;
- (viii) The subproject should have viable economic returns (a minimum economic internal rate of return of 12%);
- (ix) The subproject should require as little land acquisition as possible;
- (x) The subproject should not result in any involuntary resettlement;

- (xi) The subproject should have high potential for cluster (cooperative) development and include vulnerable communities, poor and women farmers as beneficiaries.
- (xii) The subproject should enhance capacity of the beneficiaries to operate and maintain irrigation schemes sustainably with little or no external intervention other than the normal extension services.

**1.1b: On-farm surface water catchment ponds:**

- (i) The recipient must be a smallholder willing to work with the project to implement climate resilient agricultural practices associated with surface water catchment;
- (ii) The recipient must have a land title or the land is secured in his or her name;
- (iii) Preference is given to female headed households;
- (iv) The plot of land has problems relating to excessive rainwater run-off or drainage channels or gullies running through the plot, both of which can be “tapped” to provide supplementary irrigation;
- (v) The smallholder can show that there will be benefits to intensive agricultural production through using of the pond as a supplementary irrigation source;
- (vi) The farmer commits not to sell or transfer the land to a third party during the life of the project, to ensure capital gain;
- (vii) The farmer commits to contribute to necessary O&M of water catchment pond; and
- (viii) If required, the farmer has no objection for his or her farm to be used as a training and demonstration location for the duration of the project.

**1.1c: Drip irrigation demonstrations**

- (i) The recipient must be a smallholder and not an absentee farmer;
- (ii) The recipient must have a land title or the land is secured in his or her name;
- (iii) The recipient has marketing contacts that require Grade A fruit or has the potential of gaining such contracts
- (iv) The recipient must grow the *Keo Romeat* mango variety or other climate resilient varieties that are amenable to floral manipulation and have market potential
- (v) The recipient has access to the water or quality water is available for a borehole and pond construction (if of sufficient size or replenishment to satisfy the water demands of irrigating mango);
- (vi) The recipient must work with the project and accept technological innovations of drip irrigation, including necessary O&M;
- (vii) The farmer commits not to sell or transfer the land to a third party during the life of the project, to achieve capital gain and; and
- (viii) The farmer has no objection for his or her farm to be used as a training and demonstration location for the duration of the project.

**Activity 1.2: Upgrading agricultural cooperative value chain infrastructure**

- (i) The cooperative must be registered for more than a year and is able to access loans;<sup>33</sup>
- (ii) The cooperative stores seed and/or is trading or has a business plan to develop a trading agribusiness with potential downstream value chain linkages;
- (iii) It should have at least 1,000 m<sup>2</sup> land available or planning to buy similar area of land;
- (iv) It should have a reserve fund, with preference to those reinvesting at least 10% above the minimum legal requirement of 20% gross profit (the minimum stipulated in the Law on Agricultural Cooperation 2013) into the reserve fund;
- (v) The cooperative should have strong commitment to implement climate change measures to reduce vulnerability to impacts of climate change, and reduce carbon footprint of its operations through promoting renewable energy (e.g., solar roofs) and improving energy efficiency.

<sup>33</sup> Agricultural cooperatives can be registered with MAFF and those that have access to formal financing. The Rural Development Bank will support those cooperatives with good management and business plans with loans, this is a recent move (June 2016) and is backed by an AFD guarantee which commits to cover 65% of any losses; average loan size \$5,000.

- (vi) It should have strong commitment of cooperative management team and approved by at least 2/3 of members as detailed in Article 43 on the Law of Agricultural Cooperatives.<sup>34</sup> However, the 2/3 majority will be for all members and not just those attending general meetings;
- (vii) The cooperative should develop a realistic and technically viable O&M plan for post-harvest and renewable energy infrastructure at the cooperative
- (viii) The area under cooperative primarily grows rice, maize and/or cassava; and
- (ix) There is full social and gender inclusion within its membership.<sup>35</sup>

**Activity 1.3: Improving connectivity to cooperatives and markets through climate resilient farm road networks**

- (i) Candidate road should be an existing road connecting farms to the existing agricultural cooperative or other agricultural market center;
- (ii) Candidate road should complement ADB's past, ongoing and future interventions and provide the potential for higher economic growth by reducing transport costs for the movement of farm produce to agricultural markets;
- (iii) There should be a strong political and community commitment to implement adaptation measures and support O&M of farm road networks;
- (iv) Candidate road should be consistent with MRD's priorities for rural development and decentralization;
- (v) Candidate road should not involve land acquisition and should not require resettlement of roadside structures, market sites or communities;
- (vi) Candidate road should not produce a negative impact on the local indigenous people,
- (vii) Candidate road should not produce a negative effect on the environment, other than the effects that occur during the construction period, and which are to be managed through an environmental management plan.
- (viii) Candidate road should achieve the economic threshold limit of 12% for the economic internal rate of return
- (ix) Candidate road must have at least 40% female beneficiaries.

**Activity 1.5. Promoting renewable energy for value chain improvement - Biodigesters**

The biodigesters reduce GHG emissions through three pathways: (i) substitution of non-renewable cooking and lighting fuel by a renewable fuel (biogas), (ii) reduction of methane emissions from manure by capturing and burning methane for thermal energy (cooking and lighting) and (iii) displacement of chemical fertilizers by bio-slurry. The design criteria of biodigesters include: (i) durability, reliability and maintenance requirements; (ii) local availability of construction materials; (iii) appropriateness of the design for areas with high water tables; and (iv) costs.

The selection criteria for households eligible for a **bio-digester** are as follows:

- (i) Commune members who are located within the catchment area of those agricultural cooperatives supported by the project;
- (ii) Households having at least 15 kg manure available daily and at maximum 150 kg per day;
- (iii) Commitment to adopt climate smart and good agricultural practices such as composting, mulching, organic agriculture, climate resilient varieties;
- (iv) Preference to female headed households, and households committing to O&M of biodigesters;
- (v) Preference to households with presence of respiratory related illnesses due to air pollution or those households at risk that use biomass for cooking;
- (vi) Capacity to contribute funds either by having own funds or taking loans;
- (vii) Commitment to use bio-slurry as a fertilizer substitute;

**Procurement procedures**

The procurement of goods, works, and consulting services will be in accordance with the ADB's Procurement Guidelines (2015, as amended from time to time) and consulting services guidelines (March 2013, as amended from time to time) and the government's procurement manual for externally financed projects in Cambodia updated version May 2012. The

<sup>34</sup> Article 43: decisions relating to statute, internal regulations, division, amalgamation or dismissal of members shall be made by two thirds majority of votes of members present in the general meeting. Other decisions of the general meeting shall be made by majority of votes of members present.

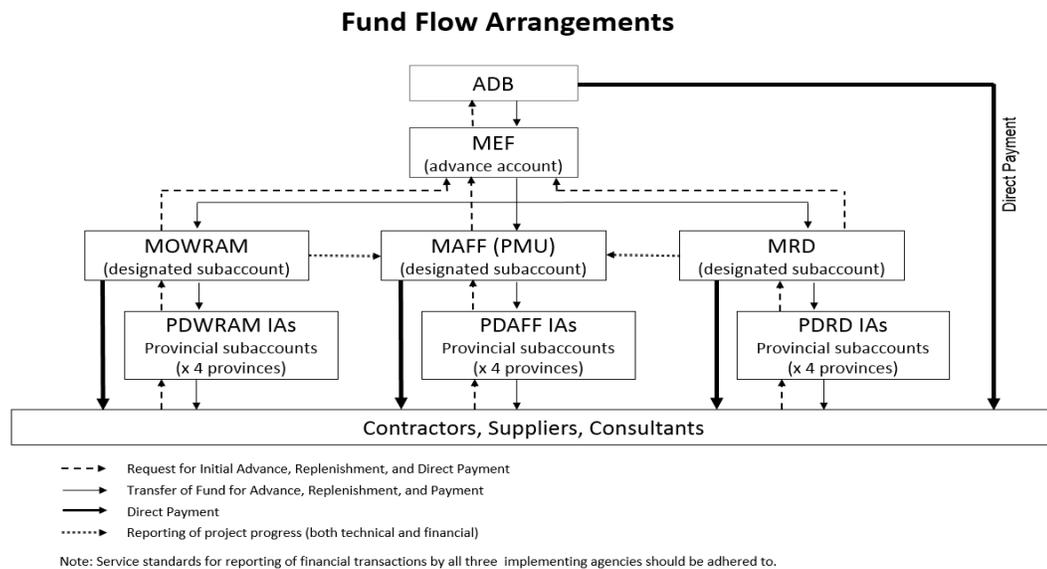
<sup>35</sup> A study on Women's Empowerment in Agriculture Index surveyed 13 countries, including Cambodia which was undertaken late 2012 and included 2,100 households in 84 villages across 17 districts. Cambodia achieved the highest score for Women's Empowerment in Agriculture of the 13 countries. The study noted that 92.6% of women achieved adequate empowerment and that 94.7% of the women had achieved gender parity, But the indicator which contributed most to disempowerment for women was 'group membership: USAID. 2014. Measuring Progress Toward Empowerment: Women's Empowerment in Agriculture Index: Baseline Report.

procurement of works and goods contracts estimated to cost from \$3 million and above for works and \$1 million and above for goods shall be procured under international competitive bidding (ICB). Contracts estimated to cost from \$100,000 to below \$3 million for works and from \$100,000 to below \$1 million for goods will be procured through the national competitive bidding (NCB) procedures. Minor items estimated to cost below \$100,000 for both works and goods will be procured through shopping method. Contracts estimated to cost less than \$5,000 for both works and goods may be procured under direct contracting method. All consulting services will be procured by PMU using the QCBS (90:10) procurement method.

MEF is the official representative of the Royal Government of Cambodia as the borrower of funds. It is the responsibility of MEF to: (i) fulfill government fiduciary and financial management oversight; (ii) provide sufficient counterpart funds for project activities in a timely manner; and (iii) ensure that delays are not encountered in procurement and recruitment. MEF, in close cooperation with the EA, will be responsible for fund flow. MEF will operate the main advance account, with three designated subaccounts for MAFF, MOWRAM and MRD. The advance accounts are to be used exclusively for ADB's eligible expenditures. Three subaccounts, with a threshold of \$10,000 each in each province, will be opened by the PDAFF, PDWRAM and PDRD to cover the project's day to day operations. The directors of PDAFF, PDWRAM and PDRD in each province will be accountable for proper use of advances and reconciliation of the subaccounts. The EA has committed to submit the audited annual project financial statement to comply with ADB requirements in terms of timeliness, completeness and acceptable quality.

The PMU is required to prepare budgets for significant activities as stated in the financing agreement and PAM with sufficient details to allow meaningful monitoring of the subsequent performance. The funds flow is arranged and disbursed based on the government's standard operating procedures and FMM and ADB's procedures with further discussions among concerned parties, such as MAFF, MEF, and ADB.

All consulting services will be procured by MAFF-PMU. Procurement of civil works contracts for the subprojects will be carried out by the PMU and in conjunction with MRD and MOWRAM national technical departments, where appropriate, within the PMU will provide national technical support (NTS) of the concerned ministry following NCB procedures. A bid evaluation committee will be formed and the PIC will assist the committee in the opening and evaluation of tenders. Recommendations which bid to accept will be passed on to the PMU for contract award. The procurement of goods, works, and consulting services will be procured in accordance with the government's procurement manual for externally financed projects in Cambodia updated version May 2012 and the ADB's Procurement Guidelines (2015, as amended from time to time) and consulting services guidelines (March 2013, as amended from time to time) in case of consulting services. The diagram below represents the flow of funds structure:



**Construction methodology**

Construction will be undertaken using service providers. Responsibility for construction supervision for post-harvest structures, irrigation infrastructure and farm roads will be given to the relevant line ministry (MAFF, MOWRAM, MRD), and training on procurement and supervision of construction will be provided in line with capacity assessments of project partners. Following completion of construction, operations and maintenance costs will be borne jointly by the project

beneficiaries (communities, such as FWUCs) and provincial governments, as part of ongoing budgets. The overall project implementation plan is attached in Annex 9. This implementation plan will be updated annually and submitted to ADB with contract and disbursement projections for the following year.

For irrigation subprojects, during construction and post construction, the project will aim to enhance the capacity and solicit matching community and state budget resources to deliver operation and maintenance (O&M) services to irrigation schemes and assist FWUCs with funding and backstopping. The present government policy on O&M sustainability is that at the end of construction the project is handed over to MOWRAM's Irrigation Agriculture Department and the O&M is shared with MOWRAM and FWUCs with MOWRAM being responsible for the major assets while FWUC has the responsibility for on-farm level infrastructure.

### **Infrastructure Operations and Maintenance (O&M)**

Infrastructure O&M is critical to ensuring its continued effectiveness and productivity, and improper or inadequate O&M arrangements can undermine the long-term utility of the investments and lead to more costly rehabilitation efforts. The root causes of underperformance of O&M in Cambodia are insufficient funding, inadequate capacity, and inappropriate governance structures. The government's manual on Standard Operating Procedures (SOP) requires that the EA/IA must determine the impact of the project on its annual resources/budgets for O&M and how these additional future costs will be covered by the RGC or EA to ensure sustainability. SOP Para 50 also recommends that a comprehensive O&M plan must be developed at an early stage of project development. MEF established an O&M budget of about \$15 million per year for all types of infrastructure. The amount is limited, but the ministry plans to increase O&M budget gradually. The project aims to address the O&M barriers related to governance, capacity, funding and technology as follows:

- (a) Institutional arrangements:** For each water management infrastructure sub-project, the PDWRAM will encourage FWUGs or FWUCs to establish O&M committees and prepare O&M plans. Likewise, each agricultural cooperative will be required to prepare a realistic and technically viable O&M plan for infrastructure related to renewable energy and post-harvest operations. The O&M plans will clearly define the roles and responsibilities of the different stakeholders, include a schedule of routine maintenance activities, initial user tariffs (wherever applicable), and collection mechanisms for at least the first few years after construction, as well as estimated O&M costs for the lifespan of the infrastructure. O&M plans will be updated and finalized on completion of the subproject and agreed upon. Formal links with the PDAFF, PDWRAM, PDRD at provincial level and MAFF, MOWRAM and MRD will be established, with their roles and contributions to O&M included in the plans. The number of completed subprojects that have O&M plans in place, and the number of subprojects that are functional and used by communities a year after completion will also be monitored. The PMU staff will visit a sample of the subprojects after completion to evaluate O&M. The project will also have a mechanism for effective complaints handling or grievance redress mechanism on O&M.
- (b) Capacity building:** As part of output 2, the project will have a strong focus on O&M learning. O&M training will be provided at regular intervals to FWUGs, FWUCs, agricultural cooperative members, biodigester beneficiaries and other stakeholders, including provincial government authorities, and, where appropriate, small-scale contractors or private companies involved in the O&M. The project will raise awareness of the need for O&M through several channels including videos and distribute simple pictorial manuals or user-friendly guides to help communities in carrying out O&M activities. Capacity building will also include communication materials and information campaigns to encourage appropriate behavior in support of O&M, such as proper use of infrastructure, fee payment, and so forth. Some efforts will also be devoted to enhancing organizational and managerial capacity of FWUCs on O&M. The project will support a community networking strategy—a peer-to-peer learning initiative—that supports the sharing and dissemination of best practices and lessons learned on O&M and will facilitate integration, business relations formation, and cross-fertilization throughout. Finally, the project budget includes post-construction training and technical support to O&M. The project design and monitoring framework (DMF) includes that at least 27 FWUCs will develop capacity to operate and maintain their irrigation schemes.
- (c) Financing:** The project budget covers short-term financing needs for routine O&M. To the extent possible, O&M financing of irrigation sub-projects would be partly covered by user fees from FWUGs or FWUCs. In addition, MOWRAM will seek support from MEF O&M budget (currently about \$15 million annually). The Department of Agricultural Cooperative Promotion (DACP) of MAFF will also allocate limited O&M budget for cooperatives to be supported under the project. Farmers' willingness to contribute labor or cash for O&M of infrastructure at agricultural cooperatives will also be a criterion for support. The project will establish appropriate incentives for O&M wherever feasible, by exploring public-private partnerships (PPPs) that can play in commercializing O&M efforts. Financial support for each major sub-project will be made conditional on the set-up and operationalization of relevant O&M arrangements. The sub-projects that provide information on O&M costs and responsibilities will be prioritized for

support. The information may include: O&M costs to be financed (e.g., operations and minor repairs versus major repairs or capital costs), ways to finance O&M costs after subproject completion (e.g., water user fees, post-harvest infrastructure usage fee), and responsibility to pay for O&M (FWUCs, cooperative members and/or local government authorities).

**(d) Technical issues:** This project aims to rehabilitate infrastructure to a climate resilient condition through good design, proper materials, and appropriate supervision. It is expected that such infrastructure will have lower long-term O&M costs. In this process, the best practices learned from other ADB projects regarding design quality and construction will be followed. Efforts will be made to select appropriate design and technology, use local materials of required quality, and provide supervision to ensure construction is according to specifications. Such efforts will help optimize the tradeoffs between the lifecycle costs (investment costs and O&M requirements) and the scale of benefits to the community. For biodigesters, only those biodigesters meeting national biodigester standards will be commissioned. Project implementation consultants will assess alternative technical solutions and inform communities of associated lifecycle costs, including future O&M costs.

The following table summarizes O&M arrangements planned for each type of infrastructure under output 1.

Infrastructure type	Institutional arrangements	Capacity building	Financing	Technical issues
1.1 Rehabilitating water management infrastructure to climate resilient condition	FWUGs and FWUCs, with support from PDWRAM, will prepare O&M plans for each irrigation sub-project.	The project will train FWUGs and FWUCs on O&M through workshops, awareness raising and multimedia.	MOWRAM will seek MEF budget on O&M. The project will encourage collection of water user fee from FWUCs.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.
1.2 Upgrading agricultural cooperative value chain infrastructure	Each agricultural cooperative, in cooperation with DACP, will develop and O&M plan for post-harvest infrastructure.	The project will train cooperative members on O&M for post-harvest infrastructure.	DACP will seek MEF budget on O&M for a few cooperatives. Farmers will be encouraged to contribute labor or fee to O&M of post-harvest infrastructure.	Good design, proper materials, and appropriate supervision will be ensured.
1.3 Improving connectivity to cooperatives and markets through climate resilient farm road networks	Agricultural cooperatives, in cooperation with PDRD, will develop O&M plan for rural roads.	The project will train cooperative members on O&M of farm roads.	PDRD will encourage farmers to contribute labor to maintain farm roads; MRD will seek MEF budget on O&M to cover critical roads.	Climate resilient design, proper construction materials, and appropriate supervision will be ensured.
1.4 Strengthening infrastructure for agricultural quality and safety testing	National Agricultural Laboratory (NAL) will be responsible for O&M of all lab facilities.	The project will train NAL staff on O&M of laboratory facilities.	NAL will allocate necessary O&M budget.	Internationally certified laboratory equipment will be procured.
1.5 Promoting renewable energy for value chain improvement	National Biodigester Program, in cooperation with the General Directorate of Animal Health and Production, will provide advice on	The project will train farmers on O&M of biodigesters and cooperative	Farmer beneficiaries will be encouraged to cover the costs of O&M for biodigesters. The cooperatives will	Quality of biodigesters and solar systems will be ensured through procurement from certified companies.

	O&M to project beneficiaries.	members on O&M for solar panels.	allocate resources for O&M of solar panels.	
--	-------------------------------	----------------------------------	---	--

**C.8. Timetable of Project/Programme Implementation**

*The project implementation timetable is in Annex 9.*

--

### D.1. Value Added for GCF Involvement

Cambodia is one of the most climate vulnerable countries in Southeast Asia, affected by floods and droughts on a seasonal basis. Weak adaptive capacity, poor infrastructure, and limited institutions underpin the country's vulnerability to climate variability and change. Floods and droughts have been recognized by the government as some of the main drivers of poverty. Climate change impacts are expected to become increasingly visible, and future projections of climate change indicate more severe variability, higher levels of risk and exposure, and potentially significant losses in livelihoods and income. The existing root causes of Cambodian vulnerability are high poverty rates, high dependence on climate sensitive livelihoods with increasing environmental degradation, compounded by limited institutional capacity, technology, and infrastructure. With 80% of the population continuing to depend on rural livelihoods, adaptation in the agriculture sector is not only a necessity, it can help drive economic development at a faster pace, provided the enabling conditions are put in place.

The GCF finance will make a real contribution to move the traditional agriculture development efforts towards a more climate resilient and low-carbon trajectory, with a comprehensive package of support to build in resilience and climate smart features in the agriculture value chain development, with some of the project outputs bearing considerable potential for scaling up and scaling out. Without the GCF's contribution, investments in Cambodia's agriculture sector would only consider current weather conditions, leading to a missed opportunity for increased productivity and resilience, and placing the entire value chain at continued exposure and risk to climate change impacts. The risk level posed by climate change would remain high, and the targeted regions, rather than benefiting from a growth opportunity, would become gradually impoverished. In order to make the investment fully resilient and to reduce vulnerability among project beneficiaries, a number of additional activities are required that can only be financed through GCF support.

The value added by GCF support includes the following:

- **Extending the performance and lifespan of water, transport, post-harvest and agro-processing infrastructure** while also reducing the recurring maintenance and repair costs. The combined effect of these climate-proofed infrastructure investments will be a stronger agro-economic activity and improved livelihoods throughout the four provinces, by increasing connectivity in all seasons and by ensuring increased and continuous availability of higher quality products;
- The GCF support will also lead to **the creation of added value at lower costs** to producers, by promoting the use of 'leapfrogging' technologies, such as precision-farming, laser land leveling, and ICTs;
- The combined impact of the project's activities will also lead to **reduced overall carbon footprint** of the entire value chains through the promotion of readily available renewable energy sources, the promotion of energy efficiency measures and the use of climate smart agricultural practices.
- **Leveraging larger scale private sector investments into green and climate smart agricultural activities** by promoting the integration of climate change concerns into agribusiness policy and by encouraging the emergence of public-private partnerships conducive to investment in climate-friendly value chains;
- **Setting standards and norms** that will help orient future private and public investments towards climate-friendly value chains, including by removing barriers to green finance and climate-based crop insurance;
- **Building lasting technical, institutional and policy capacity** among government, local enterprises, and communities, to understand and address climate risks and to develop adequate adaptive strategies; and
- Creating the **enabling conditions and services for a broader upscale of project results**, including through development of climate resilient varieties, climate smart agricultural production practices and technologies, the provision and downscaling of climate services, and by using ICTs to ensure widespread access to relevant climate and market information.

### D.2. Exit Strategy

#### *Sustainability*

The technical and financial analyses conducted have concluded that the project is financially sustainable and that benefits of the project will continue to accrue after funding completion (please refer to Annex 3 on Economic and Financial Analysis). The sustainability strategy for the overall project, including the GCF contribution, rests on the integrated value-chain approach adopted, which considers a package of interlinked interventions designed to reshape

the way in which agriculture is practiced in the project provinces. The integrated approach will create enabling conditions to allow local producers to derive increased and lasting economic benefit from agriculture, while conserving natural resources. The project's support to the overall policy and normative environment in which the agriculture sector is deployed will also contribute to creating conditions for sustainability. This includes revision or creation of standards, quality certification, good practice guidance, training and regulatory support.

The project builds on institutions that were supported by previous projects, contributing to an iterative approach to resilience building. However, this project is innovative in certain ways to circumvent potential institutional shortcomings that could prevent long-term sustainability. For example, the project intends to establish the enabling environment for the deployment of green finance or climate finance and climate risk sharing tools at local level. This will include addressing the full scope of capacity gaps, including lack of climate services and data, regulatory and institutional issues, capacity of the financing institutions as well as local level financial literacy and the design of innovative public-private partnerships for improved service delivery. The project also ties into ongoing land use planning and local governance processes, with the establishment of cooperatives and the strengthening of FWUCs. This will also help reduce conflicts over land use, land allocations and natural resources. It is expected that after the project, agricultural cooperatives, villages and FWUCs will be able to sustain most project activities and outcomes independently of project-based funding.

The project's strategy for maintaining results beyond the duration of financing is based on two approaches:

- (i) Creating or strengthening local institutions and governance mechanisms, such as FWUCs, financial institutions, cooperatives and agri-businesses. This will include building their capacity to continue their operations based on internal cost recovery and on profit generated from improved productivity and better prices; and
- (ii) Creating or strengthening the enabling environment for adopting climate friendly agriculture practices, including through capacity building of extension services, local producers, cooperative members, FWUCs and other community-based organizations. This will also include strengthening of the government's capacity to provide timely and relevant climate information and quality testing services to producers and stakeholders in the value chain, which will enhance the entire value chain's responsiveness to climate events, and which can create impact in other regions in the years beyond the project duration. The National Agriculture Laboratory will be supported a semi-commercial footing with partial cost recovery.

The project includes provisions for the coverage, from national and local resources, of ongoing operation and maintenance (O&M) costs for all infrastructures that will be built or rehabilitated, including irrigation schemes, ponds, roads and storage infrastructure. Post-implementation O&M for irrigation, ponds, drip irrigation and storage units will be the responsibility of the respective FWUCs, farmers, orchard owners and cooperatives. The government policy on O&M sustainability is that at the end of construction the asset is handed over to the relevant government department, and the O&M is shared between government and user groups, with government being responsible for the major assets while user groups have the responsibility for on-farm level infrastructure.

For irrigation works, the O&M costs represent 3% of the investment cost, and a portion of the costs are to be covered through the collection of dues from agribusiness cooperative members and FWUCs. For each subproject, during construction and post construction, the project will aim to enhance the capacity and solicit matching community and state budget resources to deliver O&M services to irrigation schemes and assist FWUCs with funding and backstopping. For the rehabilitated irrigation schemes, FWUCs will be expected to collect fees from farmers in the command areas to cover O&M costs. Some government funding for these schemes may be required from time to time to ensure that they continue to generate the expected crop production benefits. Provided FWUCs are well established and members are committed to maintaining their systems, the level of sustainability of infrastructure investments under the project should be high. Finally, post-harvest storage units are conceived as commercial units that will be self-funding and managed by the agricultural cooperatives themselves, in line with current governance arrangements. By working with private sector, individual producers, cooperatives and FWUCs, and by addressing all aspects of the value chain, the project expects to create significant added value and increased profitability for all actors of the agriculture sector. Profitability is expected to become visible during the lifespan of the project, and to serve as a basis for participants to sustain the activities, governance structures and technologies beyond the duration of the project.

## E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

### E.1.1. Mitigation / adaptation impact potential

#### **Adaptation impacts**

The project expects to make a significant contribution to increased climate-resilient sustainable development for the 390,000 direct project beneficiaries and 975,000 indirect beneficiaries it expects to reach, who are among the most vulnerable segments of society: smallholding, agriculture-dependent farmers. The project will lead to reduced exposure of the value chain to climate change by ensuring that key productive assets are adequately protected against increased variability and extremes. This includes infrastructure rehabilitation and upgrade, protection of crops after harvest, and dissemination of timely agro-meteorological advice.

The project will also help reduce the sensitivity of the sector by promoting climate smart agricultural practices, as well as through using improved varieties that are more tolerant to anticipated climate conditions. The provision of irrigation infrastructure will also reduce the rate of crop loss due to drought or irregular rainfall patterns. This will play a key function in making the entire crop sub-sector less sensitive to climate change. Finally, the project will increase adaptive capacity by improving the skills of key value chain stakeholders, including governments, local communities and farmers, agri-business operators, agro-processors, finance institutions and the private sector – using a gender sensitive approach. The dissemination of proven technologies such as ICTs, laser land-leveling, climate smart agricultural practices at all levels, will contribute to increasing the adaptive capacity of producers and traders. The project's efforts in the setting of an enabling policy and normative framework will further increase institutional adaptive capacity at the provincial and, ultimately, national levels. The support to developing policy and standards for adequate agri-business development will ensure climate-responsive development planning in the longer term.

#### **Key adaptation benefits from each output are as follows:**

Output 1 will avoid lock-in of long-lived, climate vulnerable infrastructure by constructing or rehabilitating, upgrading and climate-proofing water infrastructure, as well as rural roads and post-harvest/processing facilities. This will ensure that said infrastructure remain operational regardless of the climate scenarios that materialize, while providing lasting, cost-efficient economic assets. The project expects to climate-proof 27 water management systems over 15,000 ha, benefitting 25,000 households, with at least 50,000 women, as well as 800 on-farm rainwater harvesting ponds and 4,000 ha of land laser leveled to optimize the amount of water for irrigation and better germination and crop growth. Drip irrigation will also be promoted to further save water and enhance water use efficiency. The project expects to construct or upgrade 80 post-harvest storage units, as well as four provincial agricultural development centers and four engineering workshops to provide agribusiness services and strengthen farmer value chain linkages. Furthermore, 250 km of farm roads will be built, with climate resilient features to ensure connectivity to markets in all weather conditions to ensure increased production of higher quality products that can be easily sold.

Output 2 will lead to a significant reduction in vulnerability of local populations by enhancing adaptive capacity and resilience through the increased production of higher quality products, leading to better nutrition, higher incomes, and diversification of income sources. Farmers will produce quality climate smart products, on time and with continuity of supply. Women, landless people and poor households will be included in agribusiness, mechanization, and operation and maintenance training. The project expects to strengthen 40,000 farmers' adaptive capacity (among which 16,000 women) and reduce their exposure to climate risks through capacity building on CSA practices and agribusiness development skills, which will in turn improve productivity and diversify farming systems. The project expects to contribute to an increase in yields of at least 15% from the 2016 baseline (rice 2.7 tons, maize 4 tons, cassava 20 tons and mango 15 tons/ha) and to help at least 50 agribusinesses to become more resource efficient along the value chain in terms of water savings (5-10% efficiencies), energy savings (20%) and reduction in post-harvest losses (10%).

Under output 3, the project also expects to reduce vulnerability to climate change by strengthening institutional, policy and regulatory systems for climate-responsive planning and development. This will include testing capacity for bio-

fertilizers and pests and diseases, and the establishment of a set of standards conducive to the mobilization of green finance and crop insurance.

The project expects to contribute directly to the GCF's performance monitoring framework (PMF) indicators:

***Fund level impact indicators:***

- (i) **A1.0** Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions
- (ii) **A2.0** Increased resilience of health and well-being, and food and water security (e.g. climate-resilient crops, efficient irrigation systems, etc.)
- (iii) **A3.0** Increased resilience of infrastructure and the built environment to climate change threats

***Outcome-level impact indicators:***

- (i) **A5.0** Expected strengthening of institutional and regulatory systems for climate-responsive planning and development;
- (ii) **A6.0** Expected increase in generation and use of climate information in decision-making;
- (iii) **A7.0** Expected strengthening of adaptive capacity and reduced exposure to climate risks; and
- (iv) **A8.0** Expected strengthening of awareness of climate threats and risk reduction processes.

***Mitigation impacts***

In terms of mitigation, the project will reduce GHG emissions by 240,000 tons of CO<sub>2</sub> equivalent (tCO<sub>2</sub>eq) by 2024 directly, in addition to at least 3.25 million tCO<sub>2</sub>eq indirectly, distributed as follows:

The project will install 12,000 additional biodigesters and 6,000 compost huts benefitting at least 90,000 persons, including 40,000 women. Biodigesters will result in an integrated farming system where agricultural wastes are reused and optimized. In addition, the reduced demand for fuel wood will reduce degradation of forest and the other above-ground biomass. Further, the reduction in chemical fertilizer use from utilizing bio-slurry as fertilizer also has many climate benefits. Not only is the production of chemical fertilizers fossil fuel intensive, the application can result in GHGs such as N<sub>2</sub>O with a very high global warming potential of 298 times relative to CO<sub>2</sub>. Promoting energy efficiency and other renewable sources such as solar energy in the operation of agro-processing and storage units will also ensure that any increase in production and processing to respond to growing market demands is done with a reduced carbon footprint.

The emission reductions resulting from the biodigesters are calculated on the basis of (a) displacement/replacement of biomass with biogas for cooking, and (b) reduction of methane emissions through improving animal manure management systems. The methodology for emission reductions from biodigesters is based on approved UNFCCC and Gold standard methodologies endorsed by the National Biodigester Program of Cambodia (2015 - NBP, Cambodia – The Gold Standard). The first source is calculated with the UNFCCC default value of 77% for non-renewable biomass (NRB) and links therefore directly with reducing deforestation. The emission reductions are to be certified on an annual basis. IPCC Tier 2 approach was used for calculation of baseline emissions. The UNFCCC approved "Tool for the demonstration and assessment of additionality" version 7.0 with a 4-step approach (Identification of alternatives to the project activity; Investment analysis to determine that the proposed project activity is not the most economically or financially attractive; Barriers analysis; Common practice analysis") was used to demonstrate additionality. It is expected that the installation of the biodigesters can contribute to reducing charcoal and fuelwood use in cooking by 90%. Emissions reductions from biodigesters are expected to reach 231,627 tCO<sub>2</sub>eq over the credit period of seven years.

The emission reductions resulting from installation of solar energy in agricultural cooperatives were estimated using a combination of UNFCCC and GEF methodologies, with an assumed 4.5 kWh/m<sup>2</sup> of solar power generated per day

(using standard sunshine days estimates, total installable capacity and rates of use as specified in Annex 3B). This results in up to 18,689 tCO<sub>2</sub>eq over the entire lifetime of the project.

Given operational uncertainties related to operation of biodigesters and agricultural cooperatives, a conservative estimate of total direct emissions reductions of 240,000 tCO<sub>2</sub>eq has been maintained.

The indirect emissions calculation is based on an estimate of carbon sequestration potential from improved agricultural practices in the project areas, based on an FAO EX\_ACT (Ex-Ante Carbon Assessment Tool) simulation. Promoting climate friendly agriculture, including landscape management and restoration along with improvements in rice cultivation methods in four provinces. This will lead to reductions in methane emissions, and promotion of soil carbon sequestration. Preventing deforestation and forest degradation through CSA as well as by promoting household level access to renewable energy will avert the destruction of several ecosystem services such as carbon storage, nutrient cycling, water retention, water and air purification, and maintenance of wildlife habitat. Measures included under climate friendly agriculture include laser land levelling, alternate wetting and drying, improvements in rice cultivation (e.g. System of Rice Intensification), water use efficiency measures including drip irrigation, agro-forestry and crop rotation, permaculture, etc. This will reduce GHG emissions to the extent of 6.5 million tCO<sub>2</sub>eq (as per estimate from ex-ante carbon balance tool). A conservative figure of 50% is taken, the resulting GHG emission reductions over a period of 10 years could be about 3.25 million tCO<sub>2</sub>eq. Please refer to Annex 3B for details on assumptions governing the calculations. The tracking database for direct and indirect emissions will be used for annual monitoring and reporting of GHG emission reductions.

The project will contribute to the following mitigation indicators:

***Fund level impact indicators***

- (i) M1.0 Reduced emissions through increased low-emission energy access and power generation - Expected tonnes of carbon dioxide equivalent (tCO<sub>2</sub>eq) to be reduced or avoided (240,000 tCO<sub>2</sub>eq directly over project life and 3.25 million tCO<sub>2</sub>eq indirectly over 10 years); Expected increase in the number of households with access to low-emission energy (12,000 households);
- (ii) Degree to which the project supports the scaling up of low-emission energy in the affected region by addressing key barriers: The project will contribute to scaling up mechanisms for financing of renewable energies, including by encouraging finance institutions to invest in such technologies;

***Outcome-level impact indicators***

- (iii) M9.0 Improved management of land or forest areas contributing to emissions reductions: Expected improvement in the management of land contributing to emission reductions in 335,000 ha
- (iv) Expected improvement in waste management contributing to emission reductions (e.g. the change in the share of waste managed using low-carbon strategies and/or the change in the share of waste that is recovered through recycling and composting). The project will improve overall agricultural waste management by reducing the amount of wastes that are burned and use the materials for biogas production.

E.1.2. Key impact potential indicator			
Provide specific numerical values for the indicators below.			
GCF core indicators	Expected tonnes of carbon dioxide equivalent (t CO <sub>2</sub> eq) to be reduced or avoided (Mitigation only)	Annual	At least 35,000 t CO <sub>2</sub> eq
		Lifetime	A reduction of at least 240,000 t CO <sub>2</sub> -eq by 2024 (direct) and 3.25 million t CO <sub>2</sub> eq (indirect)
	<ul style="list-style-type: none"> <li>Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);</li> <li>Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)</li> </ul>	Total	390,000 beneficiaries, among which at least 40% are women  975,000 indirect beneficiaries  Total beneficiaries: 1,365,000 direct and indirect beneficiaries.
		Percentage (%)	Direct beneficiaries represent 2% of the total country population and 12% of the 4 provinces population, while indirect beneficiaries represent 6% and 30% respectively. Total number of beneficiaries represent 9% and 42% of total national population and of the four provinces population, respectively
Other relevant indicators	Other key indicators include:		
	Number of climate resilient water management systems rehabilitated and/or built	27	
	Number of hectares of land laser leveled	4,000	
	Length of farm roads improved to all weather condition (km)	250	
	Number of agricultural development centers established	4	
	Expected increase in the number of households with access to low-emission energy / Number of biodigesters made operational	12,000	
	Number of climate-smart and gender-responsive agribusiness policy formulated	1	
	Number of climate-relevant standards developed and enforced	3	
	Number of farmers trained in CSA practices and standard compliance	40,000 of which 16,000 women	
	Number of government officials trained in climate-resilient practices	Up to 400, of which 40% will be women	
	Number of staff from banks and MFI trained on green financing	Up to 50	
Expected increase in generation and use of climate information in decision-making	At least 60% of project beneficiaries access and use climate information after project completion		

The above indicators are aligned with the institutional readiness and impact indicators of the national climate change M&E framework developed by the National Council on Sustainable Development at MOE. The total number of beneficiaries was derived by adding the identified number of beneficiaries for each activity, as follows. The number of indirect beneficiaries was calculated using a factor of 2.5 to account for some direct and indirect benefits of dissemination to immediate neighbors and family members:

Post-harvest storage units for agricultural cooperatives: During preparation, the project identified 33 cooperatives with 3,878 members. This figure was then extrapolated (x 2.4) to reach 9,300 members which includes direct beneficiaries and nucleus family members, with more than one family member as a cooperative member. The figure amounts to 37,200 direct beneficiaries of cooperative climate-proof storage units.

Water management systems: The target of 27 small-scale irrigation was calculated by evaluating current and needed water management systems in the four provinces. For the 27 small-scale irrigation systems identified, there are 128 villages, 31,863 households and 191,200 beneficiaries targeted. Water catchment ponds will reach 800 households or 5,600 beneficiaries. Ten drip Irrigation schemes will reach 10 villages with on average 200 households and 1,400 beneficiaries.

Biogas: Biodigesters will be introduced to 12,000 households, benefitting 90,000 beneficiaries of which 43,350 are women. The number of households was determined in cooperation with Government of Cambodia, which has set a national level target of 2 million biodigesters installed by 2020 under its NBP. Selection of beneficiaries has also been conducted based on willingness to pay, since benefitting households will be required to cost-share per each biodigester.

CSA training: the number of beneficiaries was triangulated using provincial and district-level population, to achieve impact at scale. An estimated 10,000 farmers per province would be trained, with 40% of these women (16,000). Other beneficiaries include exporters, millers, trainers, government staff, Farmer Water User Community members.

## E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

### E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

This project expects to contribute to large-scale transformative impacts through the following four aspects:

- **Introduction of climate smart policies, norms and standards** for the creation of a conducive investment environment for agricultural enterprises, and to support the emergence of long-term PPPs to leverage additional growth;
- **Increased capacity of public and private institutions, including financing institutions**, to support climate-resilient agriculture and build and operate climate-resilient infrastructure; Insofar as public institutions are concerned, the project will involve planning, budgeting and technical departments beyond the project management unit to support the mainstreaming efforts.
- **Increased use of up to date technologies with a high potential for leap-frogging**, including for example, mechanization, CSA and elements of precision farming, laser land levelling and the use of information technology to upscale the delivery of climate and market information services. In selecting and deploying such technologies, the project will carefully assess lessons learned from previous projects. The quality of technologies will be ensured through use of certified companies and/or products.
- The project will also **leverage stakeholder behavioural change** of communities and the private sector through the introduction of new financial and risk sharing mechanisms such as green financing or crop insurance, as well as through awareness raising.

This project will provide opportunities for targeting innovative solutions, new market segments, up-scaling successful technologies, business models, modal shifts and/or processes. As such it intends to catalyze significant impact in Cambodia's agriculture sector. It is estimated that the direct benefits of this project will reach 390,000 people (2% of the country's population or 12% of the four provinces population), with the potential to reach an additional 950,000 indirect beneficiaries throughout the four provinces (or 42% of the four provinces population). In the long term, given

that this project is tied to the presence of transboundary transport corridors, and because the enabling policy and regulatory conditions will be set, the project activities could be scaled up to the entire population of the four provinces, and into neighboring countries. Mechanisms will be put in place to leverage a stronger scale of impact, including:

- The project will **focus on climate change resilient strategies across the entire food value chain**, while also promoting resource use efficiency and renewable energy to reduce costs and allow the deployment of low emissions pathways. The equation between low-carbon and lower prices will help develop a model for more sustainable agriculture, which will be easier to adopt by farmers. The development of PPP models and forums will also help disseminate successes and approaches to farmers beyond project beneficiaries.
- The development of **climate friendly agriculture and agribusiness skills** as well as farm mechanization at local level will create new profitable business and employment opportunities within agricultural cooperatives. The four provincial agricultural development centers (PADCs) and four provincial agricultural engineering workshops will be established to improve and create resource and training centers for service provision, agribusinesses and farmer value chain linkages. Training on reaching climate-conscious standards will be provided in these centers and will create incentives for farmers to comply with food quality and safety standards; both safeguarding the production systems and enhancing the market linkages and competitiveness. The dissemination of other technologies including biodigesters, laser land leveling, drip irrigation and ICTs will also contribute to creating high value added employment in the rural area, which could help revitalize the entire area and create low-carbon economic opportunities beyond those directly foreseen in the project.
- **Agricultural cooperatives and FWUCs will also be strengthened** at the local level by building their capacity on agribusiness and CSA through demonstration sites showing visible evidence of climate resilience and increased profitability, which will speed up the up-scaling process and allow for farmer-based autonomous adaptation. In addition, providing access to climate information services will enable farmers to make informed decisions on planning their cropping seasons and reacting to climate shocks. Agricultural cooperatives will also enhance their connectivity and access to regional and national markets thanks to climate-proofed feeder roads, facilitating upscale of agribusiness opportunities.

#### E.2.2. Potential for knowledge and learning

The project is based on an approach that integrates research into development processes. This includes for example the provision of targeted training on climate-smart agribusiness skills and climate-smart agriculture practices, O&M of infrastructure or using energy efficient technologies to reduce carbon footprint along the value chain.

The project's outputs include elements related to the dissemination of best available information, technologies and practices and their integration into policies, standards and norms applicable at the national level. Through awareness raising on the economic, social and environmental benefits of the climate-smart agribusiness approach, the project's interventions will reach remote communities and most vulnerable areas and promote, among others, climate-resilient varieties. The project will implement an aggressive knowledge management approach so that all project results are effectively documented, barriers are addressed, and policy change is leveraged. The project will produce guidance and training materials and technological information packets that can be disseminated in all areas of Cambodia. It is expected that regional linkages established through trade will also contribute to accelerating knowledge dissemination.

The project will also gather lessons learned and results through its monitoring and evaluation plan, which will be shared across projects and with project partners. Finally, the project will be linked with key regional knowledge platforms such as GMS Core Agriculture Support Program and GMS Core Environment Program to facilitate collective synthesis and cross fertilization of information and experience across the countries in the region.

### E.2.3. Contribution to the creation of an enabling environment

The project will support the creation of an enabling policy and operational environment for climate friendly agribusinesses by contributing to the identification and dissemination of technologies and best practices at local level, as well as by supporting the design and implementation of enabling policies, regulations, and standards. The project will develop a climate-smart agribusiness policy to enable public-private partnerships, which will lead agricultural cooperatives to not only reach regional but also international markets with their processed products. A comprehensive capacity development package targeting key actors along the value chain will create an enabling environment in which agri-businesses across the country can evolve.

The project will create enabling conditions first by strengthening the government's capacity and second by developing a climate-friendly agribusiness policy and climate-conscious standards. The provision of climate services will also create an enabling environment for the deployment of low-carbon, resilient agricultural practices as well as for the establishment of public-private partnerships, green financing and climate risk sharing mechanisms. The development of standards and certification for climate-resilient seeds, as well as the deployment of training on CSA will help create an enabling environment at local and provincial level. Finally, through the value chain approach, the project will support linkages to markets, which is expected to create economic incentives for continued stewardship.

All the agriculture products (i.e. rice, corn, cassava, and mango) targeted by the project provide tremendous potential for commercialization to enter new global and regional markets. The project focuses on mass deployment of proven climate resilient and low carbon technologies and practices with measurable and quantifiable benefits. Even though these technologies and practices are often new to the country but with the proven track record elsewhere, minimizing the risk of adoption failure. More importantly, the project is focusing on innovation in business model, targeting crucial intermediaries within the agriculture value chain. While the actors such as agriculture cooperatives and financing institutions already have established credibility in their own right, the project is providing an opportunity for new partnership to create new business ventures. The green financing and crop insurance provides de-risking schemes essential for the success of these new business ventures.

### E.2.4. Contribution to regulatory framework and policies

The project contributes to the creation of improved policies through outputs 3.1 and 3.2, including for example:

- (i) A private-sector friendly agribusiness policy framework;
- (ii) The design of climate and environment-friendly production standards;
- (iii) The promotion of public private partnerships; and
- (iv) Integration of climate information into production, planning, and financial services.

This, combined with investment in climate-resilient infrastructure, is expected to help leverage long term investment by the private sector in the selected value chains. The development of standards and certification for climate-resilient seeds, as well as the deployment of training on CSA will help create an enabling environment at local and provincial level, which will lead to the adoption of more sustainable, more resilient agricultural development policies. Finally, through the value chain approach, the project will support linkages to markets, which is expected to create economic incentives for continued stewardship.

## E.3. Sustainable Development Potential

### Wider Benefits and Priorities

#### E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

The project will not only contribute to the Cambodia Millennium Development Goals (MDG) (notably goals 1, 3, 7, and 8), but also to the Sustainable Development Goals (SDGs), notably SDGs 1, 2, 3, 5, 7, 8, 9, and 13. The project intends to create the following economic, social and environmental co-benefits, directly contributing to the SDGs. The gender action plan ensures that benefits of the project are inclusive and address needs of women.

#### **Economic benefits**

The project expects to create employment opportunities for landless and poor farmers such as access to off-farm and on-farm employment related to support services such as farm mechanization, drying, milling, grading and storage of produce, which will enhance their adaptive capacity, while reducing their exposure to climate risks. For example, the various socio-economic benefits to be realized by the **off-farm and on-farm water management** include:

- Rehabilitation of irrigation infrastructures, which at present are barely functional, will have a significant impact on the potential for crop production in the command area, leading to increases in both yields and cropping intensities. The estimated net incremental income per ha is about \$1,030 per year at full development and for an average holding would be \$556 per year. Because land preparation for all crops and harvesting for rice are now mechanized, labor inputs are relatively low and within the capacity of households for most activities, the value of labor inputs will also accrue mostly to households rather than to hired labor;
- Agricultural impacts include an increase in dry season rice yields from 2 tons per ha to 2.5 tons per ha which is well below the national average of 2.7 tons per ha, and main wet season rice increasing from 2.7 tons per ha to 3.5 tons per ha. The cropping intensity for the command area increases from 135% (100% for the main wet season rice and about 10% for early season rice and 25% for dry season cash crops) to 190% with cash crop production in the dry season increasing from 25% to 70% of the command area. Cash crops of watermelon and mung beans attain yields of 7.5 tons and 0.85 tons per ha from yields of 6 tons and 0.5 tons respectively (see table below).
- Efficient irrigation services combined with technical advice and appropriate inputs allow farmers to obtain substantially higher yields (with estimates varying between 0.5 tons and 1.5 additional tons per hectare for wet season rice and up to 5 tons per ha for dry season rice), expansion of cultivated areas, and increase the number of crops per year;

Crop yield improvement with and without the project's interventions

Crop	Without Project			With Project			Increment (tons)
	Yield (ton/ha)	Area (ha)	Product (tons)	Yield (ton/ha)	Area (ha)	Product (tons)	
Early rice	2.0	10	20	2.5	25	62.5	42.5
Main season rice	2.7	100	270	3.5	100	351	81
Mung bean	0.5	10	5	0.85	25	21.3	16.3
Water melon	6.0	15	90	7.5	45	338	248

- Pumping costs to individual farmers in schemes where pumping is required are likely to reduce by 30 to 50% thanks to the introduction of renewable energy and land leveling. Drainage canals, which are part of the irrigation system, can also serve as drainage in case of floods. Enhanced distribution networks to bring water to farmers' fields will greatly improve perception of service to farmers and will make it easier for FWUCs to manage the water distribution system and collect irrigation service fees. Replacing existing broken or eroded structures by new technically appropriate ones will improve the overall durability of the scheme and reduce O&M costs going forward; and
- Communities and /or individual farmers can use water resources for fish farming and water for livestock, cash cropping, vegetable home gardens etc. with increasing cropping flexibility and diversification.

The financial analysis of the representative subprojects show that the project will have significant benefits for rural households in the project areas. Members of cooperatives with drying and storage facilities will benefit from the improved quality of their production, both directly from the cooperative activities and through incentives to improve on-farm practices. At current prices, members who process all or part of their crop into chips will receive \$62 per ton for chips instead of about \$17 for fresh cassava, as well as increased dividends from the trading operations of the storage unit. For average households with a new bio-digester, annual cash benefits are about \$230 from savings on fuel and fertilizers and the impact of bio-slurry on crop yields. Owners of mango orchards in the project areas who adopt drip

irrigation after seeing one of the project's demonstration orchards can expect an annual benefit, once full production is reached, of around \$2,000 per ha.

The storage unit will offer a marketing outlet for 600 tons of dried chips equivalent to approximately 1,100 tons of fresh produce and will result in off-season prices to be 10 to 20% higher than in season. The storage units will increase household income for not only those households that are members of the agricultural cooperatives, but other households that market their fresh cassava to the agricultural cooperatives, hence reducing poverty rates. The project expects to reach a 10% increase in rural household income (from a base of KR 1.16 million/\$290) over the lifetime of the project. Additional demand for hired labor due to the increase in the need to manually cut cassava (as buyers prefer hand cut chips over machine cut chips) will be increase as well as opportunities for direct and indirect employment. The agricultural cooperative's trading business will offer continuity of supply, storage infrastructure and through quality management and an improved quality and uniform product, the value chain linkages between producer, processor and trader/exporter will be stronger and in a glut market that product will sell before other lower quality or substandard products. There will be increased trust amongst the value chain players. Increased household incomes will lead to a reduction in household debt levels, and a subsequent decrease in the incidence of domestic violence in farming households.

### **Social benefits**

The project expects to generate significant social co-benefits, including higher food and nutrition security through improved produce quality, increased incomes and stronger sanitary standards, as well as through diversification of produce (e.g. fish and non-timber forest products, vegetables from crop rotation and additional crop due to irrigation). Along with closer access to water and better water management, this will lead to overall improved health among target populations, particularly vulnerable groups such as women and children.

A project gender action plan has been developed recognizing women's important role in crop production and with the aim of addressing some of the issues related to their limited access to technology, information and extension services for agricultural production. Specific actions and targets are included in the project gender action plan to ensure for example that at least 40% of farmers benefiting from capacity building activities and technical support are women farmers, that women farmers have access to training on how to operate and maintain agricultural machinery (this is important given the increased mechanization of planting and harvesting, which are activities in which women are primarily involved), that women receive information on green finance and climate risk sharing instruments, and that they are actively involved in the selection and multiplication of climate resilient crop varieties.

An estimated 50,000 women will benefit from rehabilitated climate resilient water management systems, including in terms of reduced labor. Furthermore, the provision of alternative energies for cooking (instead of burning residues) and the training on responsible use of farm inputs, particularly agro-chemicals, will help improve household health. Access to lower-cost energy sources will also enable households and families to engage in economic diversification activities, and could improve access to education for children, particularly girls.

Given the degree of out-migration of males from the area, it is estimated that the majority of subproject beneficiaries will be women. With expanded opportunities for crop intensification, the subproject may lead to some reduction in out-migration levels, as agriculture becomes an important source of household income. School dropout levels may decrease, as families are better able to pay for their children's education. Women's access to extension services and technical information will be improved and women will be empowered through receiving training in agricultural techniques and mechanization. Increased household incomes will lead to a reduction in household debt levels, and a subsequent decrease in the incidence of domestic violence in farming households. During civil works, manual employment opportunities will be created for households and women. Women who can read and write will have the opportunity to work as record-keepers.

At the broader level, the project also expects to deliver social benefits in terms of access to improved knowledge and research, better access to extension and technical support, and opportunities for innovation.

### **Environmental benefits**

The project will have high environmental co-benefits, in addition to leading to the reduction of carbon emissions due to land use change and the introduction of biodigesters, thereby contributing to reduction of deforestation and forest degradation. The restoration of irrigation schemes and of the immediate surrounding landscapes around project-supported infrastructure will help combat soil erosion and land degradation and will help create natural buffers against floods and run-off. Forests will be protected thanks to the anticipated decrease in fuel-wood needs, due to improved access to energy, namely biogas. Introducing climate-smart agricultural practices will contribute to soil improvement and soil carbon sequestration through more effective rotation and the use of nitrogen fixing cash crops, as well as using cash crops that extract nutrients from different soil depths. This will lead to an increase in biodiversity in the natural landscape surrounding agricultural lands, allowing for the maintenance of key ecological services crucial for agricultural production. The use of wastes for energy and compost production will also help reduce local source pollution and reduce the use of agro-chemicals on farm. The climate proofing of water and post-harvest management infrastructure will improve the efficiency of at least 50 agribusiness units, reaching 5-10% of water savings and 20% of energy savings, as well as a 10% reduction in post-harvest losses.

**Gender-sensitive development impact**

A detailed gender analysis and gender action plan (GAP) has been prepared (see annex 6), which includes gender-related actions, performance indicators and targets to promote women’s voice and active participation in all project activities. The project will promote gender equality and women’s empowerment through enhancing women’s capacity in climate smart agriculture production and processing, management and business, agricultural machinery use and maintenance, accessing and using financing, and through strengthening linkages between women-led enterprises and the agribusiness industry. Other actions include a gender analysis of the four selected agricultural value chains that will inform further refinement of the GAP at the start of the project and the development of a gender-responsive MAFF agribusiness policy.

Women will be targeted for employment and training in infrastructure related construction/rehabilitation and operation and maintenance, for uptake of bio-digesters, and as decision makers in selection of climate resilient crops varieties. Benefits from cooking with biogas will include reduced time for cooking, allowing women to do other tasks outside the household (At least 40,000 women are beneficiaries of bio-digesters installed). While at least 30% women trained in infrastructure related construction/rehabilitation (e.g. masonry skills for bio-digesters construction), and operation and maintenance (e.g. local irrigation schemes), this will create at least 25% of workdays filled by women disaggregated by skilled/unskilled and type of work related to infrastructure construction/rehabilitation as well as operation and maintenance (point of reference: women’s current involvement in similar infrastructure related work varying between 17% to 46%). The project will work in close partnership and strengthen technical capacity of the newly formed Women’s Farmers Network and the MAFF Gender and Children Project Support Unit in order to ensure sustainability of gender mainstreaming efforts in the agribusiness sector. Increased awareness of gender equality may lead to improved sharing of household chores and tasks.

**Other benefits**

The project yields other benefits that could not be monetized, including (i) sound cooperative models for agribusiness operations, (ii) strengthened institutional and human capacity for climate smart agribusiness, and (iii) increased ownership and involvement of farmer groups in operations and maintenance of agribusiness infrastructure.

**E.4. Needs of the Recipient**

Vulnerability and financing needs of the beneficiary country and population

**E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)**

As a least developed, agrarian country, Cambodia is one of the most climate vulnerable countries in the world. The Cambodian population is nearly 15 million in 2016. Despite recent economic progress, the country remains one of the most vulnerable to the impacts of climate change. This is mostly due to the geographical location and topography of the country, a continued heavy reliance on rainfed agriculture, and low levels of technical capacity to apply adaptive approaches and technologies among smallholder farmers and rural institutions. The geographical incidence of extreme weather events such as droughts and floods varies, and while floods affect lowlands areas, the geographical distribution of droughts is widespread. Storms occur more frequently, with significant impacts on infrastructure and

livelihoods<sup>36</sup>. In general, the changing climate creates increased socio-economic costs, in terms of livelihoods loss, infrastructure degradation, increased costs of maintenance, and the maintenance of a high level of risk for vulnerable communities and the private sector.

Poverty remains a serious issue in Cambodia, despite remarkable progress made in achieving MDG of reducing by half the proportion of its people living below the poverty line. Given that the majority of the population derives livelihoods from agriculture, climate sensitivity is high. Cambodia's agriculture is predominantly rain-fed and characterized by low input, and moderate or low fertility land, thus making it dependent on weather conditions and changing climate. Rice is Cambodia's primary staple and provides approximately 70% of nutritional needs. Rice crops occupied 83% of the 3.22 Mha of harvested area. Four other food crops, namely corn, cassava, soybean and mung bean, occupy approximately 13%. The remaining 4% is used for growing vegetables, sesame, peanut, sugarcane, potato, tobacco and jute. Low yields, exacerbated by climate variability and climate extremes contribute to recurring food shortages.

As Cambodia has a tropical monsoon climate with marked rainy and dry seasons, the impacts of climate on human health are significant. Malaria and dengue fever are the prevailing mosquito-borne diseases. Cambodia's renewable energy sources are abundant, but they remain largely untapped for electricity production. Biomass, the main cooking fuel for households, accounts for more than 80% of total national energy consumption. Forests play a significant role in traditional rural livelihoods, providing construction wood, fuel wood, food and medicine, as well as ensuring ecosystem functions such as watersheds, storm and coastline protection. Firewood remains the main source of energy for cooking for 91% of rural people. Cambodia's forest cover was estimated at 10.8 Mha or around 60% of the country's land area in 2006.

Under future climate conditions (2025 and 2050), most of Cambodia's agricultural areas will be exposed to higher drought risks. The growing period for most agricultural areas will be less than five months (between two and three months); in these conditions, access to irrigation becomes imperative. Losses in production are mainly attributed to flooding (about 62%) and drought (about 36%). Under the high emission scenario (SRES-A2), wet season rice yield (rainfed) will continuously decrease until 2080, and could fall by up to 70% of current yield levels – which are already under regional averages. Similarly for dry season rice (irrigated rice), yields for crops planted in November and December could decrease by 40%. Under the low emission scenario (SRES-B1), the anticipated yield decrease ranges from 60% to about 20%.<sup>37</sup>

As noted in the Second National Communication and supported in the Climate Change Strategic Plan 2014 – 2023, the Royal Government of Cambodia intends to focus on increasing its capacity to cope with current climate risks by improving climate risk management and community livelihoods. Using climate information, increasing water use efficiency and creating additional sources of income for farmers are among the measures identified as priorities for adaptation. The government also expects to direct its efforts towards the revitalization of long-term policies and planning that take into account climate change. Measures include information use, infrastructural interventions, expanding to other areas with lower risks, insurance, better varieties of crops and long-term research.

The project preparation design team undertook a participatory assessment of socio-economic and climate change vulnerability in the four target provinces and four target commodity value chains (Annex 7). For example, Tbong Khmum is projected to experience a temperature increase by 3.1°C in the wet season, and 2.7°C in the dry season by 2050. Kampong Cham is also in the top range for dry season increase with +2.6°C predicted. Takeo and Kamot are projected to experience a temperature rise of 2.3 -2.4°C by 2050. In the wet season, the Kampong Cham and Tbong Khmum provinces are expected to experience increased rainfall of more than 10% while Kampot and Takeo provinces are projected to have increased rainfall of more than 9%. During the dry season, Kampot and Takeo could see a 3.9% decrease in rainfall, with Kampong Cham and Tbong Khmum projected to experience only a 0.5% decrease.

One of the target provinces, Kampot, located in the south-western Cambodia, is one of the country's four coastal provinces. However, target districts within the province may not be significantly affected by sea level rise. Vulnerability analysis of value chains of four target commodities indicated that several links in the value chain are highly vulnerable to impacts of climate change. The target communities consider themselves to be increasingly poorer than urban areas, in provinces with limited productive resources and limited income generating opportunities. Households have land

<sup>36</sup> Government of Cambodia. Intended Nationally Determined Contribution to the UNFCCC. 2015.

<sup>37</sup> GSSD 2015. Cambodia's Second National Communication under the United Nations Framework Convention on Climate Change. General Secretariat, National Council for Sustainable Development/Ministry of Environment, Kingdom of Cambodia, Phnom Penh

parcels ranging from 0.58 to 1.5 ha in size. The communities reported high levels of out-migration, leaving elderly to care for small children, resulting in less available household labor for agricultural activities, as well as gender issues related to domestic violence and secure land tenure. In addition, amongst the poor and vulnerable groups there are high rates of female illiteracy, particularly amongst older women. The priority demand in targeted areas was for affordable credit to alleviate the debt burden, and consistent supply of water.

#### E.4.2. Financial, economic, social and institutional needs

Improved macroeconomic stability and public financial management reforms have helped Cambodia's economy grow during 2004–2014. Gross domestic product grew by 7.0% in 2014 and was expected to increase by 7.4% during 2015–2016.<sup>38</sup> There has been a dramatic reduction in the national poverty rate (by 60.46%) in the rural areas from 2007 – 2012.<sup>39</sup> However, 40% of the population is still vulnerable.<sup>40</sup> Levels of investment into rural infrastructure remain insufficient to meet the needs, and significant losses have been incurred due to extreme climate events over the past few years. Consequently, the infrastructure deficit is accentuated and the lack of adequate water systems restricts the most producers to a single rain-fed crop annually, constraining intensive and high value crop production and intensification. This maintains rural populations in a state of vulnerability to climate and economic fluctuations. The government is unable to meet demands for rural investment from available public funds; there is a need to increase private sector participation in the agriculture sector.

To encourage more private sector participation, the sector must become more profitable. Processors and buyers will need to form closer linkages with the raw material supply base but this can only take place if farmers group together to produce a quality, uniform sample and are compliant with standards that are demanded by the market such as the SRP and good agricultural practice. More and more importers, traders and processors are accessing the more mature export markets of People's Republic of China, European Union, Japan, Republic of Korea, and United States of America require such standards for traceability and transparency. Cambodia's long-term growth prospects within ASEAN EC are hampered by its limited quality and non-compliant agricultural product export base.

At the farm level, there are shortages of rural labor with migration from the rural areas an issue; labor costs have risen accordingly. It is projected that mechanization will also contribute to the anticipated decline in the role of women in agriculture, with harvest and post-harvest activities usually the tasks of women. However, the introduction and use of machinery is important means to achieve increased productivity and to avoid over expansion. The repair and maintenance of the machinery is a major constraint and has substantial cost implications. Other constraints include:

- (i) lack of financial resources to invest in farming
- (ii) shortage and lack of bargaining power to purchase inputs
- (iii) difficulties in marketing agricultural products
- (iv) low farm incomes
- (v) high energy costs, which reduces the competitiveness of agribusinesses, and
- (vi) lack of access and high costs of finance contribute to sub-optimal investments in agribusiness.

The microfinance sector in Cambodia is relatively mature and effective compared to other developing countries, with low default rates of 0.7%.<sup>41</sup> Ninety two percent of SMEs are not registered, they lack business records and are not able to produce financial statements, and they lack collateral such as hard/soft land titles and have little credit history, as 75-90% of their funding is self-generated.<sup>42</sup> Agribusiness do not have sufficient access to credit as commercial banks have risk aversion lending to such enterprises, as well as those enterprises that wish to invest in "green" or climate resilient technology, infrastructure and services.

<sup>38</sup> ADB 2015, *Asian Development Outlook 2015: Financing Asia's Future Growth*. Manila.

<sup>39</sup> National Institute of Statistics/ Ministry of Planning 2013.

<sup>40</sup> World Bank 2015: *Cambodia Agriculture in Transition; Opportunities and Risks*.

<sup>41</sup> The rate has increased from 0.3% to 0.7% in the last 12 months, Cambodia Microfinance Association, 2016.

<sup>42</sup> MEET-BIS Cambodia EU funded project supporting energy efficiency investments by SMEs.

At the institutional level, the current agricultural extension system is facing numerous problems, such as limited supporting system and regulations, and lack of human resources, funding, techniques and new technology, agricultural extension materials, and facilitation skills.<sup>43</sup> The 2015 Agricultural Extension policy foresees a shift from supply-driven services towards demand-driven, extension-for-market, -competition, and – sustainability approach. This will require developing more targeted extension services, with a more diverse set of partners and stakeholders, including for example development partners, NGOs, research and educational institutions, input suppliers, private companies, CBOs, or expert farmers, and financial institutions. Re-training of current staff, and the provision of new skill sets focusing on the most up to date practices and technologies – adapted to the needs of the market in terms of production, quality, standards and climate resilience – is urgently needed. A detailed institutional capacity building and training plan was prepared to assist the government in project implementation.

### E.5. Country Ownership

Beneficiary Country (ies) ownership of, and capacity to implement, a funded project or programme

#### E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

The project is aligned with the government’s priorities on low-carbon and climate resilient development as outlined in the Government’s overarching Rectangular Strategy Pillar III, and the National Strategic Development Plan (NSDP) 2014-2018. The NSDP’s objective is to reach an annual economic growth of 7% and achieve more than 1% reduction in the poverty rate annually. Cambodia has developed the Climate Change Strategic Plan 2014 – 2023, and associated action plans were developed by each relevant ministry. These plans are Cambodia’s first ever comprehensive national policy documents that illustrate not only the country’s priority adaptation needs, but also provide roadmaps for the decarbonization of key economic sectors and the enhancement of carbon sinks. Further, Cambodia has developed a Green Growth Policy and Roadmap which sets the path to stimulating the economy through low carbon options, savings and creating jobs, protecting vulnerable groups, and improving environmental sustainability.

The project is in line with the government’s Agriculture Sector Strategic Development Plan (2014-2018), which aims to enhance competitiveness of the agriculture sector through the increase of agricultural growth by approximately 5%, by enhancing of agricultural productivity (intensification), diversification and commercialization, through emphasis on the implementation of the strategy and action plan for climate change adaptation and mitigation.

#### **Alignment with Cambodia’s Nationally Determined Contribution and Sectoral Climate Change Action Plans:**

The project’s focus on climate friendly agriculture value chains is expected to significantly contribute towards achieving climate change policy objectives outlined in the National Adaptation Program of Action to Climate Change (NAPA) of 2006, the Intended Nationally Determined Contribution (INDC) of 2015, and the individual climate change action plans for MAFF, Ministry of Rural Development (MRD) and Ministry of Water Resources and Meteorology (MOWRAM).

The project directly contributes to several priority actions identified in section 2.2 (pages 4-5) and Table A1 (pages 14-16) of Cambodia’s INDC. They include (i) promoting and improving the adaptive capacity of communities, especially through community based adaptation actions, (ii) strengthening climate information dissemination, (iii) developing and rehabilitating the flood protection dykes for agricultural development, (iv) developing climate-proof agriculture systems for adapting to changes in water variability to enhance crop yields, (v) promoting climate resilient agriculture and scaling-up of climate-smart farming systems, (vi) developing crop varieties resilient to climate change, (vii) repairing and rehabilitating existing road infrastructure and ensuring effective operation and maintenance, taking into account climate change impacts, and (viii) strengthening technical and institutional capacity to mainstream climate change into sector development plans.

The project supports the following key priorities for climate change as highlighted in the National Climate Change Action Plan as well as those of MAFF, MOWRAM and MRD:

National CCAP (2016-2018)	MAFF CCAP (2014-2018)	MOWRAM CCAP (2014-2018)	MRD CCAP (2014-2018)
---------------------------	-----------------------	-------------------------	----------------------

<sup>43</sup> RGC, 2015, Agricultural Extension Policy in Cambodia – Unofficial translation.

<p>Priority Action 10. Engage and raise awareness of different target groups on CC and GG/sustainable consumption and production;</p> <p>Priority Action 11. Promote and improve the adaptive capacity of communities to respond to climate change</p>	<p>Priority Action 1. Promoting and up-scaling climate smart farming system that resilient to climate change.</p> <p>Priority Action 2. Promote post-harvest technology for cereal crop and tuber crop, and conduct the research and transfer appropriate post-harvest technology.</p> <p>Priority Action 3. Develop crop variety suitable to AEZ resilient to climate change (include coastal zone).</p> <p>Priority Action 7. Strengthening capacity of Agricultural and agro-industry development entrepreneur and the agricultural cooperative in low emission production</p>	<p>Priority Action 1. Strengthening climate information and EWS</p> <p>Priority Action 5. Climate risk management and upgrading of small, medium and large-scale irrigation infrastructure.</p>	<p>Priority Action 2. Develop adaptation options and guidelines to improve climate change resilience of rural infrastructure</p> <p>Priority Action 4. Scale up microfinance to support GHG mitigation and reduce climate change impact in vulnerable areas</p> <p>Priority Action 6. Build capacity on climate proofing rural infrastructure design, construction and maintenance for civil engineers</p>
--	---	---	--

The project is also in line with Cambodia’s Industrial Development Policy and ADB Country Partnership Strategy for 2014-2018, which focuses on agricultural commercialization, rural infrastructure, and climate change. Furthermore, the project aims to promote resource use efficiency, renewable energy supply and biogas and bioenergy consumption; a priority in the government’s Nationally Determined Contribution (NDC). The promotion of alternative energy is linked to reducing poverty by supplying energy and power to the poor, especially in remote area, which will also contribute to (i) the National Strategic Development Plan 2014–2018 (NSDP); (ii) Rural Electrification Master Plan; (iii) the Cambodia Green Growth Roadmap and National Strategic Plan on Green Growth 2013-2030; and (iv) the policy on bio-digesters (2016 – 2025).

**E.5.2. Capacity of accredited entities and executing entities to deliver**

ADB is a multilateral development finance institution providing loans, grant and technical assistance. ADB is composed of 67 members, 48 of which are from the Asia and the Pacific region. ADB clients are its member governments, who are also the ADB shareholders. In addition, ADB provides direct assistance to private enterprises of development member countries through equity investments and loans. In 2017, ADB loan and grant approvals from its own resources to developing member countries amounted to \$15.9 billion. Private sector operations amounted to an additional \$3.2 billion. Further, ADB mobilized, with donor support, \$9.8 billion in cofinancing, bringing total operations for 2017 to \$28.9 billion. ADB was the first multilateral development bank to be accredited to the GCF, and the first Accredited Entity to mobilize GCF funding to the Pacific region (Fiji). A highlight of ADB’s operational figures for 2017 is climate financing, which reached a record \$4.5 billion (comprising \$3.6 billion for mitigation and \$0.9 billion for adaptation), a 21% increase from 2016. This puts ADB in a good position to achieve its \$6 billion climate financing target by 2020.

The executing entity MAFF, and the other implementing entities such as MOWRAM and MRD, have extensive experience to deal with projects funded by the development partners including ADB. Their experiences include program loans, investment loans and various technical assistance projects. They have adequate internal control systems and financial reporting arrangements, not only for their regular budget and expenditure management, but also for other development partner-funded projects. Additional capacity development support particularly on financial management and procurement to properly implement and comply with ADB procedures will further improve their capacity in these areas. The capacity of executing and implementing agencies on procurement and financial management has been assessed in depth. See Annex 7 for details.

**E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders**

As the project meets national strategic priorities for climate resilient and low carbon development and is aligned with Cambodia's intended nationally determined contribution, the Ministry of Environment (NDA for Cambodia), has expressed support for the project. The Ministry has given the no-objection letter for the project proposal, after conducting a review by the Secretariat of the National Council on Sustainable Development (NCSD). The Ministry of Environment and NCSD will continue to be engaged during project implementation, especially in (i) monitoring and evaluation of climate change actions in the project, (ii) building capacity and supporting policies and measures for mainstreaming climate change concerns in development planning in line ministries, (iii) upgrading the infrastructure and capacity of GMO testing facility of the NAL, and (iv) conserving watersheds in proposed irrigation and water management subproject areas.

The project conducted extensive consultations with diverse stakeholders (national ministries, provincial departments, civil society organizations, development partners and the private sector) since July 2014. The project prepared a detailed stakeholder consultation and participation plan, which includes a stakeholder analysis that identifies the key actors, their interests, and strategies to maximize their participation in the project. Information was gathered from (i) the national institutions to be involved in project implementation; (ii) public and private actors in the agribusiness sector; and (iii) community members living in the target areas. During the project design, members of the project preparatory technical assistance team comprising international and national social development specialists conducted broad consultations to solicit stakeholder input on the project design. Participants included national and provincial government representatives from relevant sectors, NGOs and private sector as well as other development partners and projects. Special sessions focusing on each stakeholder group were held at least six times.

The information and recommendations gathered from the various stakeholder consultations have been incorporated into the design of the project to ensure that the investments align with local priorities and national development plans, and that they will deliver equitable socio-economic benefits to the intended beneficiaries. The results of the pre-implementation consultations are also reflected in the summary poverty reduction and social strategy, gender action plan, and environmental assessments. There is broad community support for the project's approach to combine agribusiness-related infrastructure development with capacity building and agricultural enterprise support to create local employment and income generating opportunities.

Coordination with relevant related initiatives has been sought during the preparation of this proposal. This includes, for example, building on work that is undertaken through the following key projects:

- **Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE)**, supported by IFAD until 2021. The objective of this project is to support an improved model of extension services for Cambodia. The project supports evidence-based policy development; capacity development for extension services; improved extension services; and infrastructure to support climate-resilient agriculture. It targets productive poor people and vulnerable smallholder farmers in the provinces of Battambang, Kampong Chhnang, Kratie, Preah Vihear Pursat, Kampong, Kandal, Prey Veng, Svay Rieng and Takeo. Among the key areas for synergies, the two projects will collaborate on methodologies for extension.
- **Scaling-up of Renewable Energy Technologies in Rural Cambodia (S-RET)**, financed by GEF and IFAD (under ASPIRE project above) in Kampot, Kandal, Prey Veng Svay Rieng provinces and Takeo. The project seeks to promote the broader adoption of renewable energy technologies in Cambodia by lifting key policy and technical barriers. It includes investment in the demonstration of biodigester technology in line with the NBP as well as roll out of non-biodigester technologies such as solar water pumping and efficient biomass cook stoves. Key areas of synergies between the two projects, especially in Takeo and Kampot provinces, include (i) sharing technologies on the design and roll out of biogas digesters, and (ii) support to the technical working group on climate change in agriculture, forestry and fisheries (TWG-CCAFF) to promote policies to facilitate the adoption of renewable energy technologies by farmers.
- **Accelerating Inclusive Markets for Smallholders Project (AIMS)**, supported by IFAD until 2022. This project seeks to develop public private partnerships for key crops, to the benefit of smallholders, using IFAD's public-private-producer partnership (4Ps) model. The project seeks to promote links among buyers, producers and service providers around local value chains, including through a value chain innovation fund, which will provide direct financial support to stimulate private investment. The initiative partners with microfinance

institutions to increase access to rural finance. Key area for synergies between the two projects include knowledge sharing on green finance methods and application through AIMS pilot projects.

### E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

#### E.6.1. Cost-effectiveness and efficiency

The cost-benefit analysis showed that the project is economically viable. The economic internal rates of returns (EIRRs) for the three representative subprojects between 14.0% and 33.7%. In addition, an economic assessment for the domestic bio-digester program revealed an indicative EIRR of 26%. The viability of the sample irrigation subproject may be vulnerable to the average long-term cropping intensity that farmers are able to achieve, but the most important risk for all subprojects would be the lack of necessary skills to operate, maintain and manage the infrastructure and facilities properly. The project will mitigate this risk through provincial level training programs. The government has assured to provide necessary budget for operation and maintenance of infrastructure. The sensitivity analysis confirmed that the project benefits and returns are robust.

A financial and sustainability analysis was conducted from the perspectives of the government and farmers. For the government, the financial sustainability of the project was assessed by comparing incremental recurrent costs (considered to be 2% of the capital cost per annum), with the budget allocation available to cover these costs. Since the MAFF has substantial capacity to cover these recurrent costs, the project is considered financially viable. In addition, sustainability is assured through regulations, which secure payments for laboratory testing services to partially cover the recurrent costs of laboratory equipment and associated infrastructure. Agricultural cooperatives may raise additional revenues to be channeled for operations and maintenance of cooperative infrastructure.

The financial analyses of the representative subprojects show that the project will have significant benefits for rural households in the project areas. For the representative irrigation subproject, estimated net incremental income for households with an average holding of 0.54 ha in the command area is expected to be \$550 per year. Members of cooperatives with drying and storage facilities will benefit from the improved quality of their production, both directly from the cooperative activities and through incentives to improve on-farm practices. At current prices, members who process all or part of their crop into chips will receive \$62 per ton for chips instead of about \$17 for fresh cassava, as well as increased dividends from the trading operations of the storage unit. For average households with a new bio-digester, annual cash benefits are about \$230 from savings on fuel and fertilizers and the impact of bio-slurry on crop yields. Owners of mango orchards in the project areas who adopt drip irrigation after seeing one of the project's demonstration orchards can expect an annual benefit, once full production is reached, of around \$2,000 per ha. The project yields other benefits that could not be monetized, including (i) sound cooperative models for agribusiness operations, (ii) strengthened institutional and human capacity for climate smart agribusiness, and (iii) increased ownership and involvement of farmer groups in operations and maintenance of agribusiness infrastructure.

#### E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

The total cofinancing available for this project is \$101.4 million, inclusive of \$90 million loan from ADB, \$7.6 million from the RGC and \$3.8 million from beneficiaries. It represents a cofinancing ratio of 2.5. The project has significant potential to catalyze long term investment into emissions reduction technologies, including for example the upscaling of biogas and waste-to-energy technologies from household to small town levels, or the application of climate smart agricultural practices and precision farming practices that improve productivity and resilience, and reduce emissions.

#### E.6.3. Financial viability

The government contribution to the project will be 3% of total project cost or about \$7.7 million over the course of the 6-year project. This will be made up of waived taxes (applicable to all sources of funding) and the incremental costs of staff for the Project Management Unit and other government staff who will be involved in project implementation. The fiscal impact of the project will be negligible. In addition, the beneficiary contribution will be about \$3 million over the course of the 6-year project.

Infrastructure outputs from the project will include rehabilitated irrigation schemes, drip irrigation for mango plantations, on-farm ponds, storage and drying units for cooperatives and new or rehabilitated training facilities in the four project provinces. Post-implementation O&M for irrigation, ponds, drip irrigation and storage units will be the responsibility of the respective FWUCs, farmers, orchard owners and cooperatives. The orchards and storage units are commercial units that will be self-funding. For the rehabilitated irrigation schemes, FWUCs will be expected to collect fees from farmers in the command areas to cover operation and maintenance costs. However, such fees may not cover all costs, such as major flood damage, should it occur. Some government funding for these schemes may be required from time to time to ensure that they continue to generate the expected crop production benefits. Provided FWUCs are well established and members are committed to maintaining their systems, the level of sustainability of infrastructure investments under the project should be high. Government's main ongoing fiscal commitment arising from the project will be the project related activities of NAL, CARDI and the training activities of the PDAs in the four provinces. Only a portion of this will be incremental to current budgetary commitments.

#### E.6.4. Application of best practices

The project design has incorporated the best practices from the previous projects in several ways. The lessons include the following:

- (i) Project design must consider the multiple entry points in the value chain, including lateral points of entry;
- (ii) Access to credit is essential for all value chain players and overcoming risk aversion of the finance institutions particularly for "green" financing is particularly important;
- (iii) Strategic, policy and regulatory issues related to the selected value chains and their regional implications must be understood;
- (iv) Project design should consider **O&M** and long-term sustainability of infrastructure by paying adequate attention to the **four critical factors for O&M success**: (a) organizational and institutional arrangements; (b) capacity building (high-quality, timely training on O&M); (c) financing (e.g., revenue collection and cost-sharing mechanisms, and willingness and ability to pay) and (d) technical considerations (e.g., design and technology choices, and complexity) – **discussed in detail in section C7**.
- (v) The private sector needs incentives to take ownership of value chains, with government concentrating on public-good initiatives;
- (vi) The inclusion of small farmers is critical to transform traditional production and supply practices into commercial demand-driven processes that the buyers and processors require within the value chains;
- (vii) Promotion of on and off-farm businesses to improve rural incomes must be facilitated;
- (viii) The trade-off between product specialization and diversification;
- (ix) VC players need to trust each other and consolidate long term relationships; and
- (x) Strengthening sector and producer associations and organizations for value chain coordination and policy dialog with national and regional organizations can play important roles.

In terms of agricultural best practice, the project intends to promote the following:

- (i) SRP practices: The SRP is a global multi-stakeholder alliance aiming to transform rice value chains to enhance resource use efficiency and minimize environmental, social, ecosystem and climate change impacts of rice production. In 2015, SRP launched the world's first rice sustainability standard, along with quantitative performance indicators. Taking a landscape-based approach, SRP works at both farm and policy levels to drive adoption of climate-smart sustainable best practice. Performance indicators include: productivity related indicators, nutrient and pesticide use indicators, food security and safety measures, socio-economic indicators, as well as GHG-related indicators;
- (ii) CSA standards: Good CSA practices will be identified through cooperation with international research centers such as the CGIAR and the Global Alliance for Climate Smart Agriculture; and
- (iii) Good Agricultural Practice standards: The Cam-GAP is the regulatory tool for Cambodia's Food Safety Assurance System monitored by MAFF. It includes norms and standards related to Food Safety, Product Quality, Worker Health and Welfare and Environment Management in various value chains.

#### E.6.5. Key efficiency and effectiveness indicators

<i>GCF core indicators</i>	Estimated cost per t CO <sub>2</sub> eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)	
	(a) Total project financing	\$ 141.4 million
	(a1) Total amount spent on mitigation activities:	\$ 13.6 million
	(b) Requested GCF amount	\$ 40 million
	(b1) GCF amount spent on mitigation activities:	\$ 4.4 million
	(c) Expected lifetime emission reductions overtime	240,000 tCO <sub>2</sub> eq (direct, from renewable energy) 3.25 million tCO <sub>2</sub> eq (indirect, from agriculture, forestry and land use)
(d) Estimated cost per tCO <sub>2</sub> eq (d = a1 / c)	\$ 57/ tCO <sub>2</sub> eq*	
(e) Estimated GCF cost per tCO <sub>2</sub> eq (e = b1 / c)	\$ 19/ tCO <sub>2</sub> eq	
<p>The estimated cost per tCO<sub>2</sub>eq is calculated against the cost of project activities that expect to directly contribute to emissions reduction, meaning the installation of biodigesters, and agricultural cooperative facilities with solar energy sources. Soil carbon sequestration from the application of climate smart agriculture practices in the 4 value chains is considered an indirect contribution. Emission reductions attributed to displacement of chemical fertilizers and the use of bio-slurry as input to CSA and the introduction of climate-smart agricultural practices are not considered due to methodological complexity in assessing these sources, but will contribute to the improvement of the management of land and forest areas, which will also reduce GHG emissions. The emission reductions resulting from the biodigesters were calculated based on (i) the displacement of biomass with biogas for cooking and (ii) reduction of methane emissions through improving animal manure management systems. The first source was calculated with the UNFCCC Non-Renewable Biomass default fraction of 77% and links therefore directly with reducing deforestation. The emission reductions are based on the voluntary Gold Standard Biodigester Methodology used by the NBP Cambodia and are certified on an annual basis. Emissions avoided from the use of solar energy in post-harvest infrastructure were calculated using standard CDM methodology. Emissions reduced through application of CSA practices were estimated using the FAO ex-ante carbon assessment tool. They were as high as 6.5 million tCO<sub>2</sub>eq. Conservative estimates were considered at 50% of this, yielding 3.25 million tCO<sub>2</sub>eq.</p>		
Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)		
<p>In addition to significant levels of cofinancing, the project expects to leverage funding from the NBP, which expects to implement a further 2 million biodigesters, with funding of \$800 million. Additionally, the project leverages household level and NBP funding of \$ 400 per biodigester. While it is impossible at this stage to estimate the value of financing leveraged from private sector, the project expects that by setting the enabling conditions, significant funding flows from financing institutions and private sectors will flow to the sector through green and climate finance.</p>		
Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/ program)	Not applicable	

## F.1. Economic and Financial Analysis

The project has two main parts. Firstly, investment in infrastructure focussed on enhancing value chains for key crops, either directly as for irrigation and drying and storage facilities or indirectly as in facilities for household biogas production or for training that will help improve skills and efficiency along the value chains. Secondly, the project will invest in training and policy development as well as in essential laboratory services and agricultural research aimed at providing farmers with more climate resilient varieties.

The rehabilitation of small scale irrigation infrastructure and roads clearly fall under the public sector. Project investment in drying and storage facilities for cooperatives will demonstrate the financial and economic viability and benefits of this type of investment to government, cooperatives and the private sector and will in turn attract future investment in similar facilities from cooperatives on their own account or in partnership with private sector players. Project investments in drip irrigation for mangoes will serve the same purpose of demonstrating to mango orchard owners the benefits of such facilities and thereby encourage their investing in this technology for themselves.

Investment in training for the agricultural sector and in laboratory and agricultural research has traditionally been provided in Cambodia by the public sector. Investment in these activities by the private sector is not likely unless the legal, institutional and economic conditions are in place to enable private sector participation and ensure the possibility of a return on investment. For the time being, the responsibility for investment in these activities remains with the government.

Feasibility studies were conducted for three representative subprojects, namely a reservoir and irrigation system rehabilitation, a mango drip irrigation system and a cooperative storage facility. No economic assessment was made for the training, institutional and policy related activities. The key assumptions used for these economic analyses are:

- (i) The project life is 20 years, including construction; the salvage value at the end of the project life is zero;
- (ii) Implementation of the subproject will be over two years with benefit flows expected to start from the year following the completion of construction;
- (iii) Costs and benefits are expressed in constant third quarter 2016 in dollars and are valued using the domestic price numéraire;
- (iv) Taxes and duties, interest and price contingencies are excluded from the economic cost; and physical contingencies are included;
- (v) For tradable goods and services, economic costs and benefits are derived by adjusting their values by the shadow exchange rate factor of 1.1 and removing taxes;<sup>44</sup>
- (vi) A shadow wage rate factor of 0.9 has been used for unskilled labor;<sup>45</sup> and
- (vii) The opportunity cost of capital adopted in the analysis is 12%, which represents the opportunity cost of capital in Cambodia.

The following is a summary of the economic and financial analysis (EFA) of the three subprojects. The detailed EFA report is provided in Annex 3. While the assessment did not attempt to quantify the benefits of climate resiliency strengthening made possible by GCF financing, it can be expected that the subprojects' economic and financial viability will be further strengthened. Climate resilient design reduces the subprojects' vulnerability to extreme weather conditions, thereby reducing routine maintenance requirement and reducing the magnitude of crop losses.

### Trapaing Run Irrigation Rehabilitation

Trapaing Run Reservoir and irrigation system is located in Tani commune of Angkor Chey district of Kampot province. The reservoir and its command area of 100 ha are shared among three villages with 185 households with 832 family members of which 708 are expected to benefit directly from the rehabilitation of the system. The system was constructed during the Khmer Rouge regime between 1975 and 1978 and since then has had very little maintenance. The works to be undertaken by the project will be rehabilitation of the embankment, deepening of the silted reservoir, renewal of the

<sup>44</sup> The data required to estimate the SERF (and SCF) has not been available. A SERF of 1.1 has therefore been used, with variations in this value tested in the sensitivity analysis to check the impact on the results of the assessment.

<sup>45</sup> Variations in the SWRF are tested in the sensitivity analysis.

control structures and the construction of new main and secondary canals and the main drain. Training and support will also be provided for the establishment of a FWUC to take over O&M of the system. The subproject has an EIRR of 16.1%. The project is robust against a range of adverse scenarios.

#### Trapaing Run Irrigation – EIRR

	ENPV (USD)	EIRR (%)	SI	SV (%)
Base Case	133,543	16.13%		
-10% With project yields	3,930	12.13%	9.71	-10.30%
+10% Capital costs	85,289	14.44%	-3.61	27.67%
+10% O&M costs	130,469	16.04%	-0.23	434.34%
+10% Capital, +10% O&M costs <sup>a)</sup>	82,214	14.35%	-3.84	26.02%
+10% Crop input costs	106,522	15.30%	-2.02	49.42%
+20% Crop input costs	79,502	14.47%	-	-
-10% With project crop area	58,066	13.80%	5.65	-17.69%

Source: ADB Consultants' estimates

#### Mango Drip Irrigation Demonstration

The mango orchard for the pilot is located in Trapang Kranhoung commune and Tram Kok district of Takeo province. The orchard is 2.5 ha in area, is in its fifth season and has produced fruit in the last two years. The farm is owned and managed by a local farmer who lives in the community where the farm is located. With only a single crop per year, orchard production is likely to increase to about 7 tons per ha from the sixth or seventh year after planting. Floral manipulation results in the trees producing two crops of mangoes per year, almost doubling output. This is easier to manage successfully in orchards with irrigation, which, if properly managed, will give yields for both crops about 30% higher than without irrigation. The subproject benefits have been estimated with a crop budget for mangoes that compares production with floral manipulation and without and with irrigation. The crop budget includes orchard establishment costs of \$1,905 per ha with the first crop in the third year. Full production is from year 6. The results of the economic assessment and sensitivity analysis are given in Table 3. The EIRR for the subproject is 23.3%, reflecting the significant benefits that drip irrigation provides to both the quantity and quality of mangoes produced.

#### Mango Drip Irrigation – EIRR

	ENPV (\$)	EIRR (%)	SI	SV (%)
<b>Base Case</b>	<b>12,142</b>	<b>23.25%</b>		
-10% With project yields	10,043	21.46%	1.73	-57.86%
+10% Capital costs	10,539	21.07%	-1.32	75.73%
-10% Capital costs	13,745	25.83%	-	-
+10% Orchard operating costs	12,028	23.15%	-0.09	1064.58%
-10% Orchard operating costs	12,256	23.35%	-	-
+25% Grade A % with project (50% of grade composition)	18,903	28.75%	2.23	-44.90%
+50% Grade A % with project (60% of grade composition)	25,664	33.97%	-	-
-10% Mango prices	9,152	20.69%	2.46	-40.61%
-10% Mango prices, -10% with project yields <sup>a)</sup>	7,263	19.02%	4.02	-24.89%
+10% Capital costs, -10% with project yields <sup>a)</sup>	8,440	19.39%	3.05	-32.80%

Source: ADB Consultants' estimates

#### Seda Seanchey Cooperative Storage Facility

The market price for cassava in Cambodia is strongly influenced by the demand from neighboring countries. Approximately 90% of the cassava produced in Cambodia is exported to Thailand and Viet Nam with the remaining 10% sold for domestic starch processing and the export of cassava chips to China. The exports of chips to Thailand and Viet Nam in 2015 were 1.79 million tons and 330,874 tons, and exports of fresh roots were 106,500 tons and 464,020 tons respectively. The subproject will provide a 200-ton capacity cassava storage facility and associated drying floor. The store will allow the cooperative to consolidate the product in sufficient quantities to facilitate closer linkages with processors and traders. The drying area will provide for uniform product through the introduction of sound selection, processing, drying and storage techniques. Cooperative members will also participate in project supported training and capacity building in accounting, agribusiness, cooperative management and O&M of the storage units as well as for improving on-farm production.

The direct, quantified benefits of the subproject are the trading margins from the management and operation of the storage facility. This benefit accrues from the service of buying cassava chips from members and other growers, storing up to 200 tons at any time until they are needed by (mainly) Vietnamese traders and processors further down the value chain. The storage unit provides selling power that will enable the cooperative to benefit from higher prices for their product than they would otherwise obtain. Only these benefits are included in the economic analysis. Indirectly, cooperative members who grow cassava, and other cassava growers in their immediate area, will benefit from the incentive to improve cassava cultivation and increase yields and to undertake the cutting and drying of some of their own production to take advantage of the greater returns on the sale of chips compared with fresh cassava.

Since cassava can be harvested throughout much of the year, the facility will operate for most of the year, once management skills and markets are developed. The average storage period is assumed to be 3 to 4 months with, once the management is fully operational, 3.5 complete “cycles” per year (i.e. total throughput of 700 tons of cassava chips). However, if this level is not achieved and the volume handled in year 5 reaches only 600 tons (3 cycles equivalent) then the EIRR would be 16.7%. The eventual volume handled will depend on efficient management and well-established linkages to growers and to buyers. Since management of the facility will entail a learning curve and time to establish up and downstream market linkages, it is assumed that this level of activity is only achieved in year 5, after starting with a volume of 100 tons in the first 12-month period.

The EIRR for the subproject is 18.8%, which is robust against adverse risks.

#### Seda Seanchey Cooperative Cassava Storage Facility - EIRR

	ENPV (USD)	EIRR (%)	SI	SV (%)
<b>Base Case</b>	<b>58,007</b>	<b>18.76%</b>	-	-
+10% Storage costs	52,999	18.19%	-0.86	115.85%
+10% Capital costs	49,114	17.42%	-1.53	65.23%
-10% Capital costs	66,899	20.29%	-	-
+100% O&M (2% of the capital costs per year)	53,626	18.31%	-0.08	1324.32%
Benefits delayed one year	9,101	12.99%	-	-
+14.3% No. of storage cycles in year 5 (+0.5 cycle)	80,050	20.83%	2.66	-37.63%
-10% Cassava chip prices	34,010	16.05%	4.14	-24.17%
-10% Cassava chip prices, +14.3% No. of storage cycle in yr 5	53,534	18.03%	-	-

Source: ADB Consultants' estimates

Notes: 1) Purchase and sale price of chips varying by same percentage  
2) Capital excluding training and project management costs

## F.2. Technical Evaluation

Technical evaluation was conducted for technologies introduced in the project, and the following technical considerations were established, as conditions for implementation. A detailed technical feasibility assessment was completed for three representative subprojects. Please refer to Annex 2 Feasibility Studies.

**Rehabilitation of Irrigation Infrastructure.** The project involves rehabilitation and modernization of at least 27 irrigation and water management systems to become climate resilient. Considerations for this work include choice of appropriate technologies such as lining of canals to reduce water losses, balance between water demand and raw water availability, storage capacity, regulation of flow rates, including adequate flow capacity of regulators and other structures to prevent or reduce scour, water allocation within the command area, flood resilience, drainage and salinity control.

**Drip Irrigation technology.** The project involves the implementation of 10 drip irrigation systems to enhance quality and quantity of mango production. Considerations for this work will include availability and quality of groundwater, particularly to assess arsenic levels. Specific capacity building material will be incorporated in the implementation of these subprojects to draw farmer attention to the need for care in the application, storage and disposal of containers used for the flower/fruit enhancement.

**Water Harvesting Ponds.** The project includes the construction or rehabilitation of 800 on-farm surface water catchment ponds. These ponds will be used for supplementary irrigation and will be sited to collect surface run-off. The construction will incorporate clay lining and sediment traps to avoid excessive sedimentation.

For all water infrastructure activities (irrigation, drip irrigation, catchment ponds), access to a sustainable and reliable water source is included as a key sub-project selection criterion. Access to water under climate change scenarios is also considered. Several studies confirmed that:

- Cambodia is a “water rich” country with a renewable water resource amounting to 32,695 m<sup>3</sup>/person/year. FAO Aquastat estimates suggest that total renewable water resources are about 476,000 million m<sup>3</sup>/year while withdrawals are about 2.184 million m<sup>3</sup>/year, of which 94% are for agriculture.<sup>46</sup>
- ADB conducted a detailed water accounting study covering river basins of the entire country. Kampong province is in Basin group 1 while the other three target provinces (Kampong Cham, Tbong Khmum, and Takeo) are in basin group 3. In all target provinces, estimated withdrawals in proposed irrigation sub-projects are much less than the available resources.
- Under climate change scenario, the combined effects of decreasing rainfall, increased evapotranspiration and runoff and sea level rise are expected to result in modified river flows in the major watersheds and river basins. For example, Cambodia is likely to experience changes in the flows of the Mekong River, “altering the area’s unique flood pulse system and therefore also the high aquatic productivity of the lake-floodplain system”<sup>47</sup>. Under climate change scenario, flows in the major watersheds and river basins are expected to be modified, with an anticipated maximal decrease of 6% by 2030. The most significant impact will be a modification of the flooding regimes and hydrological systems rather than an anticipated decrease in absolute water quantity.

Given these studies, it is anticipated that within the short-term, and up to 2100, there will be no significant constraints related to water availability. The measures proposed in this project constitute no-regrets adaptation options, in that they will also promote increased water conservation (in improved reservoirs), reduced run-off (catchment ponds and watershed management), and increased water use efficiency (drip irrigation, laser land leveling, climate smart agricultural practices, and improved varieties).

**Cooperative Stores.** Project activities include the construction of an estimated 50 Cooperative Stores, and it is important that planning and design considerations ensure that these stores conform with the following requirements: (i) proposed buildings/stores be positioned such that they are not in flood prone areas; and/or (ii) specified to ensure that the structure and contents will be above any anticipated 1:100 year flood zones.

<sup>46</sup> FAO Aquastat, available at : [http://www.fao.org/nr/water/aquastat/countries\\_regions/Profile\\_segments/KHM-WU\\_eng.stm](http://www.fao.org/nr/water/aquastat/countries_regions/Profile_segments/KHM-WU_eng.stm)

<sup>47</sup> Water and Climate Change in the Lower Mekong Basin: Diagnosis and recommendations for adaptation, Helsinki University of Technology and Southeast Asia START Regional Center, 2009.

**Biodigester Screening.** The project aims to install about 12,000 biodigesters and 6,000 compost huts in target provinces, and harness the fertilization potential of bio-slurry for households. This collaboration will see training in both the construction and use of the biodigesters, particularly the handling of recycled slurry as an alternative fertilizer. There are currently no national standards associated with the use of domestic biogas and the project administrative manual details the terms of reference for consultancies to develop them.

**Rural access roads and commune tracks.** The project proposes the improvement of rural roads and tracks within communes (km to be defined), which will focus on linking some of the proposed 50 cooperative storage and drying units to be supported by MAFF, in two ways: (i) linking farm units and the production zones to the storage units; and (ii) connectivity of the stores to all-weather and or climate resilient roads, the latter being more durable structures to tolerate heavy transport and delivery trucks.

### F.3. Environmental, Social Assessment, including Gender Considerations

**Environmental Assessment.** The initial environmental examination (IEE) was prepared following the ADB Safeguard Policy Statement (2009), and relevant environmental policies and guidelines of the government. The project is classified under ADB guidelines/rules as a Category B project. Such projects are judged to have some adverse environmental impacts, most of which is occurring during the construction phase, but to a lesser degree and/or significance than those for category A projects. An IEE is required to determine whether or not there are significant environmental impact, which will warrant an environmental impact assessment (EIA). If an EIA is not needed, the IEE is regarded as the final environmental assessment report. (please refer to Annex 6 for detailed Environmental and social safeguards assessment)

The initial rapid environmental assessment (REA) for the project identified a medium climate risk, however the AWARE classification is that of High risk. The project preparation technical assistance team prepared a climate change assessment document, included in due diligence. In addition, there is a need to undertake a climate risk and vulnerability assessment for subprojects, including construction and operational (post construction) periods. This work has been included in the terms of reference for an international climate change and environmental specialist to complete during Implementation, and to be site specific.

The environmental impacts will be measured to mitigate through good design of infrastructure. Mitigation of construction-phase impacts relies heavily on responsibility of works contractors, to follow specification clauses specifically designed to minimize noise nuisance, road accident, pollution of air and water and soil erosion, illegal solid waste disposal and waste water discharge, conflict between up-dream and downstream water users, worker safety and sanitation. This mitigation will in turn rely on enforcement by the PMU environmental and social management officer and also by construction supervision consultants. Post-construction mitigation will benefit from capacity building and training under the project for each subproject's activity.

The IEE includes an environmental management plan, which will be implemented by a contractor to avoid or minimize negative environmental effects by following the IEE documents. To ensure that the contracting company are able to implement the mitigation measures effectively, the PMU will put in place the following arrangements: (i) environmental specifications will be included in the bidding documents to contractors; (ii) an appropriate environment section describing standards and responsibilities will be included in the terms of reference for bidders; and (iii) clauses referencing the EMP mitigation provisions and monitoring plans will be written into the construction contracts. Following the award of contracts, the successful contractor will prepare a Site Environmental Management and Supervision Manual, including an emergency preparedness and response plan for construction emergencies and site environmental health and safety plan, for approval by the PMU. The contractor will prepare quarterly report on environmental management to the PMU. The PMU's safeguard officer will be active in site supervision, management and appraisal, particularly during construction, so as to identify problems and solve them timely.

**Involuntary resettlement (category B).** During project preparation, some irrigation subprojects were identified that would require acquisition small strips of land to accommodate improvement of distribution canals. These small strips of land may be acquired through (i) voluntary donation, or (ii) negotiated settlement, or (iii) involuntary land acquisition and resettlement for those not willing to donate land voluntarily. If there is no involuntary settlement, there will be no need to prepare resettlement plans. A rigorous due diligence procedure to verify voluntary donation bona fides was included in the Resettlement Framework, which was uploaded to the ADB website, will be used to further screen and select subprojects during implementation. The cassava drying and storage facility involves an agricultural cooperative

that will purchase its own land if needed under a private commercial transaction independent of the project and using the cooperative's own resources. For drip irrigation, a selected small holder will receive drip irrigation infrastructure installed on his/her own land in exchange for allowing the technology to be tested and act as a working example. The smallholder will receive the infrastructure free of charge and no land is acquired by the project. The project will not finance any category A subprojects. Adequate resources have been allocated for social safeguards preparation, implementation, monitoring, and reporting.

**Indigenous peoples (category B).** There were no indigenous peoples or ethnic minorities in areas of representative subprojects. However, there are some ethnic minorities living in project provinces and districts who could be impacted by subprojects identified during project implementation. An ethnic minority development framework, which will ensure inclusion, full consultation and participation of ethnic minority households and communities was prepared and uploaded to the ADB website.

Adequate resources have been allocated for environmental and social safeguards preparation, implementation, monitoring, and reporting. The institutional capacity of MAFF to manage environmental and social impacts is considered adequate, based on prior experience in implementing the ADB projects. Training of staff at both national and provincial levels on social and environmental safeguards will continue during project implementation, as needed.

**Gender considerations.** The subproject areas have between 11% and 25% ID Poor rates, between 7 and 16% female-headed household rates, and 7 to 9% outmigration rates. Women and men differ in their roles and in their economic, educational, and health status. Heavy physical work is almost always men's responsibility. Women are exclusively responsible for managing household budgets. The health status of rural women is likely to be worse than men's and their workload is traditionally greater.

Findings from the participatory assessments indicate that there is joint access and control to productive resources such as land. The land title they possess is in both their names and joint agreement is necessary before land can be sold off. There is joint access to and control over capital, i.e. money. For accessing a loan, the bank requires both signatures on the loan agreements. Women usually take care of identifying different sources of loans. The access to information, knowledge and education is still limited for both men and women. Women are less likely to be functionally literate. In general, invitations to commune-level extension training activities are made to the head of household, who is the husband. Women are only allowed to participate in organized extension training when the husband is absent and he has given his permission – by telephone if he has out-migrated from the village. Women have expressed keen interest in receiving practical information on rice variety selection and they also would like to visit field crop demonstrations. The use of visual teaching aids to enhance understanding has also been specified.

There is equal access of men and women to markets. Both husband and wife jointly agree when, where and to whom to sell the crop, but it is the wife who contacts the local (usually female) collector by telephone. There is a low level of knowledge of market information amongst households and the price is set by the local collector. It was recommended that subprojects should disseminate market information to local farmers, particularly women, who interact with the collectors. Regarding the beneficiaries' absorptive capacity for the proposed subprojects, the different ways men and women will participate was assessed. There is a good fit for the subprojects in the local society and culture. Both men and women were motivated to take part and gain benefits from the three subprojects. However, their knowledge, skills, and organizational resources differ. Women are aware of their own technical shortcomings but express an eagerness to learn new techniques, and they are aware that they have had fewer opportunities than their husbands to receive agricultural training. Women appear more eager to learn about the potential for income-generating activities and increasing household income. This is driven by the fact that household debt is a constant worry. Since husband and wife jointly control land and capital, the subprojects are unlikely to adversely affect women's access to and control of resources.

Regarding the capacity of institutions to address gender issues, anecdotal evidence from interviews and meetings held in subproject areas suggest that the provincial level of Department of Agriculture has been less than effective in ensuring that services and capacity building are adequately delivered to women who now make up the majority of rural populations. This should be investigated further both at national level (MAFF-GCPSU) and at sub-national levels through the gender focal points. There are very few female extension agents, and invitations to agricultural training are rarely extended to household members other than the (male) head of household. Building capacity of female staff and female extension workers both at national and provincial levels is therefore considered essential. Low productivity in the target areas stems from weak extension services and farmers' lack of knowledge of optimal techniques and input

use. Focus group discussions in the three subproject areas explained that because only heads of households are invited to meetings held by extension staff, women farmers have less access to extension services than men.

The Women Farmer Network (WFN) might be able to contribute to project outcomes by sharing information on appropriate activities and offering support to women farmers. The network could also be a more substantive partner in implementation and monitoring as it is a good fit for the CFAVCP and can act as a vector for reaching women for all the technical training and cooperative organization and management. The network is also linked to the Savings for Change Groups, which facilitate financial literacy, savings and small-scale lending at community level. At commune level, the presence of Commune Women and Children Focal Points, should ensure follow-up and feedback of women's concerns regarding project activities.

### **Gender Action Plan (GAP)**

The project is categorized as 'effective gender mainstreaming' and will involve activities that will contribute to gender equality and women's empowerment. The main activities contained in the GAP are described in this section. The GAP mirrors the design and monitoring framework and has links to MAFF Gender Policy, particularly Objective 4 - increasing the ability of rural women to access and manage resources. The design features consider local aspirations as identified by women during participatory consultation as well as government representatives during the national consultations. Women expressed the desire to be trained, to be updated with agriculture developments, to participate in planning, demonstrations, decision-making and to be consulted on infrastructure design related to community-based subprojects.

In subprojects where there are civil works related to infrastructure (such as subproject 1), community-based construction committees will be established to provide a mechanism for community input to the planning, survey and design of that infrastructure, particularly with respect to canal alignments. Community representatives will disseminate information from construction engineers to their communities. Women's meetings at village level will be held to discuss designs, and feedback will be given to subproject planners and engineers. It is important that the community sign-off on the final design before it is submitted to the EA and ADB for approval.

Women will represent at least 40% of all participants in consultations, and planning workshops. Efforts will be made to bring meetings and trainings to the village level at appropriate times and to organize community based child supervision will be organized in order to facilitate women's participation in public events.

Contractors will target 25% women for skilled and unskilled labor, and regularly report on labor days disaggregated by sex. Contractors will uphold the core labor standards, including not employing child labor. Men and women will receive equal pay for equal work. Women will represent at least 30% of the total trained in infrastructure related construction/ rehabilitation (e.g. masonry skills for bio-digesters construction), and operation and maintenance (e.g. local irrigation schemes). Women will participate in all promotional campaigns in all subproject areas will be implemented related to introducing energy-saving, clean (renewable) power supplies for households such as bio-digester units.

Stronger links between small farms operated by women in subprojects 1, 2 and 3 and the agro-processing and agribusiness industry are to be facilitated through productive partnerships (e.g., contract farming), training in business and other skills, and provision of market information. Priority will be given to women led or owned enterprises and cooperatives that meet at least one of the following criteria (i) at least 50% of senior managers are women, and/or (ii) at least 50% of enterprise ownership is controlled by women, and/or (iii) at least 50% staffs are women.

At inception, the project will conduct a gender analysis for each of the four targeted value chains and develop a set of clear policy and program recommendations to strengthen women farmers' involvement along the different value chains. This activity will also ensure that capacity is built within MAFF/ Gender & Children Project Support Unit (GCPSU) for gender responsive value chain analysis and develop methodology/guidelines that can be used in future analysis. The gender focals will participate in policy dialogue and integrate key recommendations from the gender analysis of value chains and key features of the MAFF Gender Policy into the agribusiness policy and other related documents prepared under the project. Gender stakeholders (MAFF GCPSU representatives, gender focal points, and WFN) will actively participate in policy committees and meetings.

The project will involve women farmers and WFN representatives actively and meaningfully in **each** individual event for all capacity-building activities (trainings, demonstrations, study tours) supported by the project:

- (i) agricultural extension and technical capacity-building activities including those related to climate change adaptation and mitigation;

- (ii) trainings on how to operate and maintain a range of agricultural machinery; and,
- (iii) management (incl. leadership, negotiation) and business skills trainings.

Women will have the opportunity to be trained to operate a range of agricultural machinery, representing at least 40% of the increased labor pool over baseline by end of project. In all subproject areas women's ability to prepare for climate-related disasters and build resilience to impacts will be developed. All women in target areas will have access to information on climate change mitigation, improving climate resilience and resource efficiency.

Agricultural extension activities related to irrigated rice production (subproject 1), mango production (subproject 2) and cassava production, processing and trading (subproject 3) in project intervention areas will work with the agricultural cooperatives and through the WFN to increase training of more female farmers and extension workers, the use of visual aids, varied information and communication technologies to improve extension outreach, and promotion of more active participation of women in farmer extension groups, as well as making child supervision services accessible, are measures to empower women and bring economic benefits.

#### **F.4. Financial Management and Procurement**

The loan and grant proceeds will be disbursed in accordance with ADB's Loan Disbursement Handbook (2015, as amended from time to time), and detailed arrangements agreed upon between the government and ADB. The PMU is required to prepare budgets for significant activities as stated in the loan agreement and PAM with sufficient details to allow meaningful monitoring of the subsequent performance. The fund flow is arranged and disbursed based on the government's standard operating procedures and FMM and ADB's procedures with further discussions among concerned parties, such as MAFF, MEF, and ADB. Financial management risk assessment was conducted and presented in Annex 7.

All consulting services will be procured by MAFF-PMU. Procurement of civil works contracts for the subprojects will be carried out by the PMU and in conjunction with MRD and MOWRAM national technical departments, where appropriate, within the PMU will provide national technical support (NTS) of the concerned ministry following NCB procedures. A bid evaluation committee will be formed and the PIC will assist the committee in the opening and evaluation of tenders. Recommendations which bid to accept will be passed on to the PMU for contract award. The procurement of goods, works, and consulting services will be procured in accordance with the government's procurement manual for externally financed projects in Cambodia updated version May 2012 and the ADB's Procurement Guidelines (2015, as amended from time to time) and consulting services guidelines (March 2013, as amended from time to time) in case of consulting services. Within the four provinces, a number of subprojects have been identified by the design consultants, primarily related to (i) irrigation and water management systems; (ii) drying and storage units; (iii) surface water catchment ponds; and (iv) pilot drip irrigation systems.

Several subprojects have been pre-screened to ensure consistency with eligibility criteria including ADB and the government's social and environmental safeguards. The eligibility criteria are Section C of the proposal. Procurement plan is in Annex 11.

### G.1. Risk Assessment Summary

The area of detailed risk assessment and identification include: (i) governance, (ii) administrative, (iii) fiduciary, and (iv) technical. The main challenge arises in managing complex nature of multifaceted sector development project involving multiple stakeholders. The implementation large-scale project involving large volume of procurement and mobilization of big fund within the constraints of relatively weak institutional capacity possess additional challenge. Already limited capacity to operate and maintain small infrastructures will be further exacerbated by the effects of climate change.

However, the risks are manageable and if the mitigation measures and procedures outlined below are implemented. Overall the project's benefits are expected to outweigh the potential risks (please refer to Annex 7 for details).

### G.2. Risk Factors and Mitigation Measures

*Please describe financial, technical and operational, social and environmental and other risks that might prevent the project objectives from being achieved. Also describe the proposed risk mitigation measures.*

#### Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
<p><b>Governance</b></p> <p>The complexity of managing a multi-sector value chain development project may be an issue.</p> <p>The capacity of Project Management Unit (PMU) on infrastructure design and procurement can be a weakness when considering the volume of procurement and its monitoring requirement.</p> <p>Lack of interagency coordination</p> <p>The implementing agencies (IAs) in the provinces have capacity weaknesses to oversee and monitor the infrastructure subprojects, capacity building support and report progress</p>	Technical and operational	High (>20% of project value)	Medium

#### Mitigation Measure(s)

Already there are other Asian Development Bank (ADB) sector loan projects and lessons learned from those projects will be assessed and the issues highlighted will be addressed, through regular Project Steering Committee (PSC) meetings. The MAFF PMU will be able to utilize a range of international experts and advisors that have the capacity to provide support in reviewing design, elaborating tender documents and managing contractors. Furthermore, consultants have been designated to not only assist in infrastructure establishment but also to support operations and maintenance (O&M) activities, with resultant transfer of responsibilities to the concerned stakeholders.

Focal points from the Departments of Technical Affairs of the main participating ministries; MAFF, MOWRAM and MRD will be identified to actively participate in support of the PMU. Furthermore, training will be provided to the PMU staff on procurement, contracting and monitoring subproject investments. The Project will address interagency coordination issues by nominating technical focal points from the main implementing agencies; General Department of Agriculture (GDA), MOWRAM and MRD who will be part of the PSC that will sit twice yearly. The mobilization of implementation consultants and the use of GDA (MAFF), MOWRAM and MRD technical focal points will address that issue. The IA staff will through formal and on-the-job training have the capability to overcome weakness in subproject monitoring and progress reporting.

#### Selected Risk Factor 2

Description	Risk category	Level of impact	Probability of risk occurring
<b>Procurement</b> Heavy workload for the PMU staff The slow response of ADB to endorse procurement documentation or request further clarification	Technical and operational	Low (<5% of project value)	Low
Mitigation Measure(s)			
The design consultants have kept to a minimum the number of procurement packages.  Within the MAFF establishment there exists a cadre of experience from officers within ongoing and those from the previously implemented ADB projects that can provide guidance and support to the PMU.			
<b>Selected Risk Factor 3</b>			
Description	Risk category	Level of impact	Probability of risk occurring
<b>Public Financial Management</b> Shortfall or delays in counterpart funding	Financial	Low (<5% of project value)	Low
Mitigation Measure(s)			
The fiscal obligations of the participating line agencies and provincial implementing agencies (IAs) have been minimized by nominated selected government staff officials. Arrangements to pay supplementary incentives out of loan funds have been made.			
<b>Selected Risk Factor 4</b>			
Description	Risk category	Level of impact	Probability of risk occurring
<b>Anti-corruption</b> Collusion in issuing tenders and the potential for corrupt practices	Technical and operational	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
Experienced and impartial officials will be selected in the tender evaluation committees and the PSC will have oversight on major contracts. Bidding evaluation and selection will be monitored fully including reviews by consulting engineers. Potential contractors will be issued with strict instructions on bidding process in line with ADB procurement procedures.			
<b>Selected Risk Factor 5</b>			
Description	Risk category	Level of impact	Probability of risk occurring
<b>Implementation of Subproject investments</b> The O&M of the irrigation schemes, drip irrigation pilot project projects, ponds and the cooperative drying and storage units may be inadequate	Technical and operational	Medium (5.1-20% of project value)	Medium

Mitigation Measure(s)			
<p>The Ministry of Economics and Finance (MEF) has made commitments to release funds to support irrigation scheme operation of maintenance to MOWRAM (\$15 million in 2017). Within the design, the project will have private contractors operating drip irrigation demonstrations and will also have capacity building interventions for Farmer Water User Communities (FWUCs) and agricultural cooperative members in the management and operation of infrastructure provided as part of management and agribusiness initiatives. For sustainability, FWUC and agricultural cooperatives will be made aware and have in the cooperation agreements that O&amp;M costs have to be covered by service fees or as part of agribusiness recurrent expenditure. <i>Further details on infrastructure O&amp;M arrangements are given in section C7.</i></p>			
Selected Risk Factor 6			
Description	Risk category	Level of impact	Probability of risk occurring
The effects of climate change may damage project investments	Social and environmental	Low (<5% of project value)	Low
Mitigation Measure(s)			
<p>The infrastructure supported by the project considers climate resilience and has adaptation measures incorporated in the design. The project implementation consultants will review the designs at the start of the project prior to calling for proposals and tenders</p>			
Other Potential Risks in the Horizon			
N-A			

**H.1. Logic Framework.**

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level <sup>48</sup>						
Paradigm shift objectives						
<i>Increased climate-resilient sustainable development</i>	<ul style="list-style-type: none"> <li>Climate change adaptation measures introduced in the project will support sustainable and competitive agricultural value chains, through provision of climate resilient infrastructure (water management systems, farm roads, agricultural cooperatives, post-harvest facilities), deployment of climate resilient varieties, introduction of climate-friendly agricultural production practices and technologies, and formulation of climate-smart agribusiness policies and standards.</li> <li>The project will build an enabling environment for effective adaptation by strengthening capacity of financial institutions on green finance for agribusiness, enhancing the role of private sector in climate change adaptation through public private partnerships, and raising awareness of farming communities on climate risk sharing instruments such as crop insurance using ICT, thereby contributing to increased trust between farming communities and the private sector.</li> <li>The project will enhance adaptive capacity of vulnerable communities in target provinces by improving rural household incomes through increased crop yields, reduced costs of inputs and efficient use of agricultural inputs. The project will promote on-farm and off-farm value addition which in turn will generate additional employment and contribute to building social capital.</li> </ul>					
<i>Shift to low-emission sustainable development pathways</i>	<ul style="list-style-type: none"> <li>Through providing support for introduction and expansion of biodigesters, the project will reduce the drudgery of local communities, especially women, in collecting fuelwood for cooking. It will in turn reduce land degradation and deforestation, and increase carbon sinks, while also contributing to an integrated sustainable crop-livestock system by using bio-slurry as fertilizers for crops.</li> <li>The project will strengthen the agricultural cooperatives and provincial agricultural development centers to serve as catalysts in promoting the use of solar energy with a view to reduce fossil fuel dependence in agricultural operations along the value chain.</li> </ul>					
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-Term	Final	
Fund-level impacts (Adaptation)						
<b>A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions</b>	Total number of direct and indirect beneficiaries;  Number of beneficiaries relative to total population	MAFF census; Gender-sensitive household surveys	0	110,000 direct beneficiaries, of which at least 40% are women 321,000 indirect beneficiaries  Total number represent 3% and 13% of national population and population of the four target provinces, respectively	390,000 direct beneficiaries, of which at least 40% are women 975,000 indirect beneficiaries  Total beneficiaries: 1,365,000 direct and indirect beneficiaries represent 9% and 42% of national population and population of the four target provinces, respectively	Farmers are willing to participate the project's interventions and up-scale climate-resilient agricultural practices and engage in climate-resilient value chain development

<sup>48</sup> GCF Performance Measurement: [http://www.gcfund.org/fileadmin/00\\_customer/documents/Operations/5.3\\_Initial\\_PMF.pdf](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf)

	A1.2 Number of males and females benefiting from the adoption of diversified, climate resilient livelihood options	MAFF census; Gender-sensitive household surveys	0	20,000 farmers, of which at least 40% are women	40,000 farmers, of which at least 40% are women	Willingness of farmers to participate and up-scale climate-resilient agricultural practices and climate-friendly value chain development
<b>A2.0 Increased resilience of health and well-being, and food and water security (e.g. climate-resilient crops, efficient irrigation systems, etc.)</b>	A2.2 Number of food-secure households (in areas/periods at risk of climate change impacts)	MAFF census; Gender-sensitive household surveys	0	100,000 direct beneficiaries, among which at least 40% are women, representing about 33,300 households.  321,000 indirect beneficiaries (approximately 63,000 households)	390,000 direct beneficiaries, among which at least 40% are women, representing approximately 80,000 households.  975,000 indirect beneficiaries (approximately 190,000 households)	Market demand for the four targeted crops continue to increase at national and regional level
<b>A3.0 Increased resilience of infrastructure and the built environment to climate change threats</b>	A3.1 Number and value of physical assets made more resilient to climate variability and change, considering human benefits	Project reports; MAFF assessments	0	10 water management systems constructed and upgraded to climate standards;  10 post-harvest storage facilities built or upgraded to climate standards;  100km of farm roads upgraded to climate standards.  4 provincial agricultural development centers and 1 national Agriculture Testing Lab (NAL) rehabilitated;	27 water management systems constructed and upgraded to climate standards; 33 post-harvest storage facilities built or upgraded to climate standards;  250km of roads upgraded to climate standards;  4 provincial agricultural development centers and 1 national Agriculture Testing Lab (NAL) rehabilitated; Total value of assets: USD 111 million	Government contribution and communities' contributions materialize in the form of operations and maintenance;

<b>Fund Level Impacts (Mitigation)</b>						
<b>M1.0 Reduced emissions through waste management and increased low emission energy access and power generation</b>	Tons of carbon dioxide equivalent (t CO <sub>2</sub> eq) reduced or avoided	Monitoring emissions using Gold Standard Biodigester Methodology (NBP)	0	A reduction of 100,00 tons of CO <sub>2</sub> -eq by mid-term	A reduction of 240,000 tons of CO <sub>2</sub> -eq by 2024	Willingness of households to participate and switch to biodigesters and using bio-slurry as fertilizer
	Volume of Finance leveraged by Fund funding	Project financial reports	N-A	8 million in direct co-financing leveraged	13.6 million in direct co-financing leveraged	n-a

<b>H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level</b>						
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-Term	Final	
<b>Project outcomes</b>		<b>Outcomes that contribute to Fund-level impacts</b>				
<b>A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development</b>	A5.1 Number of gender – friendly policies, institutions, coordination mechanisms and regulatory frameworks that improve incentives for climate resilience and their effective implementation.	PPMS reports Mekong Business Forum reports	0	One climate-smart and gender-responsive agribusiness policy for target commodities is formulated;  PPP framework focusing on agribusinesses is being formulated;  Modalities for enforcement of CAMGAP are adopted for fruit and organic fertilizers	One climate-smart and gender-responsive agribusiness policy is approved at the national level  One PPP framework focusing on agribusinesses is formulated  Two CAMGAP are enforced as national standards for tropical fruit and organic fertilizers	Stakeholders are willing to participate in policy development.

<p><b>A7.0</b> <b>Strengthened adaptive capacity and reduced exposure to climate risks</b></p>	<p>A7.1 Use by vulnerable households (including number of female beneficiaries), communities, businesses and public- sector services of Fund-supported/developed tools, instruments, strategies, and activities to respond to climate change and variability</p> <p>National Climate M&amp;E Indicator: Number of households affected by floods, storms and droughts (National M&amp;E Framework for Climate Change)</p>	<p>Household surveys</p>	<p>0</p> <p>Baseline: 2014 baseline at national level: 18/1000 households</p>	<p>15,000 farmers, including 40% women trained in CSA and agribusiness development skills 10,000 households, including 5,000 women, are provided with information on climate risk sharing instruments</p>	<p>40,000 farmers, including at least 16,000 women trained in CSA and agribusiness development skills; 20,000 households, including 10,000 women, use information on climate risk sharing instruments such as crop insurance</p> <p>National Climate M&amp;E Target: A reduction of 50% in number of families affected by floods, storms and droughts in project areas by end of project.</p>	<p>Farmers are willing to participate in value chain business and in learning about climate-smart practices</p>
	<p>A7.2 Number of males and females reached by climate related early warning systems and other risk reduction measures established/ strengthened</p>	<p>Household surveys ICT platform reports</p>	<p>0</p>	<p>10,000 households, including 5,000 women are provided with information on climate risk reduction and sharing instruments</p>	<p>20,000 households, including 10,000 women, use information on climate risk reduction and sharing instruments such as crop insurance</p>	<p>The regulatory and enabling framework for climate risk reduction and climate risk sharing instruments is improved</p>
<p><b>A8.0</b> <b>Strengthened awareness of climate threat and risk reduction processes</b></p>	<p>A8.1 Number of males and females made aware of climate threats and related appropriate responses</p>	<p>Household surveys ICT platform reports</p>	<p>0</p>	<p>100,000 people, among which at least 40% are women, are made aware of climate threats and risk reduction processes.</p>	<p>390,000 people, among which at least 40% are women, are made aware of climate threats and risk reduction processes</p>	<p>Information and user-friendly data about localized climate change impacts and risk reduction measures is made available</p>

<p><i>M9.0 Improved management of land or forest areas contributing to emissions reductions</i></p>	<p>M9.1 Hectares of land or forests areas under sustainable management of improved protection and management leading to reduced GHG emissions and/or enhancement of carbon stocks.</p>	<p>Field surveys undertaken at the target sub-catchment areas.</p>	<p>0</p>	<p>25,000 ha under climate friendly agriculture practices  2,000 ha of laser land leveled</p>	<p>40,000 ha under climate friendly agriculture practices  4,000 ha of land laser levelled</p>	<p>Extreme weather events do not occur at the time of young seedlings are planted</p>
<p><i>Cross-cutting</i></p>	<p>Number of technologies and innovative solutions (including gender – friendly technologies and solutions) transferred or licensed to support low-emission development</p>	<p>Household surveys</p>	<p>0</p>	<p>5,000 Biodigesters and 3000 compost huts introduced</p>	<p>12,000 biodigesters and 6000 compost huts introduced</p>	<p>Communities are willing to participate and switch to using biodigesters as part of their crop's value chain (using bio-slurry as fertilizers as well)</p>

Project outputs	Outputs that contribute to outcomes					
<p><i>Output 1: Critical agribusiness value chain infrastructure improved and made climate resilient</i></p>	<p>1a. Number of climate resilient water management systems rehabilitated and/or built</p> <p>1b. Number of on-farm rainwater harvesting ponds commissioned</p> <p>1c. Number of hectares of land laser leveled</p> <p>1d. Expected increase in the number of agricultural cooperatives integrating climate change actions</p> <p>1e. Length of farm road networks upgraded to climate resilient condition</p> <p>1f. Number of samples tested in upgraded laboratory facilities</p>	<p>Field observations Household surveys MAFF reports</p>	<p>1a-1e. 2017 baseline : 0</p> <p>1f. (2016 baseline : 700 samples and 0\$)</p>	<p>1a. 12 climate resilient water management systems targeting rehabilitated</p> <p>1b. 250 on-farm ponds commissioned and 12 FWUCs trained to operate and maintain irrigation schemes</p> <p>1c. 2,000 ha of land laser leveled</p> <p>1d. 20 farm cooperatives integrate adaptation measures in post-harvest infrastructure investments</p> <p>1e. At least 100 km of farm road networks improved</p> <p>1f. Quality and safety testing infrastructure in National Agricultural Laboratory being upgraded and modalities for income generation established</p>	<p>1a. 27 climate resilient water management systems targeting at least 15,000 ha and 25,000 households (with 50,000 women) rehabilitated</p> <p>1b. 800 on-farm rainwater harvesting ponds commissioned and 27 FWUCs developed capacity to operate and maintain their irrigation schemes</p> <p>1c. 4,000 ha of land laser levelled</p> <p>1d. 50 agricultural cooperatives integrate adaptation measures in post-harvest infrastructure investments</p> <p>1e. At least 250 km of farm road networks improved to climate resilient condition</p> <p>1f. Quality and safety testing infrastructure in National Agricultural Laboratory upgraded to test 1,500 samples and generate service income in excess of \$75,000</p>	<p>Extreme weather events do not occur during the construction and rehabilitation of water management systems.</p> <p>Community members are willing to participate in adopting biogas digesters at the household level, but also within their value chain (use of bio-slurry as crop fertilizers).</p>



	1g. Number of people with access to energy from biodigesters		1g. (2016 baseline : 11,468 persons, including 5,721 women)	1g. 4,000 bio-digesters made operational	1g. 12,000 additional bio-digesters made operational benefitting health and productivity of 90,000 persons, including 43,353 women, due to improved household air quality	
<i>Output 2: Climate Smart Agriculture and Agribusiness promoted</i>	2a. Number of climate resilient varieties released  2b. Number of farmers trained in CSA practices; on standard compliance.  2c. Number of agricultural development centers established	PPMS reports Household Surveys	2a. 2017 baseline : 0  2b. (2017 baseline for SRP compliance: 0)  2c. 2017 baseline : 0	2a. One additional climate resilient variety released  2b. 20,000 farmers, including at least 5,000 women trained in CSA practices  2c. 2 provincial agricultural development centers and engineering workshops made fully operational to provide agribusiness services	2a. Three additional climate resilient varieties of rice and maize released  2b. 40,000 farmers, including at least 16,000 women trained in CSA practices, of which 50% are SRP compliant, with direct links to millers and exporters  2c. 4 provincial agricultural development centers and engineering workshops made fully operational to provide agribusiness services and strengthen farmer value chain linkages	Farmers are willing to participate in value chain business and in learning about climate-smart practices.
<i>Output 3: Enabling environment for climate friendly agribusiness enhanced</i>	3a. Number of climate-friendly and gender-responsive agribusiness policy formulated  3b. Number of standards enforced as national standard	PPMS reports Policy documents	3a. (2017 baseline : n.a.)  3b. (2017 baseline : 0)	3a. One Climate-friendly and gender-responsive agribusiness policy is formulated;  3b. CAMGAP is formulated and approved	3a. One Climate-friendly and gender-responsive agribusiness policy, including a PPP framework focusing on agribusinesses formulated  3b. CAMGAP enforced as national standard for tropical fruit and organic fertilizers	

	<p>3c. Number of staff from banks and MFI trained on green financing</p> <p>3d. Number of enterprises trained on green finance and number of households benefitting from information on risk sharing instruments.</p> <p>3e. Number of public private partnerships and agribusinesses established</p> <p>3f. Expected increase in generation and use of climate information in decision-making</p>		<p>3c. (2017 baseline : 0)</p> <p>3d. 2017 baseline : 0</p>	<p>3c. 20 staff, including 30% women are trained in CSA lending and green finance</p> <p>3d. 10 privately-owned enterprises, at least 30% women-led and/or owned**, are trained on green finance and 10,000 households, including 10,000 women provided with information on climate risk sharing instruments such as crop insurance</p> <p>3e. 15 agricultural cooperatives entered into a profitable agribusiness or trading venture</p> <p>3f. Modalities for establishing a ICT platform are approved</p>	<p>3c. 50 staff, including 30% women, from financial institutions trained in CSA lending and green finance</p> <p>3d. 30 privately-owned enterprises, at least 30% women-led and/or owned**, are trained on green finance and 20,000 households, including 20,000 women, provided with information on climate risk sharing instruments such as crop insurance</p> <p>3e. 40 agricultural cooperatives* entered into a profitable agribusiness or trading venture</p> <p>3f. ICT platform for climate smart agribusiness established in Kampong Cham province</p>	
--	--	--	---	--	--	--

<b>Activities</b>	<b>Description</b>	<b>Inputs</b>	<b>Description</b>
Activity 1.1 Rehabilitating water management infrastructure to climate resilient condition	This Activity will rehabilitate and build small-scale irrigation systems, on-farm water catchment ponds, drip irrigation systems and introduce land laser-leveling, to increase water availability for crop production, making farmers more resilient to climate shocks or slow onset climate changes.	\$34.04 million from ADB loan, \$5.28 million from GCF Loan and \$4.61 million from GCF Grant. Support to investment and civil works.	Cost of rehabilitation of water management systems and land laser leveling.
Activity 1.2 Upgrading agricultural cooperative value chain infrastructure	This Activity will support 80 selected agricultural cooperatives to integrate adaptation measures in post-harvest infrastructure investments in undertaking the construction of post-harvest units for cleaning, drying and storage	\$9.04 million from ADB. Support to investment and civil works.	Cost of climate-proofing agricultural cooperatives' infrastructure and energy efficient technologies (solar powered driers)
Activity 1.3 Improving connectivity to cooperatives and markets through climate resilient farm road networks	This Activity will support the construction to climate standards of 250 Km of rural connector roads.	\$30.00 million from ADB, and \$4.69 million from GCF Loan, and \$3.61 million from GCF Grant. Support to investment and civil works.	Cost of climate proofing the design and execution (incl. upgraded materials) for rural connector roads to withstand climate extremes.
Activity 1.4 Strengthening infrastructure for agricultural quality and safety testing	This Activity will support the establishment of four Provincial Agricultural Development Centers (PADC) and four Provincial Agricultural Engineering Workshops to create resource and training centers for service provision, agribusinesses and farmer value chain linkages.	\$4.30 million from ADB. Support for technical assistance.	Cost of establishing the centers and technical assistance for operationalization.
Activity 1.5 Promoting renewable energy for value chain improvement	Under this Activity, the project will develop rural renewable energy infrastructure by installing about 12,000 biodigesters and 6,000 compost huts at household level in the area of target cooperatives, while harnessing the fertilization potential of bio-slurry in target provinces, benefitting health and productivity.	\$2.05 million from ADB and \$4.88 million from GCF Grant, and \$3.78 million from beneficiaries. Support to material and technical assistance costs	Cost of biodigesters and training on how to use biogas at the household level and bio-slurry as crop fertilizers.
Activity 2.1 Deploying climate resilient varieties	Under this Activity, the project will support the development and dissemination of climate resilient varieties of target crops.	\$0.79 million from ADB, with \$2.79 million in GCF Grant.	Costs of training, participatory variety selection, procurement of biological materials
Activity 2.2 Strengthening capacity in climate friendly production practices and technologies	Under this Activity, the project will provide training on climate-smart agriculture to 40,000 farmers,	\$1.48 million from ADB and \$7.09 million from GCF Grant. Support to technical assistance.	Cost of training on climate friendly agricultural technologies and production practices.

Activity 2.3 Promoting farm mechanization and extension	Under this Activity the project will support the construction and operationalization of 4 provincial level agricultural training centers and workshops to ensure maintenance and repair for mechanization equipment	\$545,000 from ADB.	Cost of construction and equipment acquisition for the centers.
Activity 3.1 Formulating climate friendly agribusiness policies and standards	Under this Activity, the project will support the development of i) climate-smart agribusiness policy; ii) climate-conscious product standards;	\$410,000 from ADB and \$722,000 from GCF Grant. Support to technical assistance	Cost of trainings for government staff, farmers, and FWUC.
Activity 3.2 Promoting green finance and risk sharing mechanisms	This Activity will: (i) create an enabling environment for PPPs in agribusiness; (ii) the identification of incentives for private sector participation in agribusiness to improve the private sector's access to finance, particularly to green finance and ways to reduce the risk aversion of commercial banks; and (iii) reducing the financial risks associated with impacts of climate change on the raw material base such as the use of crop insurance.	\$507,000 from ADB and \$1.44 million from GCF Grant. Support to technical assistance.	Cost of training on PPP, on climate-friendly agribusiness investments, and of crop insurance awareness raising.
Activity 3.3 Supporting climate risk management through information and communication technologies (ICT)	The project will contribute to the production of climate information services as well as an ICT platform to disseminate soil, crop, climate and market information and in order to create an enabling environment.	\$183,000 from ADB, with \$3.52 million from GCF Grant.	Cost of technical assistance for production of climate information services and acquisition/of corresponding weather infrastructures for setting up an ICT platform.
Project Management	Project management activities, including Monitoring and evaluation.	\$4.54 million from ADB, and \$1.34 million from GCF Grant.	Costs of personnel, consultancies, equipment and trainings for project coordination unit, including climate change related technical advisors.

## H.2. Arrangements for Monitoring, Reporting and Evaluation

The IAs will be responsible for monitoring project progress and evaluating project outputs. Monitoring and evaluation shall be in accordance with the project design and monitoring framework (DMF) and each IA will be responsible for regular reporting, with the PMU producing a consolidated report, for MEF and ADB.

**Review mission.** ADB will conduct an inception mission within three months of loan signing to assess project readiness and implementation arrangements including establishment of PMU, IAs, opening of an advance account, status of the development of the PPMS, and progress of advance procurement actions including recruitment of the PIC firm and the contractor for the first three representative subprojects.

ADB will conduct regular (i.e. at least twice per year) reviews throughout project implementation to (i) assess the progress of project activities and outputs and effectiveness of implementation arrangements; (ii) monitor safeguard compliance with ADB Safeguard Policy Statement (2009); (iii) review compliance with loan agreements and related matters; (iv) follow up on decisions and actions agreed during previous review missions; and (v) resolve any project implementation issues that may arise.

**Midterm review mission.** A midterm review will also be undertaken within 30 months of loan effectiveness. This review will include a comprehensive evaluation of project implementation arrangements, detailed evaluation of the scope and implementation process and progress of subprojects, feedback from the stakeholders, performance of consultants, capacity building progress, and possible reallocation of loan proceeds. During this more significant review, the impact from the pro-poor and gender initiatives linked to infrastructure development will be assessed as will the allocation by local administrations for the maintenance of the infrastructure developed under the Project. Attention will be given to the (i) assessment of project performance and achievement against targets and indicators in the DMF; (ii) review the initial outcomes, benefits, and impact of the project; and (iii) identify gaps, if any, and recommend necessary changes to strengthen implementation arrangements or modify project design.

**Project completion review mission.** Within 6 months of physical completion of the project, ADB will field a project completion review mission to commence preparation of ADB's project completion report (PCR). The mission will (i) assess the project performance against all targets, indicators, and benchmarks (including any revised at the midterm review); (ii) evaluate initial benefits and outcome of the project across outputs; and (iii) identify any incomplete activities and agree on the necessary actions, as well as to review compliance with ADB requirements and loan covenants.

### Reporting

The MAFF PMU will provide ADB with (i) quarterly progress reports in a format consistent with ADB's project performance reporting system (an outline of the progress report is in Annex 6); (ii) consolidated annual reports including (a) progress achieved by output as measured through the indicator's performance targets, (b) key implementation issues and solutions, (c) updated procurement plan, and (d) updated implementation plan for the next 12 months; and (iii) a project completion report within six months of physical completion of the project. To ensure that projects will continue to be both viable and sustainable, project accounts and the executing entity audited financial statement together with the associated auditor's report should be adequately reviewed. ADB will ensure consistency in the timing of submission of annual performance reports, and mid-term and final evaluation reports to GCF.

**Project performance monitoring:** A project performance monitoring system (PPMS), has been developed based on the key indicators and targets outlined in the DMF. In particular, the PPMS will assess the (i) progress of planned activities according to the targets and indicators; (ii) progress in achieving each project output and project outcome according to the performance targets and indicators indicated in the DMF; and (iii) highlighting any risk seen and unforeseen that are detrimental to achieving the project outputs. It shall be implemented by the PMU in conjunction with the implementing agencies and support from the PIC in accordance with ADB's Project Performance Monitoring System Handbook within six months of loan effectiveness. The PPMS procedures, performance indicators, and their targets will be reviewed and approved by ADB. Benchmark review mainly focusing on secondary data will be conducted. With the help of PIC, the PMU will then undertake every six months quantitative and qualitative project-performance monitoring for each project activity to evaluate the delivery of planned facilities and the project benefits that accrued. A covenant will be included in

the Financing Agreement (covering GCF loan and GCF grant) with the government of Cambodia (represented by MEF) on the need for arranging project's implementation in compliance with GCF policies.

**Safeguards monitoring – Environment.** Based on the ADB's rapid environment assessment checklist the project overall is classified as Category B. Subsequently, there has been the need for an IEE along with an EMP. The environmental assessment and review framework (EARF) describes the measures required to ensure that potential environmental impacts are identified, avoided, reduced, and mitigated in accordance with ADB SPS (2009) and the laws and regulations of the government. The EARF covers subproject screening, categorization, and preparation of IEEs for each Category B subproject. Each IEE will include impact assessment and mitigation, public consultation, information disclosure, and an environmental management plan (EMP). EMPs consist of plans for mitigation, monitoring, reporting, and stakeholder communication during pre-construction, construction, and operation phases.

Out of the three representative subprojects, only one required the preparation of IEE. The IEE prepared - Supplementary Documents 2-4 describe screening, categorization, assessment, public consultation, anticipated environmental adverse impacts, required mitigation and monitoring measures, and roles and responsibilities of implementing entity staff, consultants, and contractors. The IEE concluded that the impacts of the implementation of representative subprojects with EMP will be environmentally acceptable. Representative subproject proposal request for no-objection to implement will be submitted to the Project Steering Committee (PSC) by the PMU prior to works contracts being signed; EMP measures have been incorporated into civil works designs (in the case of physical measures) and contracts.

Subprojects prepared during project implementation will follow the safeguard procedures set forth in the EARF. Responsibility for supervision of EARF implementation rests with the PMU. The environment specialist(s) of the feasibility study and design team contracted by PMU and the Safeguards Specialist within the PIC will screen and classify the future subproject proposals as Category A, B, or C. They will then prepare an IEE with EMP for each Category B subproject and a summary of environmental implications for each Category C subproject. The PMU and the provincial implementers will ensure that (i) IEE findings are locally disclosed; (ii) IEEs are submitted to ADB for review and clearance unless exempt; (iii) no objections to implement will be sought from the PSC; and (iv) EMP measures are incorporated into civil works designs and contracts, and that their IAs will undertake the required environmental monitoring and reporting, and perform their assigned roles in the grievance redress mechanism.

**Safeguards monitoring – Involuntary Resettlement Category B.** The project is classified as category B for involuntary resettlement and/or involuntary land acquisition. For the subproject screening and selection criteria, it will identify and reject any Category A subprojects that involve significant involuntary resettlement, economic displacement or involuntary land acquisition. Acceptable subprojects will either be Category B or C, with insignificant or no resettlement impacts. During project preparation, some irrigation subprojects were identified that would require small strips of land to accommodate distribution canal improvement. These small strips of land may be acquired through voluntary donation, in the case of non-productive land, or through negotiated settlement for productive land and where the negotiated settlement is based upon market values. Negotiated settlement may also be required where affected people are unwilling to voluntarily donate. A rigorous due diligence procedure to verify voluntary donation bona fides has been included in the Resettlement Framework that will be used to further screen and select subprojects during implementation.

**Safeguards monitoring – Indigenous Peoples (IP) Category B.** Although no IPs or ethnic minority were found in the subproject areas, or impacted by the subprojects selected for feasibility during project preparation, there are some Cham and ethnic Vietnamese people, who are not recognized by the government as ethnic minority, living in project provinces and districts who could be impacted by further subprojects identified during implementation. An ethnic minority development framework has been prepared that will ensure inclusion and full consultation and participation of ethnic minority households and communities. Should any subproject pose a risk of involuntary resettlement on ethnic minorities, a resettlement plan/ethnic minority plan will be prepared.

**Climate Change (Risk Category Medium).** The assessment of climate change risk for the overall project, as per the AWARE screening tool, gives a category of High Risk. However, further detailed analysis revealed that the risk is medium. It is therefore important that the PIC that have responsibilities for infrastructure development and capacity building have sufficient climate change experience and capability to ensure and maximize adaptation possibilities, promote Climate Smart Agricultural practices, and ensure that the project satisfactorily ensures that farmers are aware of the risks and the steps they can take to adapt. In addition to monitoring safeguards and project indicators, the project will also include

some monitoring, reporting and verification of climate change specific indicators, including carbon monitoring and adaptive capacity assessments.

Climate change focal points from the respective ministries (MAFF, MOWRAM, MRD and MOE) will be involved in the climate change action monitoring and review process. Both institutional readiness indicators (e.g., status of climate policy and strategy, status of climate information) and impact indicators (e.g., GHG emissions) of the national M&E framework are relevant to the project and they have been mentioned under the section E.1.2. Additional efforts will be made during project implementation to monitor the number of vulnerable communities and households in target provinces.

**Gender and social dimensions monitoring.** The provincial IAs with assistance from PMU will be responsible for implementing and monitoring the GAP, land acquisition resettlement framework (LARF) and EMDF in their respective provinces. The safeguards and social development/gender specialists from PMU will assist in the preparation, updating and implementation of the GAP, LARF and IPEDMF, and will support the provincial IAs in the monitoring of their implementation. The project will partner closely with the WFN and the MAFF Gender & Children Project Support Unit for the GAP implementation and monitoring. Sex-disaggregated data will be collected wherever relevant and gender specific and sensitive indicators (from the DMF and the GAP) will be integrated as part of the program performance monitoring system.

Sex-disaggregated data will particularly relate to activities that are linked to specific GAP actions/targets and for which verifiable sources of data for monitoring will be available at subproject level from commune and village authorities. Value chain-related indicators for each new approved subproject will be elaborated together with stakeholders and MAFF GCPSU during the lifetime of the project.

## I. Supporting Documents for Funding Proposal

- Annex 1: NDA No-objection Letter
- Annex 2: Feasibility Studies
- Annex 3: Economic and Financial analysis based on Financial Model that provides sensitivity analysis of critical elements
- Annex 4: Confirmation letter or letter of commitment for co-financing commitment
- Annex 5: Project Term Sheet (including cost/budget breakdown, disbursement schedule, etc.)
- Annex 6: Environmental and Social Impact Assessment (ESIA) including (i) Environmental Assessment and Review Framework, (ii) Initial Environmental Examination for a representative subproject, (iii) Ethnic Minority and Indigenous Peoples Development Framework; (iv) Land Acquisition and Resettlement Framework; (v) Gender Action Plan; (vi) Detailed Gender Analysis; (vii) Summary of Poverty Reduction and Social Strategy; and (viii) Detailed Poverty and Social Impact Analysis
- Annex 7: Due Diligence Report with recommendations including (i) Risk Assessment and Management Plan; (ii) Procurement Risk Assessment; (iii) Financial Management Risk Assessment and (iv) Climate Change Assessment
- Annex 8: Map indicating the location of the project
- Annex 9: Timetable of project implementation
- Annex 10: Stakeholder consultation and participation plan, Stakeholder communications strategy and Institutional Capacity and Training Plan
- Annex 11: Procurement plan



**KINGDOM OF CAMBODIA**  
**Nation Religion King**

Ministry of Environment

N° : 986 MoE

Phnom Penh, 11 October, 2017

The Green Climate Fund ("GCF")

**Re: Funding proposal for the GCF by Asian Development Bank regarding "Climate-friendly Agribusiness Value Chains Sector Project"**

Dear Madam, Sir,

We refer to the project "Climate-friendly Agribusiness Value Chains Sector Project" in Cambodia as included in the funding proposal submitted to us by the Asian Development Bank (ADB).

The undersigned is the duly authorized representative of Ministry of Environment, the National Designated Authority/focal point of Cambodia.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the project as included in the funding proposal.

By communicating our no-objection, it is implied that:

- (a) The government of Cambodia has no-objection to the project as included in the funding proposal;
- (b) The project as included in the funding proposal is in conformity with Cambodia's national priorities, strategies and plans;
- (c) In accordance with the GCF's environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

As Cambodia does not yet have a programme of work with GCF, this non-objection is provided on an exceptional basis, based on the proposal's alignment with national priorities. We also take note of ADB's indication that a concept note for this proposal has received positive feedback from GCF Secretariat staff.

We acknowledge that this letter will be made publicly available on the GCF website.

Kind regards,



SAY SAMAL  
Minister of Environment

## Environmental and social reports disclosure

Basic project information	
Project title	Climate-friendly Agribusiness Value Chains Sector Project (Cambodia)
Accredited entity	Asian Development Bank
Environmental and social safeguards (ESS) category	Category B

Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	2018-01-17
Languages of disclosure	English and Khmer
Link to disclosure (English)	IEE: <a href="https://www.adb.org/projects/documents/cam-48409-002-iee">https://www.adb.org/projects/documents/cam-48409-002-iee</a> EARF: <a href="https://www.adb.org/projects/documents/cam-48409-002-earf">https://www.adb.org/projects/documents/cam-48409-002-earf</a> A simplified ESIA consistent with the requirements for a category B project is contained in the Environmental Assessment and Review Framework (EARF) and Initial Environmental Examination (IEE)
Other link (Khmer)	<a href="https://www.adb.org/km/projects/documents/cam-48409-002-earf">https://www.adb.org/km/projects/documents/cam-48409-002-earf</a> <a href="https://www.adb.org/km/projects/documents/cam-48409-002-iee">https://www.adb.org/km/projects/documents/cam-48409-002-iee</a>

Environmental and Social Management Plan (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	2018-01-17
Languages of disclosure	English and Khmer
Link to disclosure (English)	EARF: <a href="https://www.adb.org/projects/documents/cam-48409-002-earf">https://www.adb.org/projects/documents/cam-48409-002-earf</a> An ESMP consistent with the requirements for a category B project is contained in the Environmental Assessment and Review Framework (EARF).
Other link (Khmer)	<a href="https://www.adb.org/km/projects/documents/cam-48409-002-earf">https://www.adb.org/km/projects/documents/cam-48409-002-earf</a>

Land Acquisition and Resettlement Framework (LARF)	
Date of disclosure on accredited entity's website	2018-01-17
Language(s) of disclosure	English and Khmer
Link to disclosure (English)	<a href="https://www.adb.org/projects/documents/cam-48409-002-rf">https://www.adb.org/projects/documents/cam-48409-002-rf</a>
Other link (Khmer)	<a href="https://www.adb.org/km/projects/documents/cam-48409-002-rf">https://www.adb.org/km/projects/documents/cam-48409-002-rf</a>

Any other relevant ESS reports and/or disclosures (if applicable)	
Description of report/disclosure	Ethnic Minority Development Framework (EMDF)
Date of disclosure on accredited entity's website	2018-01-17
Language(s) of disclosure	English and Khmer
Link to disclosure (English)	<a href="https://www.adb.org/projects/documents/cam-48409-002-ippf">https://www.adb.org/projects/documents/cam-48409-002-ippf</a>
Other link (Khmer)	<a href="https://www.adb.org/km/projects/documents/cam-48409-002-ippf">https://www.adb.org/km/projects/documents/cam-48409-002-ippf</a>



<b>Any other relevant ESS reports and/or disclosures (if applicable)</b>	
Description of report/disclosure	Gender Action Plan (GAP)
Date of disclosure on accredited entity's website	2018-01-17
Language(s) of disclosure	English and Khmer
Link to disclosure (English)	<a href="https://www.adb.org/projects/documents/cam-48409-002-gap">https://www.adb.org/projects/documents/cam-48409-002-gap</a>
Other link (Khmer)	<a href="https://www.adb.org/km/projects/documents/cam-48409-002-gap">https://www.adb.org/km/projects/documents/cam-48409-002-gap</a>