

PILOT PROGRAM FOR CLIMATE RESILIENCE Summary Project/Program Approval Request			
1. Country/Region:	Cambodia	2. CIF Project ID#:	XPCRKHO12A
3. Project Name:	Climate Proofing of Agricultural Infrastructure and Business-focused Adaptation [as part of the Climate Resilient Rice Commercialization Sector Development Program – (Rice SDP)]		
4. Type of PPCR Investment	Private	Public 100%	Mixed
5. Funding Request (in USD million total) for Project/Program:	Grant: \$4.5 million ¹		Loan: \$5.0 million
6. Approved Preparation Grant (in USD million):	\$0.6 million (Of the \$600,000, only \$500,000 was committed, and the balance is requested to be added to the Grant portion of the project as indicated above)		Date: 29 June 2011
7. Implementing MDB	Asian Development Bank		
8. Other MDB Involvement	None	Type of Involvement: None	
9. National Project Focal Point:	Ministry of Economy and Finance (MEF)		
10. National Implementing Agency (project/program):	Ministry of Agriculture, Forestry, and Fishery (MAFF) Ministry of Water Resources and Meteorology (MOWRAM)		
11. MDB PPCR Focal Point and Project/Program Task Team Leader (TTL):	Headquarters-PPCR Focal Point: Charles Rodgers, Sr. Environment Specialist		TTL: Bui Minh Giap, Natural Resources and Agricultural Economist
12. Project/Program Description			
<p>Agriculture remains the dominant sector in the Cambodian economy contributing 32% of gross domestic product and employing 60% of the workforce, while 80% of the population depends on the sector for their livelihood. The agriculture sector has been one of the main engines of economic growth achieving steady growth over the past 10-years.² Within agriculture, rice accounts for over 90% of the cropped area, the production from which is mostly consumed domestically.³ The rice subsector accounts for about 50% of the national agriculture, forestry and fisheries output. The Government of Cambodia (government) considers the rice subsector as an opportunity for socio-economic development and articulated its intentions in the Rice Policy to transform Cambodia into a 'rice basket' and a major rice-exporting country. In this regard, the government has set three important objectives for 2015: (i) the paddy surplus will be over 4.0 million tons, (ii) milled rice exports will be at least 1.0 million tons,⁴ and (iii) Cambodia will be recognized internationally as a rice exporting country.⁵</p>			

¹ Kindly note that of the \$600,000, only \$500,000 was committed, and the balance is requested to be added to the Grant portion of the project.

² Sector Assessment is accessible from the list of linked documents in Appendix 2 of the ADB's Report and Recommendation of the President to the Board of Directors (RRP).

³ Official statistics indicate only 200,000 tons of milled rice was exported in 2011. Therefore, it is assumed that the majority of production is consumed domestically. In reality, it is estimated that about 2.2 million tons of wet paddy are often "exported" after each harvest, causing the loss of value addition to Cambodia.

⁴ Cambodia's official rice exports were estimated at about 105,000 tons (excluding the paddy exported unofficially to Thailand and Viet Nam) in 2011 against the 34.3 million tons traded globally. While Cambodian rice has a comparatively small proportion, growth in the global trade of 9% per annum suggest sound opportunities on export markets for Cambodian rice.

⁵ The Government of Cambodia. 2010. *Policy on Promotion of Paddy Production and Rice Export*. Phnom Penh. The Rice Policy is consistent with the Rectangular Strategy (Phase II, 2008), the National Strategic Development Plan (2011-13), and the Strategy on Agriculture and Water (2009-13). These strategies and plans articulate the pathways toward enhancing agricultural commercialization. The government considers the promotion of rice export as a role model for export promotion of other agricultural products. Therefore, Rice-SDP will serve as a flagship framework for future ADB assistance in the agriculture sector.

Cambodia reported a paddy surplus estimated at 3.3 million tons in 2010.⁶ Despite the surplus, nearly one quarter of the provinces face food deficits because of limited marketing channels and distribution infrastructure. Price fluctuations across provinces are frequently observed due largely to supply and demand imbalances and the movement of unprocessed paddy to Thailand and Viet Nam after each harvest. Eleven per cent of all households are considered food insecure, with many facing a deficit for one to two months each year. This figure rises during the dry season to an estimated 18%. Furthermore, 90% of all food insecure households are found in rural areas.⁷

Given its dominant position in the economy, transforming the rice subsector from being subsistent into a commercially oriented one is a strategic option for Cambodia as it provides the best opportunity to improve national food security,⁸ expand rice export, and as a result reduce poverty. These twin objectives of food security and export expansion will be mutually reinforced by paddy surpluses being marketed more increasingly within the country and on international markets. However, to achieve this outcome, major critical binding constraints must be addressed.⁹

A legal and regulatory foundation that enables rice commercialization is lacking. Key bottlenecks must be addressed. First, the absence of legislation to protect the interests of seed developers is constraining access to new genetic material available elsewhere in Asia. As a result, the seed industry is seriously underdeveloped. Second, efficiency of land and water use has been low and aggravated by the absence of a legal framework for land use planning, zoning, the lack of current soil productivity mapping, and land leveling. Third, the opportunity for farmers to engage in cooperative action to achieve production efficiencies and improve their bargaining power is being inhibited by the lack of a legal framework governing agricultural associations. Fourth, efforts to link production to the quality required by domestic and international markets are being hampered by inadequate legal framework for contract farming. Fifth, the lack of a quality grading system for rice reduces the credibility of Cambodian rice on international markets since buyers lack confidence in receiving the quality ordered compared with alternative supply from other rice exporting countries. Finally, the rice subsector has limited access to finance since collateral options for bank loans are not diverse, driving borrowers to other higher cost financing alternatives.

Use of land and water resources for paddy production is suboptimal. Use of land and water for rice production is influenced by local physical features and precipitation patterns. Annual inundation and subsequent recession of flood waters extends over a large area of flat land surrounding the Tonle Sap basin and the Mekong River flood plains. This has given rise to complex cropping systems with the four major cropping windows that include the upland fields, rain-fed lowland fields, deep water paddy fields, and dry season paddy fields. Plantation of these crops are continuously changing given increased incidence of flooding and availability of short maturation rice varieties. In response to the need to supply a growing domestic market and higher rice prices, farmers have extended the cultivated rice areas, sometimes into environmentally sensitive areas such as the floating forest areas surrounding the Tonle Sap basin. The indiscriminate use of fertilizer and chemicals for paddy production pose a threat to natural ecosystems. In this context, Cambodia must implement and enforce agricultural land-use zoning if it is to preserve areas suitable for rice production while protecting environmentally sensitive areas. It is also critical to identify potential intensive production areas where soil types are favorable and water is available for multiple cropping. Given that only 20% of paddy production comes from irrigated areas, enhanced production can only be achieved by increasing cropping intensity. This requires rehabilitation and construction of irrigation systems that are resilient to climate change, given vulnerability of the area to climatic extremes, as discussed in the section on climate change impacts.

Capacities of post-harvest infrastructure are inadequate to handle increasing volumes of paddy. Surplus paddy has mainly been exported in wet content to Thailand and Viet Nam for subsequent drying and processing. Much of this trade has resulted from the lack of post-harvest infrastructure in Cambodia.¹⁰ Quality

⁶ This is a derived figure in the government's Rice Policy based on estimated production less post-harvest loss and seed retention.

⁷ World Food Program. 2008. *Comprehensive Food Security and Vulnerability Analysis - Cambodia*. Phnom Penh.

⁸ See footnote 16 on the link between Rice-SDP and the transport infrastructure in the Greater Mekong Sub-region.

⁹ The Sector Assessment accessible from the list of linked documents in Appendix 2 of the RRP.

¹⁰ Wet paddy is defined as the grains containing 25-30% moisture.

deterioration of moist paddy occurs after harvest if it is not dried to 14% moisture content. With (i) increased areas under production, (ii) increased use of mechanized harvesting driven by the high cost of labor, and (iii) farmers' preference to dispose of paddy quickly after harvest, the volume of paddy being supplied to the markets have increased dramatically at peak delivery times. The infrastructure to handle, dry, store and transport the volumes is not sufficiently developed in spite of significant private investment in milling, drying and storage facilities in recent years. These surpluses at peak times are cleared, often at discounted prices, across the border for processing to prevent quality deterioration and hence in-country value retention is limited.

Quality of Cambodian rice is inconsistent. Quality of Cambodian rice is low and can be attributed to the relatively low production and processing technologies used by a large number of small-scale producers and processors. This involves limited use of quality seed, traditional planting techniques, inappropriate application of fertilizers and chemicals, limited use of mechanized land preparation, land leveling and harvesting techniques. These are confounded by limited access to credit and the weak technical extension services. The quality of milled rice can only be assured with the combination of quality paddy as a raw product and modern milling techniques (i.e. drying, processing, sorting, and color grading). The wide variety of milling technologies employed in Cambodia makes it difficult to produce rice of export quality. This is further exacerbated by the absence of rice standards for quality assurance. In many instances, the phyto-sanitary requirements of importing countries can be neither achieved nor certified under current practices. The process of paddy and rice aggregation and marketing involves a large number of small-scale producers and processors. This reality, together with the limited post-harvest infrastructure, adds to the cost of the final product, which make Cambodian rice uncompetitive and little known on export markets.

Paddy production is increasingly vulnerable to the changing climate. According to the World Risk Report 2012, Cambodia ranks 8th among the top 15 countries with highest risk of impact from climate change. Climate change has increased the number of extreme climate events such as floods and droughts in Cambodia. In the coastal regions, the impacts of sea level rise and saltwater intrusion are expected to be severe by 2050. Loss in paddy output in Cambodia due to climate change is estimated to be significant.¹¹ Of the total loss, 70% was due to the occurrence of floods, 20% due to droughts, and 10% due to other reasons such as pest and diseases.¹² In this regard, climate change is expected to exacerbate food insecurity, which is already a problem in one quarter of provinces of Cambodia.

The increasing incidence of flooding has driven farmers to consider alternate cropping systems, and, where water is available, dry season irrigated rice production is adopted as an alternative. Nevertheless, some of these changes are detrimental to the sustainable use of land resources. Greater focus on the early wet season crop allows farmers to avoid the most severe flooding period as crops can be harvested before its onset. Recession and late wet season crops respond well to increased fertilizer applications. However, such practices have a detrimental effect on the structure of certain soil types. As a result of changing cropping systems, pattern of paddy delivery to collectors, traders and millers also changes and requires adaptive post harvest management strategies. To minimize the impacts of climate changes, Cambodia needs to (i) adopt sustainable land-use practices through the implementation of agro-ecosystems analyses; (ii) make available crop insurance products that are weather-indexed; (iii) modify structural designs of irrigation systems to accommodate increased peak flows and leveling the paddy land, both to improve water utilization efficiency of irrigation schemes; and (iv) adjust management and processing of wet paddy to continually improve milling efficiency and maintain high quality at reasonable processing costs.

To address the impacts of climate change, the government prepared the National Adaptation Program of Action (NAPA) to Climate Change in 2006. NAPA identified climate change adaptation activities such as the improvement of rainwater harvesting facilities at the community level; adopting system of rice intensification (SRI) to reduce vulnerability to changing rainfall amounts and patterns; modifying the designs of reservoirs and irrigation systems/channels; and managing natural ponds to better manage climate change induced risks.

¹¹ Government of Cambodia. 2011. *Strategic Program for Climate Resilience Prepared for the Pilot Program for Climate Resilience*. Phnom Penh.

¹² Cambodia Water Partnership. 2010. *The State of Climate Change Management in Cambodia*. Phnom Penh.

Despite these efforts, adaptation to climate change is often challenged by (i) limited information on local impacts; (ii) low awareness in governance and administration; (iii) limited institutional, personnel and technical capacities; (iv) weak cross-sector and cross-regional coordination; and (v) lack of suitable technologies and data, reliable disaster control and forecast mechanisms, and budgets.

To address climate change impacts in the Project areas, the PPCR funds will be used to:

- Improve water use efficiency through the upgrading of irrigation infrastructure designs to accommodate more rapid flow of flood water induced by climate change – essentially by increasing capacities of reservoirs, of delivery and drainage canals, of off-take and water management structures, and by imparting knowledge on climate resilience to those responsible for operating the irrigation facilities.
- Demonstrate the benefits from land leveling to conserve water and improve irrigation water use efficiency (an essential adaptation strategy to cope with drought and flood).
- Undertake a feasibility study, design and pilot test a weather-indexed crop insurance scheme to assist farmers to reduce climate risk associated with rice production. The scheme will be piloted in three provinces (Battambang, Kampong Thom, and Prey Veng) to test its application under local conditions.
- Assist in building the capacities of millers to accommodate the seasonal fluctuations imposed as a result of climate change into their milling operations by improved stock management and efficiencies of mill operations.

The main Sectors, Themes and Outputs of the combined Program and Project are summarized below. Additional information is available in the Attachment entitled “Enhancing Resilience of Rice Commercialization in Cambodia” and ADB’s Report and Recommendation of the President to the Board of Directors (RRP) and its associated documents.

Sectors: Water Resources, Agriculture, and Infrastructure.

Themes: Economic growth, environmental sustainability, private sector development, capacity development; Subtheme: Promoting economic efficiency and enabling business environment, natural resources conservation, climate change adaptation, public-private partnerships, and institutional development.¹³

The Sector Development Program

The Climate Resilient Rice Commercialization Sector Development Program (Rice-SDP) will address key high priority and strategic measures¹⁴ stated in the ‘Policy on the Promotion of Paddy Production and Rice Export’ (the Rice Policy) to improve national food security¹⁵ and expand rice export through (i) removing legal and regulatory constraints inhibiting rice commercialization; (ii) improving productivity of paddy crops and consistency in quality of milled rice; (iii) enhancing rice value chain support services; and (iv) addressing risks of climate change through adaptation.¹⁶

Rice-SDP comprises (i) a Program (or a policy-based component) to address legal and regulatory constraints in promoting and accelerating rice commercialization, and (ii) a Project to address key non-regulatory binding constraints in increasing production of export quality rice while maintaining the integrity of its natural resource base.

¹³ The equivalent themes in the Cambodia’s Strategic Program for Climate Resilience are: climate risk management; disaster risk reduction; ecosystem-based adaptation; business-focused adaptation; climate proofing of infrastructure, capacity strengthening for mainstreaming resilience into development planning; and stakeholder participation.

¹⁴ Policy measures for promotion of paddy production and rice export are in Annex 2 of the Rice-Policy.

¹⁵ Rice-SDP will improve rice productivity and quality, market access, and enhance resilience of natural resources to climate change. This is in conformity with: ADB. 2009, *Operational Plan for Sustainable Food Security in Asia and the Pacific*. Manila.

¹⁶ Rice-SDP will add weight to the GMS Southern Economic Corridor initiatives to gain maximum leverage from strengthening of the value chains. It will also enhance impact of investment in transport infrastructure by ADB and development partners, which was amounted to \$15 billion as of June 2012.

The thrust of the policy related initiatives proposed under the Program is directed at improving land utilization for rice production so as to ensure that farming practices do not cause further land degradation whilst maintaining the efficiency of water utilization. These address current land and water use practices that exacerbate the effects of climate change.

The Project is designed to capitalize on policy and institutional development proposed under the Program. It addresses, among others, two critical climate change related binding constraints, i.e., (i) suboptimal use of land and water resources for paddy production, and (ii) increased vulnerability of the natural resources base to climate change. The recent changes in cropping patterns with increased focus on the early wet season rice crop compared to the late wet and upland crops is evidence of farmers' response to climate change and their attempts to minimize risk. In 2010, the early wet season crop increased by 29,000 ha over the equivalent 2008/09 crop and the normal wet season crop was over 90,000 ha larger than the previous year whilst the late wet season crop actually declined by over 32,000 ha between the two years. This trend has continued in subsequent years with the improved availability of short maturation rice varieties (seed is mainly from Viet Nam). The area planted to upland rice crops is also decreasing progressively. In 2010/11, the dry season cropped area reached just over 400,000 ha that is also the higher yielding crop averaging 4.2 t/ha in that year. The area of the irrigated crop is limited by water availability and the farmer's access to irrigated land. The run-down condition of much of the irrigation systems constructed before the 1979 civil war provides an opportunity to dramatically impact total production through scheme rehabilitation and by adopting improved production technologies on rehabilitated schemes.

Rice-SDP has six outputs. Output 1 relates to the Program, whereas outputs 2-6 relate to the Project to capitalize on legal and regulatory reforms proposed under the Program.

Output 1 - A Conducive Legal and Regulatory Environment Established to Facilitate Climate Resilient Rice Commercialization. This output will focus on legal and regulatory reforms that (i) promote local seed production and distribution; (ii) strengthen agricultural land management; (iii) strengthen farmers' organizations and promotes contract farming; (iv) facilitate domestic trading and export of milled rice; and (v) improve access to finance.

It will focus on the following legal and regulatory reform areas:¹⁷

- Promote Local Seed Production and Distribution: The Program will provide support for the development of the legal framework for quality seed production by the private sector. This process will involve (i) drafting and issuance of relevant sub-decrees and decisions on implementation of the Law on Seed Management and Plant Breeder's Rights; and (ii) adoption of the policy for seed and seed industry development.
- Strengthen Agricultural Land Management: The Program will support (i) dissemination and implementation of the National Policy on Spatial Planning; (ii) issuance of the policy on agricultural land; (iii) submission to the National Assembly the draft Law on Management and Use of Agricultural Land; (iv) preparation and adoption of the national action program to combat land degradation in Cambodia; and (v) formulating the legal framework for land-use zoning.¹⁸
- Strengthen Farmers' Organizations and Promote Contract Farming: The Program will support: (i) the regulation of farmers' organizations through the Law on Agricultural Cooperatives and a sub-decree providing guidelines on the implementation of the Law; and (ii) promotion of contract farming in rice production through the issuance of a sub-decree on contract farming and a Decision on contract farming in rice production.
- Facilitate Domestic Trading and Export of Milled Rice: The Program will support establishment of: (i) standard specifications for Cambodian milled rice by issuing general standard specifications and

¹⁷ The Program is described in more detail in the Development Policy Letter in Appendix 3 and the Policy Matrix in Appendix 4 of the RRP.

¹⁸ As a result, this will improve the efficiency of irrigation water utilization and hence enhance resilience to climate change.

specific standard specifications for ten common rice varieties in Cambodia; and (ii) phyto-sanitary regulations by adopting the Law on Plant Protection and Quarantine.

- **Improve Access to Finance:** The Program will facilitate the diversification of collateral requirements and promoting finance outreach to farmers, millers, and rice exporters through (i) application of innovative collateral options for loans; and (ii) practical policy measures to increase access to finance.

Output 2 - Agricultural Land-use Zoning Improved. With an appropriate legal and policy environment developed under the Program, investment will be provided to implement agricultural land-use zoning in the provinces surrounding Tonle Sap basin. Rice-SDP will assist Ministry of Agriculture, Forestry and Fisheries (MAFF) and their provincial and district agencies to update the previous agro-ecosystem analyses in some 90 communes to identify cropping suitability on various types of agricultural land. This process takes into account, among others, topography, soil suitability, water availability and the threat from flooding. With anticipated increase in precipitation and the availability of short-maturation rice varieties, alternative cropping windows can be utilized in order to reduce farmers' risk from climate change. The resultant agro-ecosystem zoning maps will then be incorporated into MLMUPC's commune land-use plans to provide a legal basis for zoning categorization. Activities under this output comprise (i) establishment of land-use zones incorporating agro-ecosystem analyses into commune land-use plans; and (ii) updating rice ecosystem and soil classification maps for the identification of suitable rice growing areas. These will provide for the four cropping systems¹⁹ taking into account soil type, risk associated with climate change and variability, and conservation of environmentally sensitive areas. Specific products will be (i) an updated soils classification map in the main rice producing provinces, (ii) a current Rice Ecosystem Map detailing seasonal crops spatially over time, (iii) a basis for determining rice production exclusion zones based on potential risk from flood and drought.

Output 3 - Climate Resilient Rice Value Chain Infrastructure Developed. This output comprises high priority investments in three major rice-producing provinces - Battambang, Kampong Thom and Prey Veng.²⁰ The investments include: (i) rehabilitation and climate proofing of irrigation systems; (ii) construction of paddy drying and storage facilities; and (iii) construction of seed cleaning, drying, grading and storage facilities.²¹

Rice-SDP will rehabilitate and climate proof 13 irrigation systems in Battambang, Kampong Thom, and Prey Veng provinces through upgrading designs, construction supervision, and land leveling.

Upgrading designs will include capacity building in the development of design criteria, based on site characteristics and consideration of increased frequency and intensity of rainstorms, increased severity and occurrence of flooding events and prolonged periods of drought. Specific engineering measures to take into account include (i) adequate provision for interceptor drains and culverts for cross drainage (wherever needed schemes are situated in undulating terrain), (ii) larger spillways to cope with more rapid flows of flood water, (iii) rehabilitation of drainage systems, (iv) design of canal cross sections to substantially exceed full supply level, (v) specification of non-dispersing soils for embankment construction, (vi) inclusion of geo-nets for embankment strengthening where warranted, and (vii) provision of surface protection, such as stone pitching or small concrete flow control details to protect structures from scour as flood waters recede.

To enhance the resilience of infrastructure to climate change impacts, relevant technical agencies will be trained to incorporate higher design standards to accommodate the projected impacts of climate change. One of the findings during the project preparation indicated that reservoir walls may need to be designed for a 1:50 year flood compared to the existing design frequency of a 1:20 year event. These reviews will be further examined by the infrastructure engineer. Where found to be inadequate, they will be returned to the design engineers for modification. The two specific areas to be addressed include upgrading designs to accommodate the increased risk from climate change, and supervising works construction to ensure that the

¹⁹ Four rice ecosystems are recognized in Cambodia comprising the upland fields, rain-fed lowland fields (upper, medium, lower, and early wet-season paddy fields), deep water paddy fields, and dry season paddy fields (irrigated, receding, and pre-rising paddy fields) using both photo-period sensitive and photo-period insensitive varieties.

²⁰ The list of pre-screened and eligible subprojects is in Supplementary Document 1.

²¹ Items (ii) and (iii) will be operated through public private partnership (PPP) mechanism. The mechanism is necessitated for two reasons: (i) the nature of the investment is a relatively high risk for any individual private sector firm in Cambodia; and (ii) the highly commercial nature of the investment renders the RCG an inappropriate institution to operate these facilities.

rehabilitated infrastructure is more resilient to the impact from climate change. Under previous irrigation rehabilitation projects funded by ADB and AFD in particular, insufficient attention was paid to both aspects. Basic designs were adopted that have proven to be inadequate to handle the increased water flows, the extended periods of inundation and the need for greater reservoir volumes in order to capture adequate water for dry season cropping activities. As a result, many of the structures that have been rehabilitated have suffered damage under the more extreme climate conditions than were proposed during detailed design. Similarly, the construction supervision on many of these rehabilitation projects has been sub-optimal and as a result, the quality of works makes structures vulnerable to extreme weather events. The irrigated areas of Cambodia are dotted with examples where inadequate supervision has resulted in accelerated depreciation of infrastructure and increasing vulnerability to extreme climate events.

Land leveling is included as one of the subprojects' associated activities to address the threat of climate change. It is estimated that about 100 ha of paddy in each subproject area will undergo leveling to improve water-use efficiency. Training and demonstrations will be conducted for farmer water user committees to better understanding the need for efficient water utilization through water scheduling and improved maintenance regimes. The demonstration of land leveling on 100 ha for each of these subprojects equates to about 10% of the impacted area as a demonstration. With yield improvements of usually greater than 20% from land leveling, the uptake of this technology should be significant not only in the subprojects but on the broader area of 725,000 ha of wet season crop.

Output 4 - Enhanced Rice Value Chain Support Services. This output comprises: (i) support to improve availability and quality of commercial rice seed; (ii) upgrading technical extension materials to guide planting in four rice ecosystems; (iii) capacity building (technical and financial) of mill managers and operators; and (iv) facilitating access to credit by farmers, traders and millers. Items (i), (ii), and (iii) have the greatest relevance in addressing the impact of climate change.

Seed quality is the basis for improved productivity within the commercial rice subsector. The tradition of retaining seed from the previous crop leads to a progressive reduction in potential yields as the vigor of seed material declines. As a risk minimization strategy, farmers use the 'free' seed from their previous season's crop as they do not want to risk losing expensive new seed material in the event of a flood. Rice-SDP will develop a mechanism to ensure seed quality through a certification system for foundation, certified and commercial seed producers, resulting in a more resilient crop. It will also promote incremental production of foundation seed of preferred market varieties as well as certified seed to be grown on experimental research stations or by commercial seed producers. The six subprojects will be the means for multiplying this seed into quality commercial seed based on the certification system introduced. Only with the use of quality seed will the subsector be in a position to maximize productivity in a relatively insecure climate environment. With a wet season area of 725,000 ha in the three target provinces and assuming a seeding rate of 125 kg/ha, just over 9,000 tons of seed will be needed to plant the area (without allowing for lost or damaged crop and their replanting). With two seed producing and storage investments proposed in each province, the capacity to generate seed material is estimated at 3,600 tons of rice seed – just over one third of the combined provincial requirement. The conservative area proposed for seed production reflects the current farmers' attitudes to buying quality seed as they still tend to use the previous season's paddy as seed material. Without project assistance to significantly reduce the risk associated with wet season cropping, the established practice of retaining paddy from the previous crop for seed would be perpetuated. Incremental yield achieved from using improved seed material is significant and provides the incentive for change when the exposure to risk has been reduced.

Upgrading technical extension material to guide rice production in four rice growing systems has relevance to address the impact of climate change. Rice-SDP will generate technical information packages on various aspects of rice production in a changing climate. Rice-SDP will review these technical bulletins and update their content to improve farmers' ability to respond to climate change. The choice of crops, the varieties grown, water management in paddies, preparation of seed beds and the application of agro-chemicals are areas where technical recommendations will be upgraded to accommodate potential climate change impacts. Much of the technical support in recent years has come through Vietnamese input suppliers and traders as they seek to secure what the Vietnamese market wants by way of wet paddy. The introduction of some varieties more vulnerable to pests and disease such as IR504, whilst giving farmers access to short maturity varieties of

less than 100 days, exposes farmers to increased risk.

Capacity (technical and financial) of mill managers and operators will be strengthened to accommodate changing patterns of paddy supply induced by climate change. It is evident that cropping patterns are changing and consequently, the operations of the mills need to change significantly in terms of stock movements, drying and storage facilities. Management training provided by Rice-SDP will improve stock management practices and general mill operations of selected millers. Through the Cambodia Rice Millers' Association and expansion of Rice-SDP by 2016, the stock management practices that accommodate supply patterns of paddy induced by climate change will be disseminated to rice mills nation-wide.

There has been significant investment in modern milling facilities by the private sector, some electing to incorporate significant drying capacity. These will be the future for Cambodia's rice export development as they can meet the more rigorous quality requirements of the export market. However, they remain dominated by family businesses and often the children of long established millers are charged with the management of the new facility. Whilst the younger managers are better prepared to adjust to modern mill management procedures, they have little experience in this area and will benefit from capacity building efforts envisaged under this Project. Millers country-wide like to maintain their independence and strongly protect their operating activities. Under these conditions, one on one capacity building will yield the best returns to the subsector. The fluctuating paddy supplies under different climate scenarios demands a greater set of inventory management skills that can be supported by the Project.

Output 5 - Weather-indexed Crop Insurance (WICI) Piloted. A diagnostic study was conducted in three participating provinces during the preparation phase. Initial conclusions suggested that the data upon which a weather-indexed insurance product would be based was incomplete as rainfall data was not sufficiently reliable to identify the real magnitude of risk. Concern was also raised that farmers' capacity to pay for insurance premiums was limited and an alternate means of extracting the premium would be needed such as through input suppliers (seed and fertilizer providers). Being risk-averse, farmers often use seed from their previous season's crop as they do not want to risk losing expensive new seed material in the event of a flood and other extreme weather events. In this context, Rice-SDP proposes to undertake a detailed study, design, and implementation of a weather-indexed crop insurance scheme as a mechanism to minimize risk for farmers. The pilot will be tested in three provinces (Battambang, Kampong Thom, and Prey Veng) to determine its marketability and potential for up-scaling in other provinces of Cambodia. Additional details are in Section 18.

Output 6 - Efficient Project Management and Implementation. This output comprises: (i) effective project management; (ii) capacity building of the Program Management Office (PMO) and each National Implementation Office (NIO) and Provincial Implementation Office (PIO); and (iii) coordination between the Program and Project and among various ongoing sectoral and cross-sectoral initiatives.

PPCR funding is proposed to co-finance to procure consulting services of various expertise to ensure efficient and smooth implementation of (i) rehabilitation and climate proofing of 13 irrigation subprojects; (ii) land leveling associated with 30 subprojects; (iii) design and testing of the weather-indexed crop insurance pilot; and (iv) capacity building and management training initiatives for rice millers to accommodate the impacts from climate change.

13. Objective

The overall objective of Rice-SDP is increased productivity and net incomes of stakeholders along the rice value chain facilitated by an improved policy environment and climate resilient investments.²²

Rice-SDP will support national and regional food security by addressing rice productivity and quality constraints, facilitating market access, and enhancing resilience of natural resources to climate change. Along with significant investments in transport infrastructure by ADB and other development partners to improve connectivity in the GMS Southern Economic Corridor, Rice-SDP will further promote national and regional food

²² The design and monitoring framework is in Appendix 1 of the RRP.

security by taking account of all the three pillars for sustainable food security, including productivity, connectivity, and enhanced resilience to climate change.²³

14. Expected Outcomes:

The expected outcome is enhanced production of quality rice in Cambodia in a changing climate, reflected by the following indicators:

- Strengthened capacity of provincial departments in Project provinces to address climate change through climate proofing of irrigation structures, and improving irrigation water use efficiency.
- Increased paddy production from 8.0 million tons in 2012 to 9.5 million tons by 2018.
- Increased milled rice exports from 200,000 tons in 2011 to 1.2 million tons in 2017.

15. Key Results and Indicators for Success (consistent with PPCR Core Indicators):

Results	Indicators
<p>Increased resilience of households, communities, businesses, sectors and society to climate change and climate variability through investments in irrigation subprojects being rehabilitated and climate proofed.</p>	<p>Numbers of people supported by the PPCR-supported Project to cope with effects of climate change as demonstrated by</p> <ul style="list-style-type: none"> • 50,000 farmers will benefit from climate resilient irrigation structures by 2018 (2012 baseline: 0) • Enhanced gender mainstreaming - 30% unskilled laborers employed in the rehabilitation are women by 2018; 30% of construction sub-committee members are women; 2 farmer water user committees established in each irrigation scheme, with women occupying 30% of the management positions. (2012 baseline: 0) • At least 5 local engineering firms will practice commercial design and construction of irrigation system that incorporated climate resilience options by 2019 (baseline: 0). • 100,000 ha of rice producing areas covered by WICI within the three participating provinces by 2017 (50% of the policy-holders is women, of which 10% is from female headed household) (2012 baseline: 0) • 15 local input suppliers, 3 local financial institutions, and 3 local marketing agencies participating into the pilot tests in three provinces (2012 baseline: 0). • Four seed drying and storage facilities constructed by 2017 with a combined storage capacity of 8,000 tons (30% unskilled laborers and 50% administrative staff are women) • Capacity for drying paddy in target provinces extended by 2,000 tons per day by 2018

²³ This is in conformity with: ADB. 2009, *Operational Plan for Sustainable Food Security in Asia and the Pacific*. Manila.

	<ul style="list-style-type: none"> Capacity for paddy storage in target provinces extended by 40,000 tons by 2018
<p>Climate responsive investment approaches implemented through land leveling as adaptation demonstrations being conducted in each irrigation subproject.</p> <p>Strengthened climate responsive development planning</p>	<p>Quality of and extent to which climate responsive instruments/ investment models are developed and tested, as reflected by</p> <ul style="list-style-type: none"> 30% of farmers (disaggregated by sex) have leveled their paddy fields in target provinces by 2018 (2012 baseline: 0) At least nine private contractors in three project provinces engaged and trained to offer land leveling services by 2016 (2012 baseline: 0). Twenty private contractors, including 5 led by female entrepreneurs, replicated offering land leveling services at their own initiatives in three participating provinces by 2018 (2012 baseline: 0). Strengthened capacity of provincial departments in Project provinces in improving efficiency of irrigation water use through land leveling - baseline: 0% paddy land area leveled, target: 15% paddy land area leveled by 2018. <p>Degree of integration of climate change in national, including sector planning, as reflected by:</p> <ul style="list-style-type: none"> Strengthened capacity of provincial departments in Project provinces in improving efficiency of irrigation water use through land levelling - baseline: 0% paddy land area leveled, target: 15% paddy land area leveled by 2018. A joint working group including female representatives established by the government to develop agricultural land-use zoning as a climate adaptation strategy; developed and issued a framework providing procedures for establishing agricultural land-use zones, incorporating measures and targets for involving women in planning and decision making
<p>Strengthened adaptive capacity through mill management training initiatives that integrate climate change concerns.</p>	<p>Extent to which vulnerable households, communities businesses and public sector services use improved PPCR supported tools, instruments, strategies, activities to respond to CV&CC, as reflected by:</p> <ul style="list-style-type: none"> 30% of rice mills in three project provinces equipped with knowledge to address change in paddy supply patterns induced by climate change by 2018 (2012 baseline: 0).

	<ul style="list-style-type: none"> • Post-harvest losses reduced from 15% of crop yield in 2012 to 10% of crop yield by 2017. • Enhanced quality and participation of the private sector in providing advisory services to rice millers to address climate change impacts, as reflected by: 10 local firms participating in providing advisory services to rice millers by 2018 (2012 baseline: 0) Increased leverage factor of PPCR funding, reflected by an estimated \$5 million from private sector mills by 2018 to address change in paddy supply patterns induced by climate change (2012 baseline: 0). 	
Strengthened adaptive capacity through developing and piloting weather-indexed crop insurance scheme.	<p>Quality of and extent to which climate responsive instruments/ investment models are developed and tested, reflected by:</p> <ul style="list-style-type: none"> • 100,000 ha of paddy areas in three Project provinces covered by WICI by 2017 (2012 baseline: 0). • 50% of insured rice farmers (i.e., policy-holders) is women. • Enhanced capacities and participation of the private sector in paddy crop risk mitigation, reflected by: 15 local input suppliers, three local financial institutions, and three local marketing agencies participating in crop insurance services by 2017 (2012 baseline: 0). 	
Improved institutional framework in place through the adoption of sector development program approach encompassing policy and institutional reform and appropriately coordinated climate resilient investments.	<p>Evidence of strengthened government capacity and coordination mechanisms that demonstrate integration of climate vulnerability in national, including sector planning to mainstream climate resilience, reflected by</p> <ul style="list-style-type: none"> • Three important legal documents (a law, a policy and an action program) will be in place by 2016 to address climate change risks and/or adjusted to incorporate climate change risks, including (i) Law on Management and Use of Agricultural Land (ii) Framework providing procedures for establishing agricultural land-use zones; and (iii) National action program to combat land degradation in Cambodia. • Under the guidance of the Committee for Economic and Financial Policies (CEFP), a cross-sectoral mechanism taking into account of climate variability and climate change will be established by 2016 as part of the review and adjustment of the Policy on the Promotion of Paddy Production and Rice Export. 	
16. Budget (indicative):		
Expenditure²⁴	Loan Amount (US\$'000)	Grant Amount (US\$'000)
Rehabilitation of 13 irrigation schemes to enhance climate resilience	3,308.6	0

²⁴ Contingencies are included in each line item.

Detailed design and supervision of construction in 13 infrastructure subprojects	0	421.9
Land leveling in the areas of 13 subprojects	1,103.0	
Weather-indexed crop insurance developed and tested in three provinces	0	2,000.0
Miller capacity development in three provinces for climate resilience	588.4	0
Consulting services to incorporate climate resilience	0	2,078.1
Total Cost	5,000.0	4,500.0
Co-financing		
• Government	\$8.33 million in taxes and duties, resettlement	
• MDB (ADB)	\$55.0 million (\$24 million for the Program and \$31 million for the Project)	
• Private Sector	n.a.	
• Others (Global Agriculture and Food Security - GAFSP)	\$14.6 million	
17. Timeframe (tentative)		
<ul style="list-style-type: none"> • Expected Board/MDB Management approval date: June 2013 • Expected Mid-Term review date: June/July 2016 • Expected Project/Program closure date: March 2020 		
Other Partners involved in Project Design and Implementation:		
<p>During project formulation, coordination and cooperation was achieved through a series of consultation workshops, joint field visits, and separate meetings conducted by various members of the program design team to discuss climate resilience aspects of Rice-SDP. Studies from other projects on climate resilience also supplemented the project preparation such as those supported by PPCR including the GMS Flood and Drought Management and Mitigation Project, the GMS Corridor Towns Development Project and the many irrigation rehabilitation initiatives financed by ADB and L'Agence Française de Développement (AFD).</p> <p>Cooperation with the World Bank, the International Finance Corporation, AFD, USAID, Australian Agency for International Development at project level that have common objectives of developing the rice value chain in a climate resilient manner was initiated during project preparation and will continue during implementation through informal meetings as well as through the Technical Working Group on Agriculture (established under the Government-Donor Coordination Committee that meets annually).</p> <p>During project implementation, local experts (i.e. academia, professional organizations and commercial consulting companies) will be consulted in the process of preparing the detailed engineering designs of the subprojects, to ensure that the appropriate design parameters and specifications are properly integrated.</p>		
Coordination with Climate Change Initiatives Financed by Development Partners		
<p>ADB will work closely with relevant development partners to ensure their past, ongoing, and planned initiatives related to land and water resource management and climate change adaptation are rigorously taken into account during the implementation. This coordination is essential as it will maximize impact of the proposed interventions under Rice-SDP and minimize possible overlaps in geography and activities. Hereunder is a brief review of key initiatives financed by development partners, with which Rice-SDP will coordinate.</p>		
<p>Initiatives financed by GIZ. The Decree issued by the Council of Ministers in April 2011 outlines the National Policy for Spatial Planning. This recognizes the key role of land resources in socio-economic development and outlines government policy to 'ensure that land and natural resources are used in a sustainable, effective and equitable way to support socio-economic development, food security, national defense and natural history.' <i>This is a key document in guiding other land-use planning initiatives such as those proposed for Commune Land-use Planning into which the agro-ecosystem analyses are to be introduced under Rice-SDP.</i></p>		

The Project plans to collaborate with the Mekong River Commission's Flood Management and Mitigation Programme (FMMP), which is supported by Germany through a project funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. The FMMP strengthens flood forecasting and management capacities on the basis of regionally linked climate data and information systems.

Cambodia Climate Change Alliance (CCCA) coordinated by UNDP. Cambodia was selected as pilot country by the Global Climate Change Alliance (2010-2012) with a budget of \$8.9 million, supported by EU, DANIDA, SIDA, and UNDP. These funds were intended for (i) climate change policy formulation and mainstreaming, (ii) climate change knowledge management and awareness raising, and (iii) Trust Fund management. The main sectors of CCCA include agriculture and forestry, fisheries, water resource management, and health, while cross-cutting issues include gender and disaster risk management. *Work done by the CCCA will facilitate Rice-SDP implementation in both policy reforms and climate proofing of infrastructure.*

Joint Initiatives financed by ADB and AFD. AFD co-financed the Northwest Irrigation Sector Development Project, which came to an end in 2011. Due to its financial assistance in capacity building for farmers' water user communities to respond to climate change and irrigation rehabilitation, the Project has documented good practices in grassroots level adaptation. *Rice-SDP will make full use of these good practices in its subprojects implementation while continuing to work closely with AFD within the water sector and exchange information and experiences for the benefit of Cambodia.*

Initiatives financed by People's Republic of China (PRC). PRC has committed extensive funds in the rehabilitation and new development of irrigation facilities. Their Flood Protection Program with MOWRAM was estimated at \$30 million for 2010-12. It is expected that a more significant contribution will be committed to develop new irrigation facilities. *Rice-SDP will be working in similar areas as PRC-funded irrigation development and their significant resources will be utilized more effectively as climate change capacities are developed amongst irrigation design engineers under Rice-SDP. In addition, an amount of co-financing of \$60 million (additional fund for Rice-SDP in 2016) was proposed for Rice-SDP from the PRC loan program.*

Initiatives financed by DFID and DANIDA. DFID and DANIDA have been active in REDD for a long time providing further support to the National Forestry Program. It also contributed to CCCA and co-financed the Knowledge Attitude and Practice (KAP) study for climate resilience and change impact. *The KAP study provides better understanding of the requirements of beneficiaries in designing risk minimization cropping practices under Rice-SDP.*

Global Environmental Facility (GEF) has two adaptation projects identified in the National Adaptation Program of Action (NAPA). The Climate Resilience in Agriculture and Water Management Project implemented by MAFF and UNDP in the amount of \$3.1 million focuses on farmer adaptation to climate change and will be implemented up to June 2013. The second is the Vulnerability Assessment of Coastal Zones being implemented jointly by MOE and UNEP in the amount of \$5 million. *The former project has direct relevance to Rice-SDP subproject initiatives in guiding adaptation and mitigation at the grassroots level.*

Climate Change and Adaptation Initiative (CCAI) 2011-15 by the Mekong River Commission (MRC) funded by AusAid seeks to improve the capacities to manage and adapt to climate change at different levels in the MRC member countries. Key features of the CCAI 2011-15 include (i) promotion of a common adaptation planning approach, (ii) basin wide, sector and trans-boundary assessments, (iii) a network of adaptation planning and implementation projects, (iv) the Mekong Panel on Climate Change, (v) the Mekong adaptation strategy and action plan, (vi) the Mekong state of climate change adaptation report, (vii) knowledge and information sharing through databases, compendium, guidelines and events on adaptation planning, and options for using the full range of communication tools, and (viii) Integrated training packages involving a range of training methods and learning events. The Program was introduced as a demonstration in Phase I (2011-15) and will undergo replication in Phase II (2016-20) with a third phase of devolution between 2021 and 2025. Furthermore, the MRC's Drought Management Programme (DMP) will be relevant to the Rice-SDP. *ADB will ensure Rice-SDP have access to the knowledge and information databases along with other hydro-*

meteorological data as needed for irrigation design to ensure greater climate resilience.

18. Implementation Arrangements (incl. procurement of goods and services):

Implementation arrangements of Rice-SDP will be aligned to the policy and regulatory structure stated in the Rice Policy to avoid duplication and minimize implementation complexity. The Committee for Economic and Financial Policies (CEFP) will assume the role of the steering committee for the Program and the Project. The CEFP is chaired by the Senior Minister of Economy and Finance and includes representation from the National Bank of Cambodia, Office of the Council of Ministers, MAFF, Ministry of Commerce (MOC), Ministry of Industry, Mines and Energy (MIME) and others. For the purpose of the Program, the CEFP will also include the participation of representatives from Ministry of Water Resources and Meteorology (MOWRAM) and Ministry of Land Management, Urban Planning and Construction (MLMUPC) and Ministry of Women's Affairs (MWA). The CEFP will ensure overall coordination and efficient implementation of the Program through strategic guidance and monitoring of program implementation activities; interagency cooperation at national level; review and advice on policy issues and implementation constraints; and integration with other donors and government developmental activities. The CEFP will meet bi-annually for the Program or as needed.

The Program. The implementation period is from 1 January 2010 to 31 December 2016 and the closing date of the policy-based loan will be June 2017. MEF will be the Executing Agency (EA) for the Program, supported by the Program Management Office (PMO). One policy working group for each policy theme stated in the Policy Matrix will be established by relevant ministries, including MEF, Ministry of Agriculture, Forestry, and Fisheries (MAFF), Ministry of Industry, Mines, and Energy (MIME), and Ministry of Land Management, Urban Planning and Construction (MLMUPC).

The Project. The implementation period is from 1 October 2013 to 30 September 2019, and the loans and grants closing date is 30 March 2020. The PMO will be established within MEF to manage the Program and ensure policy actions are implemented. The PMO will be responsible for recruitment of consultants, including the PIC, and national consultants for preparation of feasibility studies, preparation of detailed design and construction supervision, and national entities for monitoring of safeguard measures; management and withdrawal of funds, including replenishment of imprest account and sub-accounts, disbursement, and reimbursement. The PMO will also be responsible for management, coordination and supervision of the Program activities of the implementing agencies.

At the national level, MAFF and MLMUPC will oversee the implementation of national initiatives pertaining to the respective ministries, and MOWRAM will provide guidance and assistance to PDWRAM in each program province with respect to planning and implementation of irrigation infrastructure subprojects; approving detailed designs of irrigation subprojects; ensure adequate water allocation for the irrigation subprojects; procurement of civil works contracts; and processing of resettlement plans for irrigation subprojects.

MAFF will be responsible for implementation of activities related to improving services along the rice value chain from (i) improved availability and quality of commercial rice seed through Cambodia Agricultural Research and Development Institute (CARDI), the Research Stations, and farmers cooperatives; and (ii) upgraded technical extension material for the cropping windows for rice through its Extension Department. MAFF will also be responsible for implementation of the development of land-use zoning incorporating agro-ecosystem analyses into commune land-use plans.

MLMUPC will be responsible for implementation of national initiatives related to output 2 to support the development of land-use zoning incorporating agro-ecosystem analyses into commune land-use plans. MLMUPC will also provide support and guidance at provincial level to PDLMUPC in implementation of CLUP and Land-use Zoning.

At the provincial level, a Provincial Steering Committee (PSC) will be established in each participating province to provide guidance in the implementation of subprojects. The PSC will be chaired by the Deputy Governor responsible for the agricultural sector in each province. The Deputy Chairperson will be the Head of the Provincial Administration Office. Other members of the committee will include Directors of the concerned

agencies including the PDA, PDWRAM, PDLMUPC, the Provincial Department of Commerce (PDC), Provincial Department of Economy and Finance (PDEF), Women's Affairs, and the district governors from districts in which subprojects are to be implemented. The PSC will meet bi-annually or as needed and will be supported by the PIO for Rice-SDP to provide resources for their operations. Three PIOs will be established within the governor's offices of Battambang, Kampong Thom and Prey Veng provinces respectively to carry out proposed subproject investment activities, with assistance from the PIC.

All significant procurement following ICB, NCB and shopping procedures will be carried out in accordance with the ADB procurement guidelines. In accordance with the provision of the government's *Standard Operation Procedures Manual* issued under subdecree number 74 ANK dated 22 May 2012, a procurement review committee will be formed to review and approve all procurement action under Rice-SDP. In addition a procurement committee will be established in each participating province to support and approve the procurement of precision land leveling contracts to be procured by the PIOs following shopping procedures.

Feasibility, design and pilot testing of WICI: In order to develop an appropriate WICI package, several elements need to be covered in order to establish the risk associated with various weather-related events such as flooding in rural areas. There needs to be an insurance entity to assess the risk associated with different levels and extreme weather events. The insurance company needs to establish premiums needed to cover the risk and to affect reinsurance in the event of payments being triggered in the early years of operation. As farmers are most likely unable to find the cash to pay insurance premiums, a mechanism for incorporating these insurance premiums together with the cost of other input supplies and the logical items most used by farmers are either seed material or fertilizers. On this basis, the insurance product will need to develop a mechanism for adding insurance premiums to the cost of input supplies and will therefore need the cooperation of a number of input suppliers, should this be found to be the most appropriate option. Alternatively, options to establish a Trust Fund to address this constraint regarding payment of premiums by poor and vulnerable farmers, will be explored. The third element needed is the financial institution to disburse payments when certain conditions trigger payment (being weather indexed, a defined set of circumstances will trigger payment rather than having farmers claim against a policy). The final entity needed is a communication mechanism whereby weather conditions can be communicated to insurance companies in order to trigger payments. This will most likely involve the services of a communication company operating in rural Cambodia such as Mobitel or similar other entity.

The development and implementation of the WICI scheme will be undertaken in two phases. Phase 1 will result in the determination of feasibility for introduction of WICI on a pilot scale in Cambodia, and include an assessment of the requirements for its design, establishment and operation in Phase 2. The feasibility study will entail, among other things, assessment of (i) the current status of weather data and monitoring infrastructure and operational capacity; (ii) the availability and accessibility of sound agronomic data to assess crop vulnerability needed to design an index; (iii) the availability and access to financial data to calculate the level of loss per farmer across the area to be covered by the index; (iv) the status of the local insurance industry and relevant public sector and private sector institutions in terms of structures, capacities, experience; (v) the policy environment that will facilitate adoption of WICI; and (vi) stakeholder consultation to assess their willingness to participate. It would also require identification and selection of potential sites and the crops where WICI would be introduced on a pilot scale. The feasibility study will include a phased implementation plan, identifying various milestones during the course of implementation that would eventually lead to pilot testing of WICI in selected areas in Cambodia in Phase 2.^{25, 26}

Phase 2 will comprise design of the WICI scheme, upgrading of the required institutional infrastructure and capacity building, identification and selection of potential sites and the crops where WICI would be introduced on a pilot scale. Based on the feasibility study, phase 2 may include procurement of materials and equipment, upgrading of automatic weather stations and establishing links to World Meteorological Organization (WMO)

²⁵ In this context, it may be relevant to refer to the World Bank report, Annex 11: Agriculture Insurance Systems Development in Ukraine, which lists 25 steps to develop a standard product/program (Figure A11.4: Steps to Develop a Standard Product/Program).

²⁶ Further guidance for such an assessment is available in World Bank (2011). Weather Index Insurance for Agriculture: Guidance for Development Practitioners. Agriculture and Rural Development Discussion Paper 50.

Global Telecommunication System (GTS), capacity building, and technical expertise.

For undertaking the feasibility study, and the design, establishment and pilot testing of WICI, in case it is determined to be feasible, there will be a need for the services of a team of experts led by a weather-indexed crop insurance design and application expert. Other expertise needed to assist the team leader may include meteorology, hydrology, agronomy, financing, institutional analysis, social development, climate change projections and downscaling, and monitoring and evaluation, among others

An internationally reputed firm, working in association with a national firm, will be selected on a quality-based selection (QBS) for undertaking the feasibility study, and the design, establishment and pilot testing of WICI, should it be found feasible. The selected firm/s will work directly under the PMO under the overall guidance of PIC. See Attachment – Program Administration Manual for details including the terms of reference.

19. Other Information

19.1. Public Private Partnerships and Private Sector Participation

(Business Focused Adaptation Features)

Rice-SDP will promote public private partnerships and private sector participation in five areas, including (i) development and testing of WICI; (ii) Irrigation design and supervision accommodating climate change; (iii) rice miller capacity development; and (iv) agricultural land leveling; and (v) operating lease of grain drying and storage facilities.

It is important to note that Rice-SDP will initially carry out its investment activities in three provinces. However, by 2016, Rice-SDP will be expanded to about 15 major rice-producing provinces throughout Cambodia. Therefore, PPP and private sector participation in five areas listed below will be replicated nation-wide. As a result, investment leveraged from the private sector will be very significant.

(i) Development and Testing of Weather-indexed Crop Insurance. Development and operation of WICI will require participation of (i) an insurance company, (ii) an appropriate vehicle to collect premiums - possibly a seed supplier or agricultural inputs supplier with capacity to undertake the required tasks, (iii) a financial institution through which the payments can be made, and (iv) a communications strategy and an entity to facilitate the dispatch of notices to insured farmers. While the development and testing under Rice-SDP is subject to the feasibility study, WICI, at the rolling-out stage, will certainly draw enormous attention of business entities along the rice/agricultural value chain due to the fact that WICI has become an attractive niche market for the mainstream (re-)insurance firms and related participants including financial services firms, microfinance institutions, agricultural input suppliers, and marketing agencies. It is expected that about 15 local input suppliers, three local financial institutions, and three local marketing agencies will participate in the pilot tests in three provinces by 2016.

(ii) Irrigation Design and Supervision to Accommodate Climate Change. The screening of irrigation designs to accommodate higher level risks due to climate change is an initiative that will result in skills development on the job for local private sector engineering firms recruited to undertake the detailed design activities. The design skills of these entities will be sharpened through (i) the Rice-SDP's requirements to incorporate climate resilience in the design of canals and water management structures, and (ii) the review by PICs. While these firms are not allowed to participate in civil work bids for the ones they design, by the time civil works bids are called, the overall local capacity will have been made available to implement irrigation subprojects with enhanced climate resilience and efficiency of water use in mind. There are currently about 30 local private sector engineering firms of reasonable size and capacity to participate in bids for designs and civil works implementation. The initiatives to get them involved in Rice-SDP will sustainably promote private sector participation in climate resilient designs for and construction implementation of irrigation schemes. It is expected that about 5 local engineering firms will practice commercial design and construction of irrigation system that incorporated climate resilience option by 2019.

(iii) Agricultural Land Leveling. The proposed initiatives will provide commercial opportunities for land levelling contractors in each province to replicate such activities. A least nine private contractors will be

selected and trained to offer land leveling services in three participating provinces by 2016. It is expected that an estimated 20 private contractors will offer land leveling services at their own initiatives in three participating provinces by 2019 due to the Rice-SDP dissemination of practices and profitability opportunities.

(iv) Capacity Development for Rice Millers. Rice-SDP will develop the capacity of rice mill operators to accommodate changing patterns of paddy supply induced by climate change. It is evident that cropping patterns are changing, and consequently, the operations of the mills need to change significantly in terms of stock movements, drying and storage facilities. Management training provided by Rice-SDP will improve stock management practices and general mill operations of selected millers. Through the Cambodia Rice Millers Association and expansion of Rice-SDP by 2016, the stock management practices that accommodate supply patterns of paddy induced by climate change will be disseminated to rice mills nation-wide. It is expected that about 10 local firms will participate in providing advisory services to rice millers by 2019.

(v) Operating Lease of Grain Drying and Storage Facilities. Public private partnership (PPP) arrangements will be used for operation of grain drying and storage facilities, i.e., the government will utilize the loan and grant proceeds from ADB and GAFSP²⁷ for construction of the facilities and lease to private sector entities for operation. The proposed strategy is based on the recognition that (i) the investment in these facilities for the rice sector is a relatively high risk undertaking for the private sector; (ii) the development of the rice sector and the export market is in a very early state of development; (iii) it is difficult to attract private financing for such an unknown investment in Cambodia; (iv) highly commercial nature of the investment renders the government an inappropriate institution to operate the facility on its own; and (v) facility managers must have flexibility in their operations to continually respond to market signals. At their mature stages of operation, these facilities will be used for operation of the warehouse receipt financing mechanism, whereby financial institutions can lend based on receipt of the products stored in the warehouse. To this end, Rice-SDP can promote better access of millers, exporters, and farming households to formal finance.

19.2. Stakeholder Consultation and Participation

A number of consultations with stakeholders have taken place during Rice-SDP's design, including the conduct of socio-economic surveys and feasibility studies of the three representative subprojects. During implementation, the process of consultation will continue throughout the detailed design phase of each subproject to afford community groups the opportunity to voice their views on how the subproject is to be designed, implemented and operated. This will be accomplished through a series of community consultation meetings at commune and district level. The community consultation meetings will be carried out by the PIO and the consultants. It will include the participation of representatives from the local government, civil societies, and NGOs. The communities will be briefed on all aspects of the subproject including safeguard issues of environment, resettlement. Women will be particularly encouraged to actively participate in the consultation meetings and voice their opinions and views about the subproject design and implementation arrangements.

19.3. Land Acquisition and Resettlement

Limited involuntary resettlement is envisaged under Rice-SDP since the screening process for subprojects eliminated those with significant resettlement impacts. Rehabilitation of irrigation systems will not cause significant resettlement impacts since works will be along existing rights of way.

Resettlement Framework and Resettlement Plans. A Resettlement Framework (RF) for Rice-SDP's investment project has been prepared to meet the requirements for implementation of a sector development program. Resettlement plans for two representative subprojects were prepared by the EA and endorsed by the Inter-ministerial Resettlement Committee²⁸. All costs related to resettlement and land purchase will be financed by the government. Interventions directed at other areas of the value chain involve mainly capacity building and raise no resettlement issues. The RF will be applied to all subprojects where there will be land

²⁷ Grain Drying and Storage Facilities will only be financed by ADB and GAFSP.

²⁸ The Resettlement Framework is accessible from the list of linked documents in Appendix 2 of the RRP. Resettlement plans are parts of the subproject feasibility studies in Supplementary Document 2 and 3 of the RRP.

acquisition and/or resettlement. The RF presents the specific policies and guidelines to guide the Program's process for land acquisition and resettlement. Feasibility studies will be prepared for all subprojects in the participating provinces and their districts, and will include a resettlement plan (RP) for those subprojects with potential resettlement implications. In addition socio-economic baseline surveys shall be conducted for each subproject and their findings and results about the subproject area documented in separate stand-alone reports. An independent socio-economic survey of all potentially affected household will be also be prepared and incorporated in RPs.

Grievance Redress Mechanism. A well-defined grievance redress and resolution mechanism will be established to address affected households (AHs) grievances and complaints regarding land acquisition, compensation and resettlement in a timely and satisfactory manner. All AHs will be made fully aware of their rights, and the detailed procedures for filing grievances and an appeal process will be published through an effective public information campaign. The grievance redress mechanism and appeal procedures will also be explained in the project information booklet (PIB) that will be distributed to all AHs.

19.4. Indigenous Peoples

Based on commune data-base information, supported by socio-economic survey data in the target provinces, there are no significant ethnic groups impacted by the program. The Program is therefore assessed as Category C for Indigenous Peoples.

19.5. Information Generation and Knowledge Management

During project implementation, there will be a consulting services package to support Rice-SDP implementation (Program Implementation Consultants - PICs). In undertaking their assignments, technical specialists will focus on development of relevant knowledge products. Among other things, this will include taking account of vulnerability to risk from extreme climate events in the development of land-use zoning and the preparation of rice eco-system maps. Included in the knowledge management will also be the development of a GIS based land management data base to be operated jointly by MAFF and MLMUPC.

Included in the terms of reference of the irrigation engineer is the requirement for incorporation of higher risk parameters in infrastructure design due to climate change. Information generated as a consequence will be analyzed and used in informing infrastructure design which, in itself, will be a knowledge product for replication within and outside the country. Similarly, with support of the PICs, the advanced techniques employed for land levelling will generate information and knowledge with the potential for replication in other provinces and adoption elsewhere in the GMS. Knowledge products will also result from the development and application of modern post-harvest technologies including paddy drying, grading and storage. Of special significance in terms of knowledge are the lessons to be learnt from the public-private partnerships in post-harvest handling operations.

Another innovative feature in terms of knowledge generation is the initiative of weather indexed crop insurance (WICI). Enhanced capacity of the private sector in providing quality services in paddy crop risk mitigation in the selected project areas will result in replicable models for adoption elsewhere in Cambodia and with potential replication in the GMS.

In addition to these technical knowledge packages, standard monitoring measures will be developed in an information databases which can be used to produce project-related publications for monitoring purposes.

19.6. Gender Dimensions

Rice-SDP is categorized as "effective gender mainstreaming". Rice-SDP Project's gender action plan (GAP) was prepared during project preparation in consultation with relevant stakeholders. GAP shall be a priority reference document in the implementation of the infrastructure investments to ensure that relevant gender issues identified during the project preparation are addressed. Among the proposed actions and targets in the GAP that should be ensured are: (i) women will comprise 50% of the community membership of construction sub-committees, (ii) final designs on infrastructure investments will be signed off by construction sub-

committees and the commune councils before submission to the government for approval, (iii) target of at least 30% employment of women as unskilled laborers in rice drying and warehousing facilities, (iv) occupational safety measures and training provided to all workers, (v) farmer water user communities (FWUCs) will accept membership registrations from husband and wife - 50% target for each with at least 30% women in management positions in FWUCs, (vi) women will be provided training on leadership and management and will be remunerated for their roles, and (viii) water provision where feasible, will include both irrigation and non-irrigation water needs of beneficiary households. These GAP actions will enable women and girls not just to gain new employment and career development opportunities, but also gain knowledge on the aspects of climate change and climate resilience.

19.7. Monitoring, Evaluation and Reporting

Program Performance Monitoring: A Program Performance Monitoring System (PPMS) will be developed on the basis of the program design and monitoring framework to record the Program's technical performance, evaluate delivery of program facilities, assess achievement of the program's objectives and measure the social, economic, financial and institutional impacts. The PMO will be responsible for developing and operating the PPMS with assistance from the PIC and information provided by the implementation agencies and the PIOs, and will report monthly to ADB. Progress monitoring, safeguard monitoring and benefit monitoring and evaluation will be carried out regularly during program implementation. Post-evaluation will be carried out three years after program completion. A baseline survey covering both target and control groups, and periodic surveys will be carried out by collecting data disaggregated by income group, sex, and other characteristics as appropriate. The EA will maintain a Program-specific web-page, in English and Khmer, on its official web-site, for wider dissemination of procurement and distribution related information, and to provide a feedback mechanism.

Compliance Monitoring: A number of assurances have been given by the government to ensure the smooth implementation of the Program. Those are subject to Loan covenants (Loan Agreement - Schedule 5). The ADB will monitor compliance with those covenants throughout program effectiveness and implementation via regular review missions, quarterly progress reports submitted by the CPMU, and review of program accounts and procurement procedures.

Evaluation: ADB will conduct regular (at least twice per year) reviews throughout program implementation to review and assess implementation performance and achievement of program outcomes and objectives; examine financial progress; and identify issues and constraints affecting the Program and work out time-bound action plans for their resolution.

Reporting. The PMO will prepare and submit to MEF and ADB within 30 days of the end of each calendar quarter, consolidated quarterly progress reports in a format consistent with ADB's project performance reporting system. These progress reports are designed to allow ADB staff to readily capture key information to record in ADB's project reporting system. In addition to these quarterly progress reports, the PMO will prepare consolidated annual reports, which will include (i) progress achieved by output as measured through the indicator's performance targets, (ii) key implementation issues and solutions; (iii) an updated procurement plan; and (iv) an updated implementation plan for the next 12 months. To ensure the program continue to be both viable and sustainable, program accounts and the executing agency annual financial statements, together with the associated auditor's report, should be adequately reviewed. Within 6 months of physical completion of the Program, the PMO will submit to ADB a completion report that describes the physical achievements of the Program, actual costs incurred in relation to cost estimates, the results of program activities, a preliminary assessment of achieved benefits, and other relevant program implementation matters requested by ADB.