

Project Title: Promoting the use of solar technologies for agricultural and rural development in Cambodia and Myanmar

Project Number: 112026 (Output ID 00124811)

Implementing Partner: UNDP

Start Date: 01 November 2020 **End Date:** 31 October 2023

PAC Meeting date: 05 November 2020

Brief Description

The objective of the project is to increase resilience of agriculture sector in Cambodia and Myanmar to climate change through a three-pronged interventions: (i) supporting the uptake of resilient agricultural practices, (ii) enhancing the agricultural value chain and (iii) promoting and scaling up the adoption of solar technologies for water pumping and powering market facilities.

To meet the above objective, the project will implement a set of measures that span across two key outputs.

- 1) Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain.
- 2) Enhanced awareness, capacities, adoption and utilization of solar water pumping solutions.


The project will increase smallholder farm productivity and climate resilience through the adoption of resilient and innovative agricultural practices and technology, capacity development of market actors and extension services officers, and the establishment of technology-enabled market facilities. By doing so, the project aims to address a set of barriers related to agriculture productivity - including marketing facility to link farmer products to markets and consumers; access to agriculture inputs such as resilient seeds, farm tools and innovative technologies; agricultural market information; technical know-how to improve quality and safety agricultural products for markets; and consumer trust of the farmers to supply safe agricultural products and mechanism of labelling and certification of agriculture products.

The project will also demonstrate/promote adoption and utilization of solar water pumping (SWP) solutions in the agriculture sector with the aim of reducing vulnerabilities to climate change, increasing agricultural productivity and reducing GHG emissions. This will be done through awareness creation on SWP solutions, enhancing capacities of market actors to supply, install and maintain quality SWP solutions tailored to local conditions, and installing SWP solutions in select vulnerable communities. By doing so, the project will capacitate market actors to design, install and maintain solar water pumping systems; build trust between solar companies and groundwater drilling companies; create conditions for easy access to low-cost water storage/distribution technology and related information; and provide technical support to develop new business models and innovate SWP solutions.

<p>Contributing Outcome (UNDAF/CPD, RPD or GPD): (Outcome 1: Advance poverty eradication in all its forms and dimensions)</p> <p>RPD Outcome 2: Accelerate structural transformations for sustainable development</p> <p>RPD Output 2.4 Climate Change</p> <p>Indicative Project Output(s) with gender marker¹: Output 1: Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain. (GEN1) Output 2: Increased adoption and utilization of solar water pumping in the agriculture sector. (GEN1)</p>

Total resources required (USD):	\$ 4,994,867	
	UNDP TRAC:	
	Donor ROK MAFRA:	\$ 4,994,867
	Government:	
	In-Kind:	
Unfunded:		

Agreed by (signatures):

UNDP	
	
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Date:	04-Dec-2020

¹ The Gender Marker measures how much a project invests in gender equality and women's empowerment. Select one for each output: GEN3 (Gender equality as a principle objective); GEN2 (Gender equality as a significant objective); GEN1 (Limited contribution to gender equality); GEN0 (No contribution to gender quality).

I. DEVELOPMENT CHALLENGE

Cambodia and Myanmar have similar development challenges and contextual conditions. As such, the proposal seeks to address these similar problems faced by both countries in one project while making adjustments as necessary to tailor for the variances of each country.

Cambodia has a population of ~16 million that is predominantly rural but with a strong urbanization trend. Cambodia's GDP has been growing at greater than 5% above for 20 years. Despite the country's steady economic growth and the reduction of the national poverty rate from 50% in 2002 to 17% in 2012, more than 70% of Cambodians still live on less than \$3 a day, making them vulnerable to slipping back into poverty in situations of economic or climate shocks.

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.

Cambodia is a predominantly agrarian country in which farming communities largely depend on rain-fed agriculture for their livelihoods. 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. The latest National Water Status Report of MOWRAM confirms that the frequency and intensity of floods, droughts and windstorms have increased since 1989 when national weather and climate data began to be reliably recorded.

In 2014, the agriculture sector accounted for 29% of GDP, with crop production contributing 59.4% of the sector's GDP. Cambodia continues to exclusively depend on Thailand and Viet Nam for the value addition of its agriculture commodities subjecting its farmers to external risks of market volatility and price shock. More recently, the growth of the agricultural sector has gradually slowed down from 5.4% in 2009 to 0.24% in 2015 mainly due to extreme weather events, including floods and droughts and to systemic constraints to production increases. The loss of yield combined with post harvesting losses continue to affect Cambodia's ability to set competitive pricing for its agriculture commodities in regional and global markets.

Historical temperature records show an approximate increase of 0.18°C per decade since 1960. According to different climate models, these observed trends will continue, with the average annual temperature rising by 0.7-2.7°C by the 2060s and 1.4-4.3°C by the 2090s. While historical records of rainfall do not show any consistent increase or decrease since 1960, climate models predict an increase in annual rainfall and more specifically the proportion of total rainfall falling under heavy events is projected to increase.

Observed impacts of climate change trends in recent years have been marked by more intense rains over shorter periods of time 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, unexpected dry periods during the rainy season, and untimely rains spoiling ready to harvest or drying crops, such as rice and maize.

The observed impacts and projections of climate change highlight the increasing vulnerability of Cambodia to climate change and more importantly of the agricultural sectors as 85% of the population depends on rain-fed agriculture for their livelihoods and source of income.

According to the Asian Development Bank, Myanmar is among the most vulnerable countries to climate change. In Myanmar's Dry Zone, which is home to about 18 million people, drought and water scarcity are the dominant climate-related hazards. The Dry Zone with its poor and severely eroded soils, thin vegetation cover, and scarce water resources has become the most food insecure region of the country. Irregular dry spells and drought have resulted in recurring extreme water shortages, which in turn constitute a constant threat to the livelihoods of the rural poor. These conditions combined with low uptake of agricultural inputs and technologies, underdeveloped transportation network and a lack of clean agricultural markets lead to a continued cycle of poverty.

Access to technology and irrigation is a key factor in improving agricultural output and livelihoods in the Dry Zone. Currently, there is a low utilisation level of irrigation, and what is in place, is primarily provided by diesel-powered pumps which are not only contributing to the emitting of greenhouse gases but are expensive to operate, which increase market inefficiencies.

Myanmar has excellent solar resources and solar resource mapping show enormous potential for solar powered equipment, especially in the Dry Zone. At the same time, Myanmar is facing power shortages and especially rural areas are most often not connected to the national grid. Solar Water Pumps can offer irrigation solutions and have proven to be operationally, financially and environmentally sustainable. Prices for solar panels used in these systems have dropped substantially in recent years. Solar energy has been introduced in some rural areas in the last decade through photovoltaic cells for charging batteries and pumping water for irrigation.

II. STRATEGY

The project is closely aligned to Cambodia's and Myanmar's development strategies.

The project supports the implementation of the GoC's nationally focused **Rectangular Strategy Phase-IV (RS4)** which puts forth a strategic goal to minimize environmental impacts, enhance the capacity to adapt to and mitigate climate change and advance on a path towards sustainable development. In particular, increasing investments in clean energy – especially solar power is detailed as a main priority. In addition, RS4 outlines the GoC strategic goal to improve access to sustainable water resources. The project, which proposes to increase the use of solar energy and improve the access to sustainable water resources, aligns very closely to these priorities detailed in the RS4.

The Myanmar Sustainable Development Plan (2018-2030) is the overarching development framework which lays a strong emphasis on strengthening agricultural productivity and promotion of value chains. The 2018 Agricultural Development Strategy calls for reorienting irrigation systems for higher productivity and impact. The Strategic Directions for Myanmar Agricultural Sector 2018-2023 clearly states that agricultural development will be environmentally sustainable.

MAFRA's contribution to this project is critical to making investments in the agriculture sector more climate-resilient, and helps Cambodia and Myanmar orienting their agricultural value chains towards low-carbon pathways. Although there is some uncertainty with regards to how climate

change will manifest in specific locations of Cambodia, current trends indicate that the country will not be able to undertake the deep transformation of the agriculture sector required to make it climate resilient on its own. Poverty remains a serious issue in both countries despite remarkable progress made (especially Cambodia) in reducing the proportion of people living below the poverty line. Given that the majority of the population in both countries derive their livelihoods from, predominantly, rain-fed agriculture that can be characterized by low input, and moderate or low fertility land. Lack of reliable access to water constraints livelihoods and the development of vibrant agricultural sectors.

Cambodia:

Cambodia's agricultural value chains, besides being highly vulnerable to the impacts of climate change, are not as developed as those in Thailand and Vietnam with respect to domestic and export markets due to a lack of utilization of technology, 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 postharvest 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, labour 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 unfavourable 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.

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. Climate Smart Agricultural (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 including solar water pumping and other inputs offers significant potential to increase yields to a profitable and sustainable level.

The agriculture sector covers 30% of the country's land use, of which 70% of the agriculture area is arable land, 27% is permanent meadows and pastures, and 3% is permanent cultures. Regarding crop production, 5.5 million hectares of the country is dedicated to crop lands, mainly to rice (75% of the cultivated lands), the primary commodity and source of income for the majority of farmers. The other cultivated lands (25%) are used for the production of other food and industrial crops such as rubber, vegetables, cashews and cassava (FAPDA, 2014; FAO, FAOSTAT-Aquastat, 2016).

Most of the farms have a surface of 0.03 ha to 4 ha (92% of the households in Cambodia) whereas only 7% have a bigger surface (from 4 ha to 10 ha), and 1% have more than 10 ha (National Institute of Statistics, 2015). Regarding livestock breeding, it is the second most important agricultural activity after crop cultivation. This activity plays a key role in supporting the livelihood

and providing income to rural households. Indeed, the study of the census of agriculture in Cambodia in 2013 showed that 75% of the agricultural households in Cambodia raise livestock (National Institute of Statistics, 2015).

Crop agriculture is by far responsible for the largest water withdrawal in Cambodia, whether using irrigation or rainwater. In the last decades, the average of yields increased for various crops due to the improvement of the technologies in the agriculture sector, especially irrigation systems and mechanized services.

The country is transitioning from a traditional subsistence to a modern commercial agriculture and the government priorities are focused on the development of irrigation practices. The latter aims at sustaining livelihoods and food security by improving the crop yields, enhancing crop resilience and diversification, increasing the income and providing additional benefits for health, education and poverty. The poverty rate has decreased by more than half since 2007 but 18% of the population is still living below the poverty line (Ministry of Environment, 2011). In addition to the poverty rate, the proportion of undernourished in the population declined from 39% in the 90's to 15% in 2013 (FAO, 2014).

The total irrigated crop land is estimated at about 1.6 million ha in the country. The Plain region is the area with the most irrigated areas, following by the Tonle Sap Lake region (National Institute of Statistics, 2015). Data about existing irrigation infrastructures is limited but in 2011, the Government estimated that global infrastructures allowed to irrigate 1.05 million ha (Ministry of Environment, 2011).

Cultivated lands are mainly irrigated with water from the main streams and rivers (especially the Mekong River) and the Tonle Sap tributaries. Thus, the agriculture for crop production is a significant consumer of water coming from surface water sources and the Mekong River and the Tonle Sap tributaries are the main sources of surface water (respectively covering 734,000 ha and 358,900 ha) (Ministry of Environment Cambodia, 2011).

The results of a SWP market study conducted last year showed that farmers use mainly water from surface waters (natural ponds, dams and rivers) for irrigation whereas livestock activities rely more on groundwater sources. The use of the groundwater for livestock breeding may be due to the proximity of the activity from the house. Rural households raising livestock generally provide water from their private wells to their animal for drinking or for cleaning animal shelters.

The project is based on an approach that integrates research into development processes and the project design. This includes, for example, the provision of targeted training programmes on how to enhance agricultural productivity and the development and implementation of solar water pumping based irrigation. 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 that can be applied at the regional as well as the national level. Through awareness-raising on the economic and environmental benefits, the project's interventions will reach remote communities and vulnerable areas.

The project builds on lessons learned and results from many projects, most notably the "Promoting Climate-Resilient Water Management and Agricultural Practices in Rural Cambodia" and the "Clean Energy Revolving Fund". There have been a few projects in Cambodia that incorporate SWP technologies.

The “Promoting Climate-Resilient Water Management and Agricultural Practices in Rural Cambodia” project ran from 2009 to 2015 and was financed by a UNDP grant. The project installed 48 communal SWP systems in two Cambodian provinces that were selected based on their high levels of vulnerability to disruptions in their access to clean water. The project was cost-effective and considered highly successful, however, issues were detected such as seasonal variabilities of groundwater that required a deeper pump, cases where pumps were damaged and lacked available technicians to repair in due time, and arsenic-contamination in the water appearing few months after installation. The 5-large-scale communal SWP systems proposed in this project will conduct a comprehensive hydrological analysis at least three months prior to installation, to ensure a specific pump design that accounts for seasonal variations and avoids arsenic-contaminated waters.

This Clean Energy Revolving Fund project was implemented by NEXUS, a Cambodian-based developmental organization. Amongst other agri-food initiatives, SWP was one of the main components in which the project provided funding in the form of loans and risk-guarantees and has provided a total of 12 loans for both SMEs and larger-scale agricultural farms. One major lesson from this initiative that this project proposal considered is the engagement between SWP installers and drilling companies, which the experience of the CERF highlighted as a major barrier to upscale their project to more beneficiaries. A key activity of this project proposal is to bridge the gap between drilling companies and SWP providers.

Myanmar

This project seeks to build a model for inclusive and sustainable development of rural communities in the Dry Zone by tapping synergies between the private sector and existing development programmes of the government, the UNDP and other agencies. To do so it will address the problem of (1) poor adoption of mobile technologies among rural communities, especially women, which undermines the potential of mobile communications and related information technologies as a cross-cutting means to integrate and amplify the effectiveness of development interventions; (2) weak agricultural extension services and research capacities and efficient service delivery to farmers; (3) lack of use of mobile information and communication technologies to enable access to information and to provide location-specific services for rural communities; and (4) lack of access to technology, markets, credit and energy have limited the growth of rural micro and small enterprises and excluded them from high-demand value chains. The above problems will be tackled in an integrated manner - considering both gaps in technology and systems and capacities of stakeholders and beneficiaries. In doing so, it will try to narrow the gaps between beneficiaries and service providers, including enhancing access to markets, financial services and livelihood inputs.

Lack of reliable access to water serves as a constraint on livelihoods and the development of a vibrant agriculture sector. Poor and landless farmers are particularly vulnerable to climate shocks, such as droughts and floods, and other extreme weather conditions. Lessons learned from UNDP’s projects in the Dry Zone region has found that access to water and irrigation services are vital for improving smallholder production, and reducing incidences of crop failure, and enables farmers to explore improved crop varieties and fertilizers.

Since 1988, the Government of Myanmar has made considerable efforts to expand irrigation in the Dry Zone, and a large number of surface water irrigation projects have been developed on the Ayeryarwady, Chindwin and Mu rivers. The Dry Zone contains large areas suitable for irrigation- the majority is irrigated by gravity diversion and pumped surface water schemes using electric and diesel pumping stations.

Pumping of water is required to increase irrigation at scale in the Dry Zone. However, smallholder farmers that do engage in pumping water for irrigation prefer to use diesel-run pumps instead of solar-powered pumps. Surveys of these smallholder farmers indicate that their resistance to using solar-powered pumping is primarily a factor of lack of awareness and access to the technology. Solar water pumping is considered optimal for irrigation in the Dry Zone.

Solar water pumping for irrigation will improve agricultural productivity in the region. Additionally, complementary interventions are needed to link agricultural production with markets to enable the safe storing of produce as well as access to high-quality seeds, fertilizers, and pesticides leading to increased agricultural productivity and diversification. High-quality extension services and facilities are also important required interventions. While there has been an increase in the use of solar for energy purposes via off-grid installations and even at the household level, the use of solar-powered water pumping for irrigation has been slow to develop. Off-grid, community-operated Solar Water Pumps confront similar sustainability challenges as other small scale renewable energy technology interventions involving ownership, maintenance, recurrent funding for spare parts and repairs, management and control, and long-term operation after installation and the exit of donor support. Moreover, PV water pumps require more customization, time, and engineering input (pumps must be designed and drawn for each unique site and source of water), and a wider range of installation skills.

UNDP has extensive experience designing and managing similar projects in Myanmar and specifically implementing projects that try and address challenge through innovative interventions for women and farmers in the Dry Zone.

The "**Addressing Climate Change Risks on Water Resources and Food Security in the Dry Zone of Myanmar**" project is among the more important of these interventions. The project started in 2015 and terminated in 2019. The Adaptation Fund project led to increased agricultural productivity and reduced vulnerability of subsistence agriculture to climate related disasters through diversification, post-harvest technologies and processing and access to advisory and climate services. The natural resource base in the project villages has been stabilised and enhanced through extensive soil and water conservation, afforestation and agroforestry interventions. The project has generated a wealth of knowledge about effective implementation strategies for resilience building among communities and scaling up and replication of these strategies.

Two relevant lessons have been learned from the mid-term review of the project:

- The need to narrow down the focus of interventions to ensure sufficient resources are available along with adequate oversight and monitoring of activities and capacity development of implementing partners.
- Creating market linkages to sustain and upscale the uptake of increased agricultural and livestock production and inputs.

A follow-on project of the AF project is currently ongoing in the proposed project locations – "**Sustainable Enterprises and Agricultural Development Project**" which is jointly funded by Ooredoo Myanmar (a telecom service provider) and UNDP in partnership with MoALI. The project is expected to strengthen agricultural extension services by building capacities to leverage mobile communications technologies for outreach and dissemination; bridge growing gap in mobile applications and services designed for rural communities by identifying specific needs and finding innovation solutions to everyday problems (eg. access to financial services, transports, markets and labour markets; incubation of small and medium rural enterprises by integrating technology, markets, RE and credit for high demand value chains).

The Bangkok Regional Hub will ensure consolidation of results/impacts and reporting to the donor on a regular basis. It will also ensure value-addition through knowledge management experience sharing across participating countries and dissemination of lessons to other countries in the region. Based on lessons and best practices, BRH will support countries to mobilize additional resources through similar arrangements in the future.

III. RESULTS AND PARTNERSHIPS (1.5 - 5 PAGES RECOMMENDED)

Expected Results

The project comprises of a set of measures that span across two key outputs with corresponding country-level outputs, as follows:

1. Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain.
2. Increased adoption and utilization of solar water pumping in the agriculture sector.

OUTPUT 1: Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain.

Rural farmers in Cambodia and Myanmar, especially female farmers, are among the most vulnerable to risks imposed by climate change. Many of them do not have access to social safety nets, credit services and information which collectively serve to absorb external shocks. Without these shock absorbers, farmers are made to be highly risk-averse to adjust their agricultural practices and vulnerable to external shocks brought about by more erratic rainfall patterns, rising temperatures, and extreme events.

In this Output, climate resilient agricultural practices and technologies will be delivered to vulnerable farmers with 100% concessionality, on a pilot basis, to ensure initial uptake. At the same time, the project resources will be invested in strengthening market actors and value chains to ensure sustainability of the project impacts. Support extended to farmers and market actors will be tailored to country contexts. For example, in Cambodia where market connectivity remains an issue but there is a sizable market that supplies production inputs to rural farming households, the focus of the project will be to enhance the connectivity between farmers and markets so that the former is more robustly integrated into the value chain.

On the other hand, in Myanmar, where rural agricultural production is much more dependent on support from public service, the focus will be on strengthening the existing extension support provision by using ICT-enabled services and direct investment in critical assets along the value chain such as storage facilities and women-led SMEs that act as aggregators. Members of SMEs will receive intensive, hand-holding support for productivity enhancement, market linkage, general management capacity building, access to credit, etc.

CAMBODIA:

Activity Result C1.1: Producer-buyer linkages strengthened for sustainable provision of agricultural production inputs for resilient agriculture. Rural farmers in Cambodia face challenges in accessing production inputs required for resilient agriculture. Improved seeds are

available through individual sales from private agents or sporadic access to government-supported distribution channels. In turn, farmers also face limited marketability as the sales of their agricultural produce are highly dependent on middle-buyers visiting their villages. Underdeveloped producer-buyer linkages prevent information exchanges and economies of scales from emerging, which limits the profit margin for farmers and innovation for more profitable and resilient agricultural practices. Under this Activity result, **RoK funding will be invested in establishing four market facilities/stores in rural and urban areas as exchange nodes of both agricultural produce and production inputs such as resilient seeds, mulching materials, drip irrigation, etc.** The facilities are also expected to act as a venue for suppliers to present and sell innovative and technology-enabled production inputs to the farming community as well as for capacity building activities provided by the project or by the Government.

RoK funding will also be used under this Activity result to raise awareness of farmers about resilient agriculture production inputs.

Activity Result C1.2: Resilient agricultural production and marketability enhanced. Under this Activity result, **the project will facilitate the identification of demo farmers and pairing with local market agents, private and government institutions to sign an off-take agreement and jointly undertake resilient agricultural production.** Farmers who benefit from access to irrigation under Output 2 will be specifically targeted. Resilient agriculture techniques include integrated pest management, safety application of pesticides and insecticides, effective/efficient use of water, drip irrigation, soil management, greenhouse setting, etc. Based on past successful projects supported by UNDP, the resilient agricultural techniques as well as irrigation facilities will benefit farmers who are growing *rice, cabbage, Chinese radish, cucumbers, green mustard, and cherry tomato*.

The project resources will also be used to build the technical capacities of farmers and relevant private and public institutions to carry out safety and quality certification processes. The new certification will be applied to produce that will be traded in the four farm stores.

MYANMAR:

Activity Result M1.1: Extension services improved through the use of ICT enabled services and associated capacity development of extension agents and farmers in the Dry Zone. This Activity result focuses on building the technical capacities of both the Government and farmers for climate resilient agricultural techniques. In particular officers providing extension support from the Department of Agriculture and the Livestock Breeding and Veterinary Department at the local level will be targeted. Based on successful past and ongoing projects in the Dry Zone supported by UNDP, as well as building on the findings of the community level needs assessments completed under the SEAD project, **the topics will include identification and production of drought-resistant seed varieties, intercropping, application of legumes to improve soil nutrients, AWD for rice farming, vermiculture, post-harvest handling, vaccination for livestock and cross-breeding of temperature tolerant pig varieties.** Applying the Training of Trainer approach, those officers who have been trained will pass on the learnings to farmer groups. The possibility of ICT-enabled services, such as mobile-based extension support, will be explored.

Activity Result M1.2: Aggregation capacities enhanced for realizing economies of scale and sustainable support for resilient agriculture. One of the persistent challenges for farmers in the Dry Zone in building resilience is the limited integration into value chains and marketability of their produce. This is largely because farmers in this area are predominantly small-scale and dispersed with limited means of aggregating and transporting their produce. Many middle buyers

are involved before the produce are delivered to the market, reducing the profit margin for farmers. The RoK funding will be invested in first undertaking a study to identify geographical areas where the possibility and benefits of market linkage are greatest. Then, the project will identify active women's groups that can be nurtured to establish micro/small/medium enterprises. Linking up to UNDP's collaboration with the Ministry of Planning, Finance and Industry for strengthening capacity of MSMEs, including facilitation of digital transformation of the MSME eco-system, and launch of an accelerator programme, mentoring program and exchange visits will be conducted to expose group members to successful enterprises, including green enterprises, in the region. The project support will facilitate a linkage with financial institutions and markets. **The RoK funding will be used to invest in storage facilities and value-addition equipment.**

OUTPUT 2: Increased adoption and utilization of solar water pumping in the agriculture sector.

There are substantial barriers preventing the growth of a robust SWP market in Cambodia and Myanmar, many of which are difficult for the private sector to address. This outcome sees the potential of each country's SWP market unlocked through interventions that target some the most fundamental challenges stakeholders currently face, **with new product technologies that fit the needs of end-users and a business model which facilitates cooperation between installation service providers.** Additionally, the limited awareness of the benefits and opportunities SWP solutions offer will be addressed by bringing attention to SWP products, businesses, and operators, clarifying the solutions they can bring for end-users, the profitability for innovative technology and business models, as well as new employment opportunities for solar technicians.

CAMBODIA:

Activity Result C2.1: Improved business models and design of SWP solutions. Through catalyzing innovations for contextual technologies, learning from best international practices, introducing new business models, and expanding the pool of qualified technicians, this Activity result introduces new opportunities for **stakeholders** to stimulate the SWP market in Cambodia. To promote the use of solar technologies for agricultural and rural development in Cambodia, a challenge fund **will be** made available to stimulate innovation in solar water pumping (SWP) solutions with co-investments in at least 3 SWP innovations for improved business models and design of SWP solutions. **The overarching objective of the challenge fund is to stimulate innovations in SWP solutions and its increased adoption and utilization in the agriculture sector with the aim of reducing vulnerabilities to climate change, increasing agricultural productivity and reducing GHG emissions.** Further, these innovations are expected to raise awareness, enhance capacities of market actors to supply, install and maintain quality SWP solutions tailored to the local conditions including special needs of community members, especially women, and installation of SWP solutions in select vulnerable communities with co-investments. It is likely that ACCLAB at CO will administer the challenge fund and incubation support. At the same time, the RoK funding will be used to develop technical capacities for a pool of local engineers to install, design and maintain the SWP system.

Activity Result C2.2: Tailored information on SWP disseminated among stakeholders. Spreading awareness on SWP in Cambodia, especially for a large segment of the potential market, requires clear, concise and non-technical information adapted in the Khmer language to a local context. This output seeks to provide such knowledge through various knowledge products that are tailored to specific segments of the SWP market, and to facilitate interactions between a broad group of stakeholders that will raise a sense of market-place formality.

Activity Result C2.3: Enhanced capacities of current and new operators of SWP systems.

The technical knowledge and functional capacities of SWP operators are essential in strengthening the long-term viability of the market. Operating SWP technologies requires greater knowledge and technical understanding than what is required for traditional hand-pump or diesel systems. This output seeks to train both current and new commercial and community-based operators of SWP solutions that will increase the functional capacities of installed systems.

Activity Result C2.4: SWP solutions installed and operational. Learning from past experiences, community-based SWP solutions can be very effective to improve access to sustainable water resources but must be very carefully designed, installed and maintained to fit the hydrological conditions within the community. **This output seeks to meticulously identify, sensitize, design, install and provide post-installation maintenance of large community-based SWP systems to 30 of the most vulnerable communities in Cambodia.** The RoK investment is expected to target three different groups: 1) smallholder farmers with the capacity of 210W or below, bringing <0.5 ha of agricultural land under irrigation; and 2) vulnerable communities with the capacity of 1.5kW, mainly targeting the domestic use. In addition, information about the benefits of the SWP systems and capacity building of SWP operators will encourage productive business operators to install SWP systems with their own resources. Development impacts of access to freshwater delivered through this Output will be enhanced by linking explicitly with activities under Output 1.

MYANMAR:

Activity Result M2.1: Business environment and technical capacities of SWP companies enhanced through technical assistance and capacity building. Building on the work conducted by the Korea Rural Community Corporation (KRC) investigating the feasibility of installing SWP technology in the Dry Zone, **the RoK funding will be used to carry out site specific assessments for SWP system application.** The assessment will also include sustainability and viability of multiple business models of the SWP system and research and development for alternative water storage technologies to lower the overall systems costs. Capacity development of SWP technology stakeholders will be carried out under this activity result as well. The project will also explore the possibility of south-south cooperation between Myanmar and Cambodia by facilitating collaboration/exchange visits.

Activity Result M2.2: Sustainable irrigation services provided to vulnerable communities through solar technology. This activity result will entail installation of SWP systems in vulnerable communities, capacity building and sensitization and setting up servicing facilities that provide after-installation O&M services to ensure sustainability. **20 units of 1.5kW SWP systems will be installed in Myingyan and Nyaung U Townships** benefitting up to 10,000 farmers (The exact number will be confirmed at a later stage). The beneficiaries from this activity result will also receive support from activities from Output 1 to realize the largest impact potential by combining the benefits from access to freshwater and climate resilient agricultural practices. Crops to be cultivated in these Townships include groundnut, sesame, and pigeon pea. Access to irrigation will also assist those growing livestock including cows, goats/sheep, pigs and poultry.

Activity Result M2.3: Enhanced awareness on benefits and financial feasibility of utilising SWP solutions. This activity result envisages facilitating interactions between SWP companies and businesses while using lessons learned from this project as critical inputs. Interactions will also be explored with the recently endorsed UNDP-GEF project on rural renewable energy development for which DRD is the Implementing Partner. Evidence of positive impacts from the

project is expected to stimulate the latent demand from businesses and marketability of such products in the Dry Zone. The RoK resources will also be invested in an enabling environment to realize the replication potential of SWP technologies by developing a policy proposal to integrate SWP financial support mechanisms in a government program, which successfully demonstrated similar support to promote uptake of solar home systems earlier. Similar efforts will also be implemented through the UNDP GEF RE project mentioned above.

Resources Required to Achieve the Expected Results

The project will be implemented directly by UNDP, with UNDP Bangkok Regional Hub (BRH) providing coordination and oversight support and UNDP Cambodia and UNDP Myanmar executing activities on the ground, in collaboration with the respective governments. At the regional level, a technical advisor and a project assistant will provide project implementation and oversight support. UNDP Cambodia and UNDP Myanmar will make use of project resources to execute the project through recruitment of project personnel.

The total financing required for the project is US\$ 4,994,867 (Korean Won 6,078,600,000 @1,216.97 per US\$). A detailed breakdown of the project budget is included in the table below:

Detailed Project Budget with Budget Notes:

Output	Activity Result	Responsible Parties	Financing Source	Account Code	Description	Y1	Y2	Y3	TOTAL	Budget Notes
Cambodia										
1. Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain	1.1 Producer-buyer linkages strengthened for sustainable provision of agricultural production inputs for resilient agriculture 1.2 Resilient agricultural production and marketability enhanced	UNDP	ROK	71200	International Consultants	20,000	20,000	38,000	78,000	1
				71300	Local Consultants	15,000	7,000	-	22,000	2
				72300	Materials and Goods	27,039	80,000	72,961	180,000	3
				75700	Training, Workshops and Conference	15,000	24,800	19,800	59,600	4
				72200	Equipment and Furniture	48,000	-	-	48,000	5
				72100	Contractual Services - Companies	14,000	14,000	14,000	42,000	6
				71400	Contractual Services - Individuals	10,000	20,000	20,000	50,000	14
Sub-total for Output 1						149,039	165,800	164,761	479,600	
2. Increased adoption and utilization of solar water pumping in the agriculture sector	2.1 Improved business models and design of SWP solutions 2.2 Tailored information on SWP disseminated among stakeholders 2.3 Enhanced capacities of current and new operators of SWP systems 2.4 SWP solutions installed and operational	UNDP	ROK	71200	International Consultants	20,000	33,000	35,000	88,000	7
				71300	Local Consultants	20,000	36,500	30,000	86,500	8
				75700	Training, Workshops and Conference	3,000	20,000	22,000	45,000	9
				74200	Audio Visual and Print Production Costs		7,000	-	7,000	10
				72300	Materials and Goods	80,000	359,897	259,603	699,500	11
				61300	Salary & Post Adj. Cost - IP Staff	75,000	100,000	100,000	275,000	12
				71455	Innovation challenge	40,000	40,000	40,000	120,000	13
71400	Contractual Services - Individuals	10,000	20,000	20,000	50,000	14				
Sub-total for Output 2						248,000	616,397	506,603	1,371,000	
Project Management		UNDP	ROK	71400	Contractual Services - Individuals	33,672	32,400	32,400	98,472	14
				75700	Training, Workshops and Conference	5,500	500	500	6,500	15
				74500	Miscellaneous	2,000	2,000	2,000	6,000	16
				74596	Service to Project - GOE	34,050	34,050	34,050	102,150	17

Output	Activity Result	Responsible Parties	Financing Source	Account Code	Description	Y1	Y2	Y3	TOTAL	Budget Notes
				61100	Salary Costs - NP Staff	35,500	35,500	35,500	106,500	18
				61200	Salary Costs - GS Staff	8,000	8,000	8,000	24,000	19
				71600	Travel	3,000	5,000	5,000	13,000	20
				72400	Communication & Audio Visual Equipment	500	500	500	1,500	21
				72500	Supplies	700	700	700	2,100	22
				72800	IT Equipment	5,000			5,000	23
				73100	Rental & Maintenance-Premises	3,000	6,000	6,000	15,000	24
Sub-total for Project Management Costs						130,922	124,650	124,650	380,222	
Total budget for Cambodia						527,961	906,847	796,014	2,230,822	
Myanmar										
1. . Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain	1.1 Extension services improved through the use of ICT enabled services and associated capacity development of extension agents and farmers in the Dry Zone 1.2 Aggregation capacities enhanced for realizing economies of scale and sustainable support for resilient agriculture	UNDP	ROK	61300	Salary & Post Adj Cost-IP Staff	24,978	24,978	24,978	74,934	25
				71200	International Consultants		48,506	-	48,506	26
				71300	Local Consultants	15,000	16,500	14,000	45,500	27
				71400	Contractual Services - Individuals	11,004	40,996	20,000	72,000	28
				71600	Travel	6,732	8,500	43,500	58,732	29
				72600	Grants		35,000	30,000	65,000	30
				75700	Training, Workshops and Conference	19,000	19,000	19,000	57,000	31
				72100	Contractual Services - Companies	68,000	70,000	97,000	235,000	32
				74200	Audio Visual & Print Prod Costs	3,000	3,000	3,000	9,000	33
Sub-total for Output 1						147,714	266,480	251,478	665,672	
	2.1 Business environment and technical capacities of SWP	UNDP	ROK	61300	Salary & Post Adj Cost-IP Staff	24,978	24,978	24,978	74,934	25

Output	Activity Result	Responsible Parties	Financing Source	Account Code	Description	Y1	Y2	Y3	TOTAL	Budget Notes
2: Increased adoption and utilization of solar water pumping in the agriculture sector	companies enhanced through technical assistance and capacity building 2.2 Sustainable irrigation services provided to vulnerable communities through solar technology 2.3 Enhanced awareness on benefits and financial feasibility of utilising SWP solutions			71200	International Consultants		109,000	74,000	183,000	34
				71300	Local Consultants		14,000	4,000	18,000	35
				71400	Contractual Services - Individ	5,502	22,498	20,000	48,000	28
				71600	Travel	5,000	49,000	44,000	98,000	36
				74200	Audio Visual & Print Prod Costs		5,000	-	5,000	37
				75700	Training, Workshops and Conference	4,000	36,000	15,000	55,000	38
				72100	Contractual Services - Companies	216,000	164,000	147,500	527,500	39
Sub-total for Output 2						255,480	424,476	329,478	1,009,434	
Project Management		UNDP	ROK	74596	Service to Project - GOE	65,516	140,853	161,970	368,339	40
				71400	Contractual Services - Individ	25,512	25,990	7,900	59,402	41
				71600	Travel	6,000	5,000	4,000	15,000	42
				72500	Supplies	4,663	3,000	3,935	11,598	43
				73100	Rental & Maintenance-Premises	5,000	10,000	10,000	25,000	44
Sub-total for Project Management Costs						106,691	184,843	187,805	479,339	
Total budget for Myanmar						509,885	875,799	768,761	2,154,445	
Regional Project Management		UNDP	ROK	61100	Salary Costs - NP Staff	43,293	76,403	48,499	168,195	45
				61200	Salary & Post Adj. Cost - GS Staff	7,000	12,000	7,000	26,000	46
				71200	International Consultants	0	0	25,000	25,000	47
				71600	Travel	0	2,500	2,000	4,500	48
				74596	Service to Project - GOE	6,415	6,500	3,000	15,915	49
Sub-total for Regional Project Management Costs						56,708	97,403	85,499	239,610	

Output	Activity Result	Responsible Parties	Financing Source	Account Code	Description	Y1	Y2	Y3	TOTAL	Budget Notes
					Total project without GMS	1,094,554	1,880,049	1,650,274	4,624,877	
					GMS fee (8%)	87,564	150,404	132,022	369,990	
					GRAND TOTAL	1,182,118	2,030,453	1,782,296	4,994,867	

Note: The total approved amount (exc. 1% coordination levy) is 6,078,600,000 Korean Won, equivalent to approximately USD 4,994,867 at exchange rate of 1,216.97 Korean Won/USD)

BN no.	Budget note description	Total Amount (USD)
Cambodia		
1	Technical expertise from Korea to support the training to the staff of farmer stores	53,000
	Technical expert (international consultant) to support Output 1.1 and Output 1.2. The costs already include travels and DSA	25,000
2	National consultant to develop business plan and marketing strategy	5,500
	National consultant to assess farmer needs and analyze market demand	5,500
	National consultant to lead and support the discussions on business plan with selected farmers and to establish a market-farmer connection Memorandum of Understanding (MoU)	11,000
3	Procurement of the following items: Solar panels, batteries and controllers (4x\$10,000=\$40,000), cooling system (4x\$5,000=\$20,000), equipment and packaging machine (4x\$5,000=\$20,000) and buildings (4x\$10,000=\$40,000)	120,000
	Purchase of resilient seeds, farm tools, plastic cover, plastic net, drip irrigation, and water storages	60,000
4	Provision of relevant trainings to the staff of Farmers Stores	8,000
	Awareness raising activity on resilient seeds and innovative agriculture technology and inputs (this includes travels, DSA, materials, workshop logistics)	8,000
	Workshops/consultations to identify and select potential farmers in target districts	8,100
	Hands-on training/coaching to farmers on Integrated pest management, safety application of pesticides, insecticides, effective use of water, drip irrigation, plastic mulching and greenhouse setting, etc.	12,000
	Workshops/consultations with relevant institutions (both government and private) to carry out the certification processes of agriculture products for the Farmers Stores	12,000
	Documenting and sharing good practices and experiences for scaling up	11,500
5	Purchase of a mini truck for transporting agricultural products and supplying farm tools/seeds	48,000
6	Consultancy services to identify and select local market agents (at commune level) to build market-farmer connection and provide hands-on training on resilient agriculture techniques and innovative technology to the farmers.	35,000
	Consultancy services to undertake regular M&E and spot check to the project sites to ensure the safeguard procedures for a safe environment and agriculture products	7,000
7	International consultants to provide technical assistance during innovation process (SWP technology as well as business practices such as accounting, tax law, sales, etc.)	17,000
	Korean experts to provide technical assistance during innovation process (SWP technology as well as business practices such as accounting, tax law, sales, etc.)	20,000
	Korean expertise to support the annual training of 25 engineers, including female engineers, to install, design, and maintain SWP systems	10,000
	International SWP Expert to develop new business model, including standardized contract, facilitating cooperation between SWP companies and companies providing drilling services	4,000
	Korean expertise to support the annual training for current commercial operators of SWP solutions as well as prospective new users (including interactions between groups, as well as interactions with suppliers)	10,000
	Korean expertise to support the annual training for current community-based operators of SWP solutions as well as prospective new users (including interactions between groups)	10,000
	Korean expertise on after-sales	17,000
8	National consultant to prepare market, market scoping (USD 250 x 60 days in a period of 6 months)	15,000
	National consultants to provide technical assistance during innovation process (SWP technology as well as business practices such as accounting, tax law, sales, etc.)	6,500
	National legal consultant to draft and finalize standardized contract (USD 400 x 10 days)	4,000

BN no.	Budget note description	Total Amount (USD)
	National consultant to collect and design informational pamphlet in Khmer	6,500
	National consultant to organize marketplace event which will facilitate interactions between solar companies and business groups	6,500
	National consultant to organize the annual training for current commercial operators of SWP solutions as well as prospective new users (including interactions between groups, as well as interactions with suppliers)	6,500
	National consultant to organize the annual training for current community-based operators of SWP solutions as well as prospective new users (including interactions between groups)	6,500
	National consultants to engage with communities to prepare for SWP as part of pre-installation capacity building and sensitization to 30 vulnerable communities	7,500
	National consultant to provide regular post-installation services to 30 vulnerable communities (USD 300 x 100 days)	25,000
	National consultant to organise promotional activities around small SWP solutions (USD 250 x 10 days)	2,500
9	Organization of challenge fund events	5,000
	Field exchange for 4 high level officials, 2 technical specialists, 4 private-sector stakeholders and the project manager to a leading SWP country (approx \$1,800/person x 11 persons)	20,000
	Annual training course (5 days) of 25 engineers, including female engineers, to install, design and maintain SWP systems	5,000
	Organization of marketplace to facilitate interactions between solar companies and business groups. The costs include venue, food and drinks	5,000
	Annual training for current commercial operators of SWP solutions as well as prospective new users (including interactions between groups, as well as interactions with suppliers)	5,000
	Annual training for current community-based operators of SWP solutions as well as prospective new users (including interactions between groups)	5,000
10	Promotional materials for the launch of challenge fund	2,000
	Tailored information materials in Khmer language for specific business segments prepared	5,000
11	Consultancy services to carry out research on innovations applied in other countries, including digital innovations. Part of the report will also be translated to Khmer	21,000
	Service company to identify solutions in other countries and availability of alternatives in Cambodia	10,000
	Company to carry out SWP survey and initial drilling activities	20,000
	Piloting of new storage technologies in cooperation with local SWP companies	5,000
	Provision of 10 small SWP solutions (demo-models suitable for small-holder farmers) to agricultural extension organisation (USD 10,500 x 10 small SWP solutions)	105,000
	Installation of 30 solar water irrigation systems (USD 17,950 per installation)	538,500
12	UNDP technical expertise to support activities under Outcome 2 (40% of the contract time of UNDP technical advisor)	275,000
13	Innovation Challenge (\$40,000 x 3 years)	120,000
14	National Project Manager (approx 25% in Output 1 and Output 2; 50% in PMC)	110,000
	National Project Assistant (approx 25% in Output 1 and Output 2; 50% in PMC)	66,000
	Project Driver (approx 25% in Output 1 and Output 2; 50% in PMC)	22,472
15	Project start-up workshop and staff learning cost	6,500
16	Misc./operations costs (including fuel, O&M, connectivity, etc)	6,000
17	Support on administrative services including procurement, HR, IT, finance services for 3 years of project implementation	102,150
18	Salary Costs - NP Staff to support the implementation of project throughout 3 years	106,500
19	Salary Costs - GS Staff to support the implementation of project throughout 3 years	24,000
20	Travel for the PIU throughout the 3 years implementation of the project	13,000

BN no.	Budget note description	Total Amount (USD)
21	Communication & Audio Visual Equipment for PMU	1,500
22	Supplies and stationery for PMU	2,100
23	IT Equipment (for PIU for the first year)	5,000
24	Office rental and maintenance costs for 3 years	15,000
Myanmar		
25	Chief Technical Advisor for the project implementation (50% distribution under Outcome 1 and 2 each)	149,868
26	International consultant for the implementation of activity 1.1.1 - Institutional strengthening of Department of Agriculture (DOA) and Livestock Breeding and Veterinary Department (LBVD) in 2 townships	12,000
	International consultant for the implementation of activity 1.1.3 - Strengthen linkages between farmers and agricultural/livestock businesses and input suppliers	7,500
	International consultant for the implementation of activity 1.2.1 - Feasibility study for the identification of thrust areas and opportunities for the development of MSMEs in the Dry Zone	14,506
	International consultant for the implementation of activity 1.2.2 - Exposure visits, training programmes and workshops designed for comprehensive incubation of entrepreneurs for select MSMEs	7,500
	International consultant for the implementation of activity 1.2.3 - Hands on training for select entrepreneurs followed by mentoring by master entrepreneurs	7,000
27	Local consultant (3 trainings in each township) for the implementation of activity 1.1.2 - Training of farmers to improve agriculture value chain covering major regional crops (ground nut, sesame, pigeon pea) and livestock (cows, goats/sheep, pigs and poultry)	9,000
	Local consultant for the implementation of activity 1.1.3 - Strengthen linkages between farmers and agricultural/livestock businesses and input suppliers	7,000
	Local consultant for the implementation of activity 1.2.1 - Feasibility study for the identification of thrust areas and opportunities for the development of MSMEs in the Dry Zone	3,000
	Local consultant for the implementation of activity 1.2.2 - Exposure visits, training programmes and workshops designed for comprehensive incubation of entrepreneurs for select MSMEs	6,500
	Local consultant for the implementation of activity 1.2.3 - Hands on training for select entrepreneurs followed by mentoring by master entrepreneurs	10,000
	Local consultant for the implementation of activity 1.2.5 - Train rural communities, especially women in the use of mobile money for existing transactions as well as micro-credit and savings	10,000
28	Project Manager (60% distribution under Outcome 1 and 40% for Outcome 2 - contract of approx 40,000/year for 3 years)	120,000
29	Travels for project implementation of activities under Outcome 1 in 3 years	58,732
30	Grants for the implementation of activity 1.2.8 - Improve access and wider choice of financial services including through remittances, savings, grants, credit and insurance	65,000
31	Training and workshops under activity 1.1.1 - Institutional strengthening of Department of Agriculture (DOA) and Livestock Breeding and Veterinary Department (LBVD) in 2 townships	3,000
	Training of farmers to improve agriculture value chain covering major regional crops (ground nut, sesame, pigeon pea) and livestock (cows, goats/sheep, pigs and poultry) under activity 1.1.2	8,000
	Training and workshops to strengthen linkages between farmers and agricultural/livestock businesses and input suppliers under activity 1.1.3	8,000
	Training and workshops to increase skills in operating and using mobile applications imparted to rural communities in the dry zone with emphasis on women and adults who are unfamiliar with the technology under activity 1.1.4	13,000
	Training and workshops under activity 1.2.1 - Feasibility study for the identification of thrust areas and opportunities for the development of MSMEs in the Dry Zone	3,000
	Hands on training for select entrepreneurs followed by mentoring by master entrepreneurs under activity 1.2.3	9,000
	Train rural communities, especially women in the use of mobile money for existing transactions as well as micro-credit and savings under activity 1.2.5	13,000

BN no.	Budget note description	Total Amount (USD)
32	Company to carry out activities 1.1.4 - Skills in operating and using mobile applications imparted to rural communities in the dry zone with emphasis on women and adults who are unfamiliar with the technology	35,000
	Company to carry out activities 1.2.2 - Exposure visits, training programmes and workshops designed for comprehensive incubation of entrepreneurs for select MSMEs	30,000
	Company to carry out activities 1.2.5 - Train rural communities, especially women in the use of mobile money for existing transactions as well as micro-credit and savings	40,000
	Company to carry out activities 1.2.6 - Enable localized rental services targeting agricultural machinery and transport services through aggregation platforms	60,000
	Company to carry out activities 1.2.7 - Facilitate access to agricultural and labour markets and crop storage through virtual marketplaces, yellow pages and notice boards	35,000
	Company to carry out activities 1.2.8 - Improve access and wider choice of financial services including through remittances, savings, grants, credit and insurance	35,000
33	Printing costs for lessons learned and knowledge management products, including dissemination of the KM materials	9,000
34	International consultant for the implementation of activity 2.1.1 - Conduct feasibility studies for SWP systems applications in the Dry Zone	10,000
	International consultant for the implementation of activity 2.1.2 - Train engineers/technicians to install, design, maintain and operate SWP systems	30,000
	International consultant to conduct workshops and conferences under activity 2.1.3 - Development of business model facilitating cooperation between SWP companies and companies providing drilling services	8,000
	International consultant for the implementation of activity 2.1.4 - Provide technical assistance and technology transfer through innovative approaches	45,000
	International consultant for the implementation of activity 2.2.2 - Provide pre-installation capacity building and sensitization to communities through on-the-job training programme	15,000
	International consultant for the implementation of activity 2.3.1 - Produce and disseminate tailored information materials for solar water pumping	40,000
	International consultant for the implementation of activity 2.3.3 - Develop policy proposal to integrate SWP financial support mechanisms in DRD-NEP program (e.g. similar to Solar Home Systems financial support)	15,000
	International consultant for the implementation of activity 2.3.4 - Develop business models based on DRD-NEP financial support in combination with micro-finance institutions for SWP finance	20,000
35	Local consultant for the implementation of activity 2.1.2 - Train engineers/technicians to install, design, maintain and operate SWP systems	12,000
	Local consultant for the implementation of activity 2.3.1 - Produce and disseminate tailored information materials for solar water pumping	6,000
36	Travels for project implementation of activities under Outcome 2 in 3 years	98,000
37	Produce and disseminate tailored information materials for solar water pumping	5,000
38	Train engineers/technicians to install, design, maintain and operate SWP systems under activity 2.1.2	15,000
	Pre-installation capacity building and sensitization to communities through on-the-job training programme under activity 2.2.2	10,000
	Organize marketplace to facilitate interactions between SWP companies and business groups under activity 2.3.2	30,000
39	Company to carry out activities 2.1.5 - Research and development of alternative water storage technologies to lower overall systems costs	75,000
	Company to carry out activities 2.1.6 - Organize exchange visits and learning programs for cross learning and technology transfer	60,000
	Company to carry out activities 2.2.1 - Installation of large SWP in targeted vulnerable communities (20)	320,000
	Company to carry out activities 2.2.3 - Provide regular after-installation services to vulnerable communities	45,000

BN no.	Budget note description	Total Amount (USD)
	Company to carry out activities 2.2.4 - Provide trainings on operation and maintenance of SWP systems	27,500
40	Support on administrative services including procurement, HR, IT, finance services	368,339
41	Project coordinator	59,402
42	Project Implementation Unit travels	15,000
43	Supplies including stationery, office materials, etc	11,598
44	Office rental and maintenance costs	25,000
Regional Management		
	Project coordinator	120,195
45	National Officer(s) PMU BRH	48,000
46	Project assistant	26,000
47	Terminal evaluation for Cambodia and Myanmar	25,000
48	Travels for Regional PMU	4,500
49	Support on administrative services including procurement, HR, IT, finance services	15,915

PROJECT DOCUMENT
[Regional Project]



*Empowered lives.
Resilient nations.*

Partnerships

In **Cambodia**, the project will work closely with the Ministry of Agriculture, Forestry and Fisheries (MAFF), who is currently implementing a number of agriculture development projects with loan and grant from IFAD-Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE) and ADB-the climate-friendly agribusiness value chains sector project. The project will work closely and seek technical support from the department of agriculture, forestry and fisheries at provincial and district levels.

The **Ministry of Water Resources and Meteorology (MOWRAM)** will be an important partner for the project – as it is the principle ministry mandated to oversee water resources management and development, flood and drought management, water-related legislation and regulation and water resources information management. MoWRAM promotes irrigation management transfer and Participatory Irrigation Management and Development (PIMD). The project will seek technical feedback and guidance on irrigation management and infrastructure related issues, as well as issues related to Farmer Water User Committees (FWUCs) who are responsible for community management of water resources.

The project will collaborate with the **Ministry of Rural Development (MRD)** which is mandated to coordinate, cooperate, implement, monitor and evaluate rural development. As, the MRD oversees establishment of WATSAN group, manage small-scale water supply facilities such as ponds, wells and groundwater quality control, etc, they will also be an important partner for the project.

Under component 2, a close cooperation with the **Ministry of Mines and Energy (MME)** is anticipated to implement the solar energy components. The MME is the principle ministry charged with formulating regulatory, legal and policy frameworks regarding mines and energy in Cambodia and establishes the strategic direction on how the electricity sector in Cambodia will be developed.

In terms of advocacy and awareness, as well as replication and upscaling of solar irrigation technology, the project will work closely with the **National Committee for Sustainable Development (NCSD)** and the **Ministry of Environment (MoE)** – which is responsible for coordinating government efforts on environmental issues including climate change, as well as in documenting good practices to feed into policy and decision-making.

The project will seek guidance and coordination support of the **National Committee for Sub-national Democratic Development Secretariat (NCDDS)** – which is an inter-ministerial coordination mechanism to promote the D&D reform agenda and is responsible for strengthening institutions at sub-national levels – provinces, districts/municipalities, and communes/sangkats.

Finally, the project will be implemented in close partnership with **EnergyLab** which works to support growth of clean energy market, with a focus on innovation, startups and entrepreneurship. EnergyLab has an ongoing relationship with UNDP for the implementation of challenge funds to encourage innovations and for technical assistance to private sector in the solar energy space in Cambodia. A similar role is foreseen in this project, focussing on fostering ideas and implementing innovations in the solar space, particularly the productive use applications (such as solar water pumping).

In **Myanmar**, the project will partner with the **Ministry of Agriculture, Livestock, and Irrigation (MoALI)** and technical guidance will be sought from the ministry for the formulation and vetting of advisories, training modules and materials for capacity development. DOA and LBVD are responsible for agriculture and livestock development in the country and therefore will collaborate closely on the work on agriculture value chain enhancement. DRD leads the development of biofuels, micro-hydro power (with an installed capacity of up to 10 MW), bioenergy from agricultural residues, for off-grid electrification (solar home system, mini-grid system, etc) and will therefore provide guidance and technical support on the solar component of the project. Alongside, the project will also collaborate and seek guidance of the **Ministry of Energy and Electricity (MoEE)** which is the focal point for energy policy, coordination and international cooperation.

The project will collaborate with the **Ministry of Natural Resources and Environmental Conservation (MoNREC)** on policy matters related to climate change issues and the **Ministry of Education (MoE)** to coordinate on future solar energy-based irrigation technology development. The MOE is the focal ministry on research and development of renewable energy technologies in universities and training institutes. The MoE could include the project as part of its research activities. **Yezin Agricultural University (YAU)** will support activities related to research and development, as well as in the development of capacity development modules and materials, as necessary. Yezin Agricultural University is the only institution of higher education focused on Agriculture in Myanmar. Its primary functions are teaching and training, conducting research and providing extension services to the public.

Private sector companies in the field of ICT and mobile technology will also be important partners. They will play the lead in the design and deployment of the mobile applications, networks and services which will be used by the project to power its ICT needs. The project will also engage agricultural cooperatives, agri-businesses and agricultural input suppliers in the training programmes and farmer field schools along with local traders and input suppliers/providers. In addition, the project will also partner with **Financial Institutions** in the insurance sector including government and private banks, micro-finance institutions and insurance agencies and create the much-needed network with farmers and entrepreneurs.

Risks and Assumptions

The major risk factors in both countries that could result in the project not producing the expected results are the following:

- **Strategic risks:** Power dynamics and political and economic structures at the sub-national level undermine the implementation and impact of the project and lead to resources being allocated to in a manner that is not consistent with the project objective.
- **Organizational risks:** Insufficient number of extension agents with required basic skills / learning potential. This could limit the scope and impact of the agricultural activities.
- **Climate risks:** If there a drought or significant reduction in rainfall occurs in the targeted areas then projects sites may not be feasible locations. If this occurs the project will look for other suitable communities that have adequate water for pumping.
- **Operational risks:** Solar pumping is limited to the hours when the sun is sufficiently strong and can be affected by weather conditions, as such solar pumping may not deliver the volume of water farmers require, or the pumps may need to be over-sized compared with

the current diesel pumps. A combination of capacity building and testing to appropriately size the pumps and adoption of efficient irrigation techniques will help overcome this risk. On the agricultural side there are operational risks to the running of the farmers markets and interpersonal dynamics between the actors selected and involved in all agricultural projects.

- **Implementation capacity risks:** Inadequate and/or non-capacitated human resources to successfully implement the project are a risk. The current capacity to install and operate solar pumping is low. However, with training (to be provided by the project) those with basic technical skills can learn the skills necessary to install and service solar pumps. On the agricultural side, there are risks of capacity as well as it relates to the capabilities of service providers and partners to provide training and communities absorptive capacity.
- **Currency/market risks:** If the price of diesel and or the value of the local currencies falls, solar PV pumps will become increasingly unattractive compared with diesel pumps because the operational costs of diesel pumps will become cheaper and or the price of solar water pumps increases.
- **Project management risks:** A committed project management team with adequate outreach and networking skills are essential for the success of the activities. The team will need to have the ability: i) to engage the key stakeholders in constructive discussion about future SWP development needs; ii) to guide and supervise the studies undertaken and effectively cooperate with the international and Korean experts who are engaged to support this work; iii) to present their findings and recommendations in a convincing manner to key policy-makers and opinion leaders by taking into account the main macroeconomic and policy drivers for development of the solar pumping sector development; and iv) to identify areas of future work. During project implementation, the management team also needs to be supported by required technical experts.
- **Equipment risks:** The equipment procured does not perform as expected and or needed under local conditions. Extra care will be taken to spec and select equipment that meets the performance needs and can work well in the local environmental conditions.

Stakeholder Engagement UP TO HERE

Cambodia:

The total number of direct beneficiaries is approximately 7,000 rural farmers in Kampong Thom and Siem Reap provinces. SWPs (30 large and 10 small systems) are expected to benefit 5,300 farmers. These same farmers are also expected to be supported directly through capacity building on and access to inputs for climate resilient agricultural practices, access to four farm stores to be established through the project. A slightly large number of direct beneficiaries is expected from the resilient agricultural support: So combined, 7,000 direct beneficiaries are expected to be reached.

However, it is important to note that the project will build enabling environments for commercial SWP operators to sustain and expand their businesses, and multiplication effects expected from the project are not taken into consideration when calculating the number of direct beneficiaries.

The project will particularly emphasize the following groups of beneficiaries:

Women entrepreneurs: The project will actively engage women, especially those who already have experience in selling and marketing products, on the design of the new farmer stores. Other

interested women entrepreneurs will be also engaged to take part in the business operations of the farmer stores. Various engagement models will be explored and considered for engaging women.

Local market agents: Local buyers or middleman regularly visit the villages and buy/collect agriculture products and sell them to the markets. The project will select and provide these “local market agents” with additional knowledge and skills, specifically related to new resilient seeds, innovative agriculture technologies that are appropriate to the local context. 2-3 local market agents in each district will be selected and they will play an intermediary role between market (Farmer Stores) and farmers (producers).

Farmer producers: Farmers who produce agriculture products for selling to the farmer stores will be identified. 5-10 farmer producers in each commune will be selected to take part in this farmer-market linking model in an effort to ensure that they can produce year-round crops for market, improve access to water and improved and innovative agricultural techniques. The provision of solar water pumps will be supported under Component 2.

Those who will benefit from access to freshwater are categorized into five primary beneficiary groups: 1) Smallholder farmers, 2) vulnerable communities that have large SWP systems installed, 3) SWP companies installing the SWP systems, 4) businesses buying SWP for productive means, and 5) the Royal Government of Cambodia. SWP matching the needs of each beneficiary group are being targeted, as shown in table 1.

Table 1: Beneficiaries and SWP solutions

Beneficiaries	Small-holder farmers		Productive businesses		Vulnerable communities
	Very small ¹	Small	Medium	Large	
SWP size	Very small ¹	Small	Medium	Large	Large
Capacity	160 W	210 W	1.5 kW	>5 kW	1.5 kW
Price	\$750	\$2,000 - 2,500	\$7,000 - 8,000	\$12,000	\$7,000 - \$22,000 (average \$15,000)
Irrigated land size	<0.3 ha	<0.5 ha	0.3 ha <> 3 ha	0.7 ha <> 7 ha	0.3 ha <> 3 ha
Water demand	Low	low	medium	high	household avg. consumption 5-6m ³
Pressure demand	Low	low	medium	high	N/A
Pump head demand	30m	30m	50m	100m	N/A

*all prices are quoted in USD.

*sources from UNDP 2018 SWP market survey, PIN-Sevea report 2017, NAPA Project.

¹ Very small SWP pumps are unavailable at market scale in Cambodia. The project seeks to bring this technology to market.

Smallholder farmers are targeted to gain new access to small-scale SWP technologies that are more applicable and flexible to their needs. Additionally, the potential for alternative water storage technologies are scoped that can lower the overall system costs with scale, which together can

result in a much more affordable SWP product to meet the irrigation needs of this underserved smallholder farmer market. This target group was identified through a barrier analysis, grounded in a market analysis that included surveying a representative group of this stakeholder, which demonstrated there was a high demand for a smaller, applicable SWP system that is unavailable. The UNDP Cambodia SWP market study conducted in 2018 that served this group of beneficiaries had significant influence in project design and determined specific outputs and activities to address identified barriers for this stakeholder.

A total of 30 communities (15-20 households each = 525 households) chosen based on a high degree of vulnerability to seasonal disruptions in their access to clean water, will be the direct beneficiaries of large-scale SWP systems. By engaging in pre-installation capacity building and sensitivity, this project integrated lessons learned from previous projects and stakeholder feedback in order to sufficiently create ownership within the community and ensure the design is in line with the needs of the community and local circumstances. Additionally, the maintenance component will ensure the sustainability of the benefits for the stakeholders, as reported complications tend to happen soon after installation. This targeted group of beneficiaries have been selected as a primary target as there remains a substantial portion of Cambodia's rural communities that have a high degree of vulnerability to seasonal disruptions which jeopardize their access to clean water.

SWP companies that install the systems will benefit from a larger market for SWP systems, stimulated by innovation (new smaller SWP system) and the local dissemination of SWP opportunities and the facilitation of marketplace events. Additionally, this beneficiary group will benefit from an expanded pool of skilled SWP technicians (through the training component) and the development of a new business models, including a model that facilitates cooperation between solar companies and companies providing drilling services to best accommodate new installations. This stakeholder group was targeted largely due to UNDP's 2018 SWP market analysis that identified these specific barriers for SWP companies which are difficult for the private sector to internally address. The design of certain project components is influenced by surveys with SWP companies and consumers.

Businesses of any size purchasing SWP systems for productive means will benefit from access to new scalable technologies and an organized annual SWP marketplace that provides the opportunity to evaluate the best SWP solution to accommodate their needs. Additionally, the working relationship (and standardized contract) between SWP and drilling companies will shift the responsibility of contracting an appropriate drilling service that is fixed to the installation needs of the SWP system away from the consumer and towards the two service providers themselves. This established a necessary continuity between the SWP installation and the required hole characteristics of the well to be drilled, but also shifts this large burden away from businesses purchasing SWP systems (also relevant to small-holder farmers). This beneficiary group was targeted as a necessary stakeholder that comprises a significant portion of the total demand in the potential SWP market for Cambodia. The design of many project components was influenced by the UNDP market survey assessment, which identified some of these barriers as necessary to overcome for these beneficiaries.

The Royal Government of Cambodia (RGC) is an indirect beneficiary from this project as it contributes towards the targets of the *National Strategic Plan for Rural Water Supply, Sanitation and Hygiene* by directly strengthening access to clean water services for 520 households. Additionally, it will stimulate the growth of the SWP market in Cambodia that will also contribute achieving this goal. This project also benefits the RGC by increasing the use of solar energy, as particularly highlighted by *Rectangular Strategy Phase-IV*.

Myanmar:

The number of direct beneficiaries from this project is 16,280 farmers (of whom 8,700 are women) from 20 villages, business entities dealing in solar irrigation technology and the Irrigation, Water Utilization and Management Department (IWUMD) under the Ministry of Agriculture, Livestock and Irrigation. This number is based on the estimated beneficiaries from Output 1. At this point in time, since the exact geographical focus of the project is not identified, the direct beneficiaries from the SWP systems cannot be estimated.

The target 20 villages will be selected from the total of 130 villages under Myingyan and Nyaung U townships in the Dry Zone of Myanmar. A breakdown of the number of villages, households and population size is provided in the table below:

Township	Villages	Households	Pop (male)	Pop (female)	Pop (total)
Myingyan	60	11,367	22,012	25,811	47,823
Nyaung U	70	15,144	34,289	39,062	73,351
Total	130	26,511	56,301	64,873	121,174

The indirect beneficiaries include communities in the remaining 126 villages in Myingyan Township and 150 villages in Nyaung U Township.

The target beneficiaries identified are part of the UNDP Adaptation Fund project - Addressing Climate Change Risks on Water Resources and Food Security in the Dry Zone of Myanmar, where UNDP has established good relationships with local authorities and communities. This project will build on the work of the Adaptation Fund project and addresses remaining gaps and constraints, especially those related to enhancements in value chain in Myingyan and Nyaung U Townships. As in the case of the AF project, beneficiaries will be fully engaged in implementation, as well as in the monitoring and evaluation of project activities. Wherever necessary, the project will leverage existing mechanisms established under the AF project - eg. farmers groups, user groups, etc to implement activities and compliment past efforts.

South-South and Triangular Cooperation (SSC/TrC)

This proposal is designed in line with the Republic of Korea's New Southern Policy Strategy (2018) which articulates South Korea's commitment to expanding its ties with ASEAN countries and India. The strategy aims at building and contributing to a community with human-centred prosperity and peace. The guiding principles of the New Southern Policy are building a community of people, prosperity and peace.

People: Boost people-to-people and cultural exchanges between Korea and Southern countries. Increase tourism, enhance cultural exchanges, support human capacity building of youth, teachers, government officials, etc, improve transparent and effective governance, protect the rights of immigrants and visitors, and assisting in improving the quality of life of people (e.g. especially those working in agriculture, fisheries, environment).

Prosperity: Establish a mutually beneficial and future-oriented economic cooperation mechanism. Strengthen the trade and investment system; increase investment in infrastructure on

transportation, energy and water resources; mutually beneficial cooperation between SMEs of Korea and Southern countries; expand cooperation in technology and innovation including smart cities/factories/farms and develop economic cooperation models tailored to country needs.

Peace: Ensure a peaceful and safe secure environment in the region. Strengthen strategic relationships with Southern countries through summits and high-level talks and visits; secure support on ROK government's work toward a complete denuclearization and peace on the Korean peninsula; deepen strategic partnership on military and defense; work closely together in new challenges including cyber security, terrorism and ocean security; and improve resilience from violent conflicts, climate change and natural disasters.

Cambodia and Myanmar are still heavily reliant on agriculture. Farm household incomes remain low and there is a widening gap between farm and urban household incomes. As such, improvements in productivity and profitability of smallholders in these three countries will significantly improve livelihoods and help raise rural incomes. Korea's contribution to narrow the development gap on agriculture will help the countries improve the lives of farmers and is in alignment with the Prosperity aspect of ROK New Southern Policy.

Since 2011, MAFRA has implemented several agricultural ODA projects that address varied agricultural development challenges including rural development planning, irrigation, agricultural productivity, and agricultural technology transfer. Many of these projects have been or are being implemented in Cambodia and Myanmar.

This project will increase synergy with MAFRA's agricultural ODA projects in these two countries. For example, MAFRA is developing a project in Myanmar focusing on a groundwater monitoring system and tube well renovation for agricultural use. Solar irrigation linked to groundwater monitoring system can not only improve energy access but also be part of low-emission groundwater recharge strategies.

The **Korea Rural Community Corporation (KRCC)** has developed and managed agricultural infrastructures such as water pumping and irrigation in Korea. It has also successfully implemented solar irrigation ODA projects in El Salvador and Senegal. It is envisioned that the **KRCC will provide technical support in this initiative.**

As part of its objective, the project will enhance sharing of experience and information between Cambodia and Myanmar. There is an increasing demand for irrigation in both Cambodia and Myanmar due to the need for higher food production for a rising population and decreasing supplies of freshwater in the context of a changing climate. High diesel and electricity costs and often unreliable energy services affect the pumping requirements for irrigation for small and large farmers. In many rural areas, grid electricity is not, or is only sporadically, available. Using solar energy for irrigation water pumping is a promising alternative to conventional electricity and diesel-based pumping systems. Cambodia and Myanmar will be able to learn from each other's experience, as well as share lessons with other countries in the region.

Knowledge

The results and lessons of the project will be consolidated and disseminated as part of the project implementation strategy and collaboration/support will be sought through national-level knowledge management platforms so that similar approaches can be implemented elsewhere. Overall, aspects related to knowledge management and communications will be based on

respective UNDP country office strategies to improve awareness of government officials, stakeholders and communities in the respective countries.

The knowledge generated during project implementation will be linked with the project M&E system and used for assessing impacts of project activities, facilitate feedback on project activities, and enable timely adjustment and course corrections. This will help to ensure project impact and adaptive management, as well as ensure results are delivered, as intended.

Knowledge Management will contribute to learning and advance replication and scaling up of solar irrigation technology elsewhere in the country and in the region. This will be essentially done through (i) documentation and dissemination of case studies and lessons; (ii) development of policy guidance based on project lessons; (iii) technical reports, publication and knowledge management products; (iv) national and provincial workshops to enhance information sharing; (v) institutionalizing and upscaling best practices through capacity building and technical support; (vi) public engagement pages; (vii) replication and scaling-up strategy; and (viii) Implementers' manual and lessons learned guide to facilitate scaling up.

Sustainability and Scaling Up

Cambodia

The SWP installations and market facilities are expected to continue after the completion of the project as they will remain under the ownership of the farmers. Individuals trained to provide operations and maintenance services will also continue to provide services to the operators established under the project as well as an increasing number of farmers who have installed swp facilities.

Successful operating of the SWP will serve as a proof of concept and stimulate other farmers to adopt the technology expand to other areas or sectors, once the current phase of assistance is completed. The broader adoption and expansion of SWP for irrigation and power beyond the project will depend largely on a few key factors.

First is the technical performance of the pumps to deliver sufficient pumping capacity to irrigate the fields and generate power. With regards to SWP the technical performance will be more highly valued should farmers incorporate water saving measures alongside the new technology.

A second factor is the price of diesel, as it is the main energy source of the established alternative technology. Diesel is imported in Cambodia and so, therefore, the price of diesel is largely controlled by forces outside of the national governments of Cambodia and Myanmar. If the price of diesel substantially reduces then diesel-powered pumps will become a more attractive option in the short term and it will be difficult to stimulate and convince farmers to invest in solar-powered technologies.

In addition to the sustainability from the energy perspective, the water saving measures that the project will put in place (efficient use of water resources) will try to manage the water withdrawal from the underground aquifer thereby increasing its longevity.

The project also includes activities that drive replication and scaling up of the adoption of solar technologies in agriculture through a knowledge sharing programme. Replication and scaling up will be encouraged by demonstrating, documenting, and disseminating the informational products that illustrate the value of using of solar equipment. These efforts will also include illustrations of

cost savings and improved environmental benefits of avoiding diesel use. Several activities targeting improving capacities and business models of private sector, so they are better able to offer products needed in the market.

Finally, the project will capture and consolidate a findings and results report that will be aimed at encouraging additional investments from national government budgets as well as from development partners.

Myanmar

The project will seek to demonstrate a replicable model for leveraging mobile communication and information technologies for the development of agriculture and agricultural value chains.

Crucial elements of the strategy for sustaining project outputs include:

- Multiple linkages with the private sector.
- Utilising locally available knowledge and expertise.
- Focus on local markets and
- Upgrading existing elements of the agricultural value chain through renewable energy and modern technology.

Furthermore, the outputs of the project, in terms of training materials, services, mobile applications and strategies for their adoption are inherently replicable. The project will develop an explicit framework for replicating and scaling up successful interventions as part of its final outputs.

The component on SWP will address linkages between technology suppliers and users and build in a component of operations and maintenance - which will ensure increased confidence of users, as well as long-term operation and sustenance of the system.

The project will capture and consolidate a findings and results report that will be aimed at encouraging additional investments from national government budgets as well as from development partners.

IV. PROJECT MANAGEMENT

Cost Efficiency and Effectiveness

Cost efficiency and effectiveness in the project management will be achieved through adherence to the UNDP Programme and Operations Policies and Procedures (POPP) and reviewed regularly through the governance mechanism and UNDP's Asia and the Pacific Regional Programme 2018-2020. In addition, there are specific measures for ensuring cost-efficient use of resources through using a portfolio management approach.

This project will leverage on existing related activities as well as partnerships to improve cost-effectiveness. Procurement costs will be reduced through joint operations with other related projects in the region.

Cambodia

The project is based on an approach that integrates research into development processes and the project design. This includes, for example, the provision of targeted training programmes on how to enhance agricultural productivity and the development and implementation of solar water pumping based irrigation. 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 that can be applied at the regional as well as the national level. Through awareness-raising on the economic and environmental benefits, the project's interventions will reach remote communities and vulnerable areas.

The project builds on lessons learned and results from many projects, most notably the "Promoting Climate-Resilient Water Management and Agricultural Practices in Rural Cambodia" and the "Clean Energy Revolving Fund". There have been a few projects in Cambodia that incorporate SWP technologies.

The "Promoting Climate-Resilient Water Management and Agricultural Practices in Rural Cambodia" project ran from 2009 to 2015 and was financed by a UNDP grant. The project installed 48 communal SWP systems in two Cambodian provinces that were selected based on their high levels of vulnerability to disruptions in their access to clean water. The project was cost-effective and considered highly successful, however, issues were detected such as seasonal variabilities of groundwater that required a deeper pump, cases where pumps were damaged and lacked available technicians to repair in due time, and arsenic-contamination in the water appearing few months after installation. The 5-large-scale communal SWP systems proposed in this project will conduct a comprehensive hydrological analysis at least three months prior to installation, to ensure a specific pump design that accounts for seasonal variations and avoids arsenic-contaminated waters.

This Clean Energy Revolving Fund project was implemented by NEXUS, a Cambodian-based developmental organization. Amongst other agri-food initiatives, SWP was one of the main components in which the project provided funding in the form of loans and risk-guarantees and has provided a total of 12 loans for both SMEs and larger-scale agricultural farms. One major lesson from this initiatives that this project proposal considered is the engagement between SWP installers and drilling companies, which the experience of the CERF highlighted as a major barrier to upscale their project to more beneficiaries. A key activity of this project proposal is to bridge the gap between drilling companies and SWP providers.

Myanmar

UNDP has extensive experience designing and managing similar projects in Myanmar and specifically implementing projects that try and address challenge through innovative interventions for women and farmers in the Dry Zone.

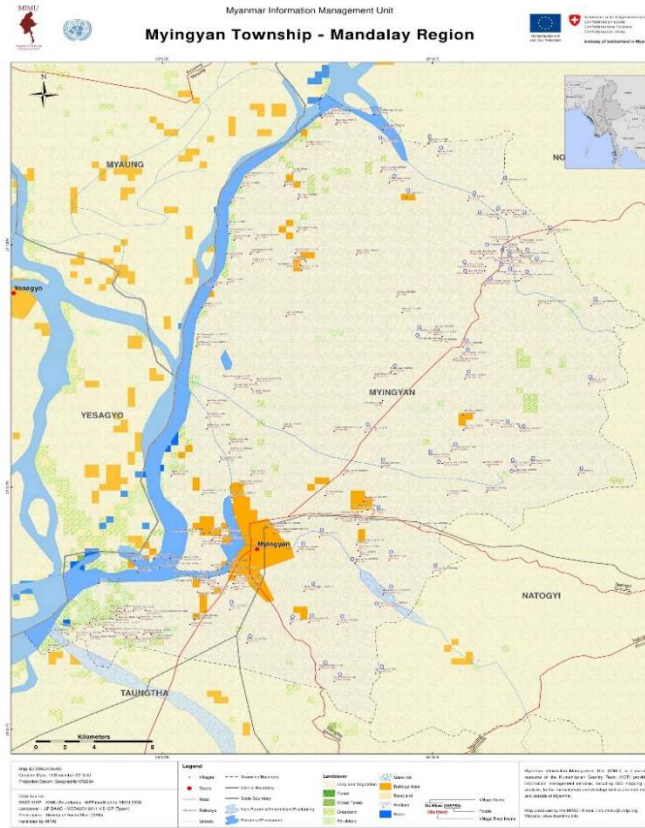
The "Addressing Climate Change Risks on Water Resources and Food Security in the Dry Zone of Myanmar" project is among the more important of these interventions. The project started in 2015 and finished in 2019. The Adaptation Fund project led to increased agricultural productivity and reduced vulnerability of subsistence agriculture to climate related disasters through diversification, post-harvest technologies and processing and access to advisory and climate services. The natural resource base in the project villages has been stabilised and enhanced through extensive soil and water conservation, afforestation and agroforestry interventions. The project has generated a wealth of knowledge about effective implementation strategies for resilience building among communities and scaling up and replication of these strategies.

Two relevant lessons have been learned from the mid-term assessment of the project:

1. The need to narrow down the focus of interventions to ensure sufficient resources are available along with adequate oversight and monitoring of activities and capacity development of implementing partners.
2. Creating market linkages to sustain and upscale the uptake of increased agricultural and livestock production and inputs.

Project Management

In Cambodia, the project will be implemented in Kampong Thom and Siem Reap provinces. The total number of direct beneficiaries in Cambodia is approximately 7,000 rural farmers in Kampong Thom and Siem Reap provinces. SWPs (30 large and 10 small systems) are expected to benefit 5,300 farmers. These same farmers are also expected to be supported directly through capacity building on and access to inputs for climate resilient agricultural practices, access to four farm stores to be established through the project. A slightly large number of direct beneficiaries is expected from the resilient agricultural support: So combined, 7,000 direct beneficiaries are expected.



The project will construct **at least 20 large SWP systems** across several villages in two townships. The exact villages to be included will be identified through a feasibility study that will be completed under outcome 2. The 20 large SWP systems will provide irrigation services to an estimated 16,280 farmers of whom 8,700 are estimated to be women. The process of preparing communities and installing SWP systems may take up to 1 year.

O&M considerations will be an integral part of the planning of the SWP systems. Replicating the successful practice in previous projects supported by UNDP in which SWP systems were installed, Water User Groups will be established and will be responsible for the overall O&M of the assets. To financially sustain the SWP systems, the Water User Groups will establish water user fees to be paid by the members of the Water User Groups. These fees will be used for O&M purposes.

Furthermore, the project will train local engineers/technicians on how to use, maintain and fix the SWP equipment. This will result in a trained cadre of individuals who will provide maintenance and technical assistance to the communities on their SWP systems, therefore ensuring operational sustainability.

The Bangkok Regional Hub will ensure consolidation of results/impacts and reporting to the donor on a regular basis. It will also ensure value-addition through knowledge management experience sharing across participating countries and dissemination of lessons to other countries in the region. Based on lessons and best practices, BRH will support countries to mobilize additional resources through similar arrangements in the future.

V. RESULTS FRAMEWORK²

Intended Outcome as stated in the UNDAF/Country [or Global/Regional] Programme Results and Resource Framework:																	
Outcome 1: Advance poverty eradication in all its forms and dimensions																	
Outcome 2: Accelerate structural transformations for sustainable development																	
Outcome indicators as stated in the Country Programme [or Global/Regional] Results and Resources Framework, including baseline and targets:																	
Outcome Indicator 1.3 Number of country-led measures accelerated to advance women's economic autonomy and independent livelihoods. (SDG 5)																	
Baseline 0 Target: 6																	
Outcome indicator 2.2 Number of countries that have communicated the establishment or operationalization of an integrated policy/ strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low green gas emissions development in a manner that does not threaten food production. (Strategic Plan 2.5, SDG 13.2.1)																	
Baseline: 0 Targets: 8																	
Applicable Output(s) from the UNDP Strategic Plan: 1.4.1. Solutions scaled up for sustainable management of natural resources, including sustainable commodities and green and inclusive value chains																	
Project title and Atlas Project Number: Promoting the use of solar technologies for agricultural and rural development in Cambodia and Myanmar																	
EXPECTED OUTPUTS	OUTPUT INDICATORS ^[1]	DATA SOURCE	BASELINE		TARGETS												DATA COLLECTION METHODS & RISKS
			Value	Year	Year 1				Year 2				Year 3				
					Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Output 1: Increased smallholder farm productivity through adoption of innovative agricultural technology and an improved value chain.	% of farmers who confirm they received services and products in a timely manner	Survey	0	2020													Survey
	# of agreements/MOU between farmers and agriculture/livestock businesses and input suppliers	Monitoring data	0	2020													Monitoring data, partnership agreements
	% increase in productivity of small hold farmers	Survey	TBD	2020													Online Survey
	% increase in income of small-hold farmers	Survey	TBD	2020													Survey
	# of farmers and entrepreneurs accessing financial services, start-up capital and insurance of whom 50% are women (MMR only)	Survey Monitoring data	0	2020													Survey Monitoring data

² UNDP publishes its project information (indicators, baselines, targets and results) to meet the International Aid Transparency Initiative (IATI) standards. Make sure that indicators are S.M.A.R.T. (Specific, Measurable, Attainable, Relevant and Time-bound), provide accurate baselines and targets underpinned by reliable evidence and data, and avoid acronyms so that external audience clearly understand the results of the project.

	% increase in the use of mobile money of which 50% are women (MMR only)	Survey Monitoring data	TBD															Survey Monitoring data
	Number of micro, small and medium-sized enterprises utilizing supplier development platforms for inclusive and sustainable value chains (SP IRRF indicator 1.4.1)	Survey	0	2020														Survey
Output 2: Increased adoption and utilization of solar water pumping in the agriculture sector.	% of farmers who confirm increased and timely access to water	Survey	TBD	2020														Survey
	Number of SWPs managed by women-led community groups (% of total)	Monitoring data	0	2020														Monitoring data
	# of agreements/MOU/partnerships developed between SWP companies and business groups	Monitoring data	0	2020														Monitoring Data
	Satisfaction level of water user group on the quality of after installation services	Survey	TBD	2020														Survey
	% cost reduction from alternative water storage technologies (MMR)	Survey	TBD	2020														Survey

[\[1\]](#) It is recommended that projects use output indicators from the Strategic Plan IRRF, as relevant, in addition to project-specific results indicators. Indicators should be disaggregated by sex or for other targeted groups where relevant.

VI. MONITORING AND EVALUATION

In accordance with UNDP's programming policies and procedures, the project will be monitored through the following monitoring and evaluation plans: *[Note: monitoring and evaluation plans should be adapted to project context, as needed]*

Monitoring Plan

Monitoring Activity	Purpose	Frequency	Expected Action	Partners (if joint)	Cost (if any)
Inception Workshop	Present project overview, governance structure, roles and responsibilities, monitoring and reporting requirements, review work plan and budget and approve the work plan for the 1 st year	Within 3 months after project signature	<u>Inception Workshop Report</u> prepared and shared with participants to formalize various agreements and plans decided during the meeting.		US\$ 10,000
Track results progress	Progress data against the results indicators in the RRF will be collected and analysed to assess the progress of the project in achieving the agreed outputs.	Quarterly	Slower than expected progress will be addressed by project management.		
Monitor and Manage Risk	Identify specific risks that may threaten achievement of intended results. Identify and monitor risk management actions using a risk log. This includes monitoring measures and plans that may have been required as per UNDP's Social and Environmental Standards. Audits will be conducted in accordance with UNDP's audit policy to manage financial risk.	Quarterly	Risks are identified by project management and actions are taken to manage risk. The risk log is actively maintained to keep track of identified risks and actions taken.		
Learn	Knowledge, good practices and lessons will be captured regularly, as well as actively sourced from other projects and partners and integrated back into the project.	At least annually	Relevant lessons are captured by the project team and used to inform management decisions.		
Annual Project Quality Assurance	The quality of the project will be assessed against UNDP's quality standards to identify project strengths and weaknesses and to inform management decision making to improve the project.	Annually	Areas of strength and weakness will be reviewed by project management and used to inform decisions to improve project performance.		
Periodic Monitoring	Internal review of data and evidence from monitoring actions to inform decision making.	Quarterly	Performance data, risks, lessons and quality will be discussed by the project board and used to make course corrections.		

Project Board Meeting	Review and assess performance of project and review Multi-Year Work Plan to ensure realistic budgeting over the life of the project.	Annually	Any quality concerns or slower than expected progress should be discussed by the project board and management actions agreed to address the issues identified.		US\$ 5,000
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Evaluation Plan

Evaluation Title	Partners (if joint)	Related Strategic Plan Output	CPD Outcome	Planned Completion Date	Key Evaluation Stakeholders	Cost and Source of Funding
Terminal Evaluation	n/a	1.4	RPD 2.4	3 months before project end	UNDP, Government of Cambodia and Myanmar	US\$ 25,000 (ROK)

VII. MULTI-YEAR WORK PLAN ³⁴

All anticipated programmatic and operational costs to support the project, including development effectiveness and implementation support arrangements, need to be identified, estimated and fully costed in the project budget under the relevant output(s). This includes activities that directly support the project, such as communication, human resources, procurement, finance, audit, policy advisory, quality assurance, reporting, management, etc. All services which are directly related to the project need to be disclosed transparently in the project document.

CAMBODIA:

Description	Year One				Year Two				Year Three			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output C1.1 Producer-buyer linkages strengthened for sustainable provision of agricultural production inputs for resilient agriculture.												
Activity C1.1.1 Engage interested landowners in building/setting up farmer stores. Farmer stores are facilities that are equipped with solar panels that power a cooling system, packaging equipment and a computer-based cashier, etc.												
Activity C1.1.2 Develop business plan and marketing strategy for the farmer stores												
Activity C1.1.3 Provide training to the staff of farmer stores.												
Activity C1.1.4: Assess farmer needs and analyse market demand												
Activity C1.1.5: Carry out awareness-raising activity on resilient seeds and innovative agriculture technology and inputs.												
Activity C1.1.6: Supply resilient seeds and agriculture inputs and equipment to farmers through lease or credit agreement												
Output C1.2: Resilient agricultural production and marketability enhanced.												
Activity C1.2.1: Identify and select potential farmers in target districts, specifically the beneficiaries of the UNDP's Strengthening of Resilient Livelihoods project, to be engaged in the implementation of appropriate resilient agricultural techniques to supply high-quality and safe agriculture products for the markets (farmers stores).												

³ Cost definitions and classifications for programme and development effectiveness costs to be charged to the project are defined in the Executive Board decision DP/2010/32

⁴ Changes to a project budget affecting the scope (outputs), completion date, or total estimated project costs require a formal budget revision that must be signed by the project board. In other cases, the UNDP programme manager alone may sign the revision provided the other signatories have no objection. This procedure may be applied for example when the purpose of the revision is only to re-phase activities among years.

Activity M2.3.4: Develop business models based on DRD-NEP financial support in combination with micro-finance institutions for SWP finance										
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VIII. GOVERNANCE AND MANAGEMENT ARRANGEMENTS

The Project will be managed at the regional level with regional and country-level implementation. The regional platform provides greater space for government and CSO to work more closely on sensitive issues that may be challenging to full explore at the national level and facilitates cross-country coordination and learning. The direct implementing modality (DIM) of the regional programme under UNDP Bangkok Regional Hub (BRH) also allows UNDP greater flexibility to work directly with CSOs and the private sector.

The current UNDP Asia Pacific Regional Programme Document's Advisory Board will serve as the highest level Board and provides strategic direction and executive management decisions and meets once a year. A project specific Project Board will be set up at regional level to provide overall oversight to the planning, implementation and reporting of the project. This board meets at least once a year and can be called upon any time to meet on a needs basis. It will be chaired by UNDP and include UNDP Bangkok Regional Hub (BRH), target UNDP Country Offices as well as relevant donor representatives as needed. In addition, a technical working group will be constituted at country level to support the planning, implementation and monitoring of the project in the respective countries. It will convene other partners, including donors and beneficiaries of the project specific to the country quarterly.

The Project Assurance role will be carried out by UNDP BRH's Programme Coordinator under the overall direction of the Hub Manager. The Project will be Managed by a Project Coordinator based in BRH, under the supervision of the NCE Team Lead/Advisor especially on substantive issues, who will manage day-to-day activities of the project and coordinates closely with the participating Country Offices. The Regional Programme Coordinator, through the Programme Management Unit (PMU) will carry out objective and independent programme oversight and monitoring functions and supports the Project Coordinator to ensure compliance. In addition to meeting the donor monitoring and evaluations requirement, an annual report will be produced to showcase progress made and a final project report will be produced followed by an independent evaluation of the project.

The project will be implemented following UNDP's the Direct Implementation Modality (DIM). The Implementing Partner for the project is the UNDP Bangkok Regional Hub (BRH). Both in Cambodia and Myanmar, the funding from RoK will be channeled, via the UNDP Bangkok Regional Hub, to UNDP Country Offices in Cambodia and Myanmar for the implementation of the country level workplans.

The Project Board is responsible for making, by consensus, management decisions when guidance is required by the Project Coordinator, including recommendations for approval of the country-level Annual Work Plans (AWPs) and revisions, and addressing any project level grievances. In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.

Specific responsibilities of the Project Board include:

- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
- Address project issues as raised by the project manager;
- Provide guidance on project risks, and agree on possible countermeasures and management actions to address specific risks;

- Agree on project manager's tolerances as required;
- Review the project progress, and provide direction and recommendations to ensure that the agreed deliverables are produced satisfactorily according to plans;
- Appraise the annual project implementation report, including the quality assessment report; make recommendations for the work-plan;
- Provide ad hoc direction and advice for exceptional situations when the project manager's tolerances are exceeded; and
- Assess and decide how to proceed on project changes through appropriate revisions.

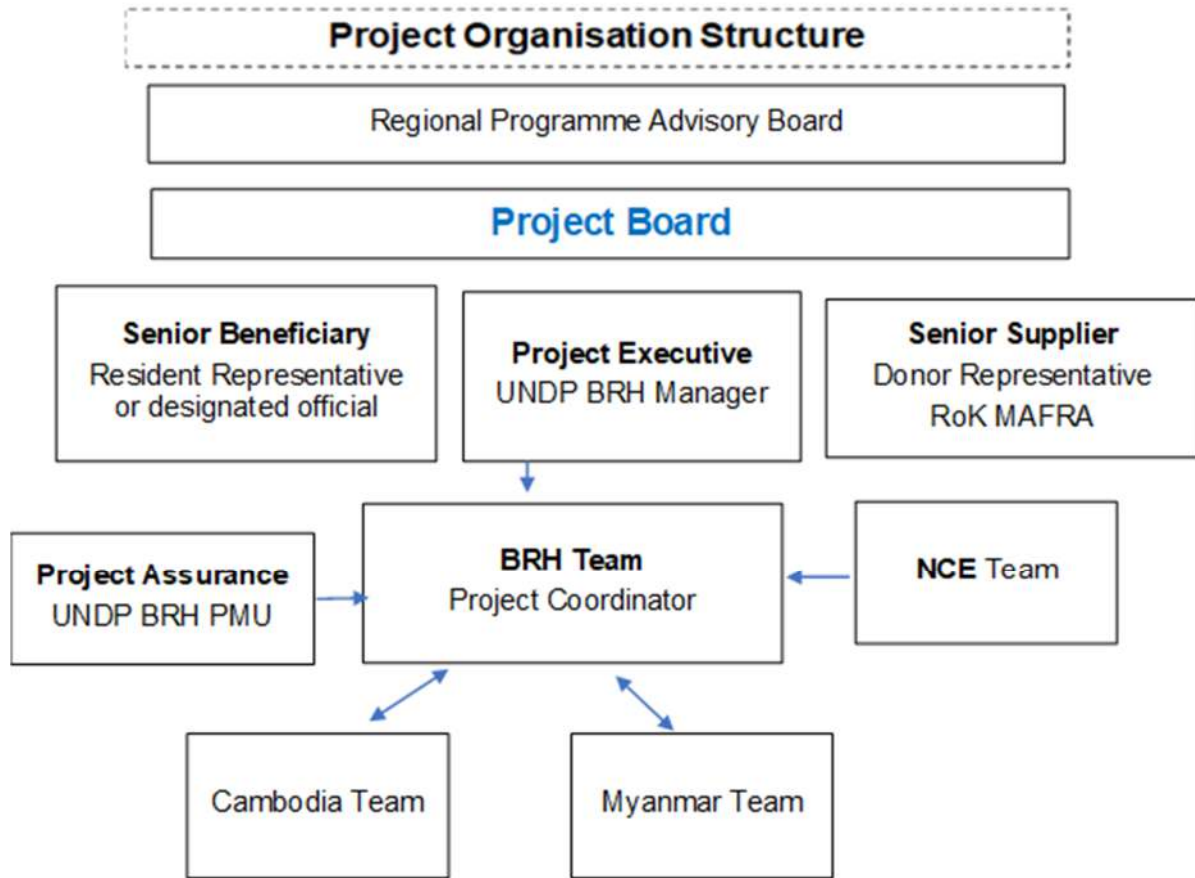
UNDP HQ, BRH and Country Offices will provide the project oversight.

At the regional level, The Bangkok based Project Coordinator will act as regional project manager and will coordinate activities between both countries and at Bangkok level and will report to the respective UNDP Country Office and PB and be responsible for quality assurance of the implementation of the project's technical components. He/She will be supported by a project assistant. Substantive progress reports and financial reports will be consolidated at the regional level to ensure that a single window of communication is maintained throughout the duration of the project.

Country-level activities will be led by a country Project Manager and guided by a country-level project workplan and budget, which will be developed specifically for the RoK funding component, while ensuring alignment with the overall objective of the host projects.

The day-to-day management of the project will be carried out by the Project Implementation Unit (PIU) within each country and the PIU will be staffed with dedicated personnel hired with RoK funding in line with the agreed workplan and budget.

Overall project oversight will be provided by the BRH Programme Management Unit (BRH).



IX. LEGAL CONTEXT

This project forms part of an overall programmatic framework under which several separate associated country level activities will be implemented. When assistance and support services are provided from this Project to the associated country level activities, this document shall be the “Project Document” instrument referred to in: (i) the respective signed SBAA’s for the specific countries; or (ii) in the [Supplemental Provisions to the Project Document](#) attached to the Project Document in cases where the recipient country has not signed an SBAA with UNDP, attached hereto and forming an integral part hereof. All references in the SBAA to “Executing Agency” shall be deemed to refer to “Implementing Partner.”

This project will be implemented by [name of entity] (“Implementing Partner”) in accordance with its financial regulations, rules, practices and procedures only to the extent that they do not contravene the principles of the Financial Regulations and Rules of UNDP. Where the financial governance of an Implementing Partner does not provide the required guidance to ensure best value for money, fairness, integrity, transparency, and effective international competition, the financial governance of UNDP shall apply.

X. RISK MANAGEMENT

1. UNDP as the Implementing Partner will comply with the policies, procedures and practices of the United Nations Security Management System (UNSMS.)
2. UNDP as the Implementing Partner will undertake all reasonable efforts to ensure that none of the [project funds]⁵ [UNDP funds received pursuant to the Project Document]⁶ are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/sc/committees/1267/aq_sanctions_list.shtml. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.
3. Social and environmental sustainability will be enhanced through application of the UNDP Social and Environmental Standards (<http://www.undp.org/ses>) and related Accountability Mechanism (<http://www.undp.org/secu-srm>).
4. UNDP as the Implementing Partner will: (a) conduct project and programme-related activities in a manner consistent with the UNDP Social and Environmental Standards, (b) implement any management or mitigation plan prepared for the project or programme to comply with such standards, and (c) engage in a constructive and timely manner to address any concerns and complaints raised through the Accountability Mechanism. UNDP will seek to ensure that communities and other project stakeholders are informed of and have access to the Accountability Mechanism.
5. In the implementation of the activities under this Project Document, UNDP as the Implementing Partner will handle any sexual exploitation and abuse (“SEA”) and sexual harassment (“SH”) allegations in accordance with its regulations, rules, policies and procedures.
6. All signatories to the Project Document shall cooperate in good faith with any exercise to evaluate any programme or project-related commitments or compliance with the UNDP Social and Environmental Standards. This includes providing access to project sites, relevant personnel, information, and documentation.

⁵ To be used where UNDP is the Implementing Partner

⁶ To be used where the UN, a UN fund/programme or a specialized agency is the Implementing Partner

7. UNDP as the Implementing Partner will ensure that the following obligations are binding on each responsible party, subcontractor and sub-recipient:
- a. Consistent with the Article III of the SBAA *[for the Supplemental Provisions to the Project Document]*, the responsibility for the safety and security of each responsible party, subcontractor and sub-recipient and its personnel and property, and of UNDP's property in such responsible party's, subcontractor's and sub-recipient's custody, rests with such responsible party, subcontractor and sub-recipient. To this end, each responsible party, subcontractor and sub-recipient shall:
 - i. put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
 - ii. assume all risks and liabilities related to such responsible party's, subcontractor's and sub-recipient's security, and the full implementation of the security plan.
 - b. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of the responsible party's, subcontractor's and sub-recipient's obligations under this Project Document.
 - c. In the performance of the activities under this Project, UNDP as the Implementing Partner shall ensure, with respect to the activities of any of its responsible parties, sub-recipients and other entities engaged under the Project, either as contractors or subcontractors, their personnel and any individuals performing services for them, that those entities have in place adequate and proper procedures, processes and policies to prevent and/or address SEA and SH.
 - d. Each responsible party, subcontractor and sub-recipient will take appropriate steps to prevent misuse of funds, fraud or corruption, by its officials, consultants, subcontractors and sub-recipients in implementing the project or programme or using the UNDP funds. It will ensure that its financial management, anti-corruption and anti-fraud policies are in place and enforced for all funding received from or through UNDP.
 - e. The requirements of the following documents, then in force at the time of signature of the Project Document, apply to each responsible party, subcontractor and sub-recipient: (a) UNDP Policy on Fraud and other Corrupt Practices and (b) UNDP Office of Audit and Investigations Investigation Guidelines. Each responsible party, subcontractor and sub-recipient agrees to the requirements of the above documents, which are an integral part of this Project Document and are available online at www.undp.org.
 - f. In the event that an investigation is required, UNDP will conduct investigations relating to any aspect of UNDP programmes and projects. Each responsible party, subcontractor and sub-recipient will provide its full cooperation, including making available personnel, relevant documentation, and granting access to its (and its consultants', subcontractors' and sub-recipients') premises, for such purposes at reasonable times and on reasonable conditions as may be required for the purpose of an investigation. Should there be a limitation in meeting this obligation, UNDP shall consult with it to find a solution.
 - g. Each responsible party, subcontractor and sub-recipient will promptly inform UNDP as the Implementing Partner in case of any incidence of inappropriate use of funds, or credible allegation of fraud or corruption with due confidentiality.

Where it becomes aware that a UNDP project or activity, in whole or in part, is the focus of investigation for alleged fraud/corruption, each responsible party, subcontractor and sub-recipient will inform the UNDP Resident Representative/Head of Office, who will promptly inform UNDP's Office of Audit and Investigations (OAI). It will provide regular updates to

the head of UNDP in the country and OAI of the status of, and actions relating to, such investigation.

- h. Option 1:* UNDP will be entitled to a refund from the responsible party, subcontractor or sub-recipient of any funds provided that have been used inappropriately, including through fraud or corruption, or otherwise paid other than in accordance with the terms and conditions of this Project Document. Such amount may be deducted by UNDP from any payment due to the responsible party, subcontractor or sub-recipient under this or any other agreement. Recovery of such amount by UNDP shall not diminish or curtail any responsible party's, subcontractor's or sub-recipient's obligations under this Project Document.

Note: The term "Project Document" as used in this clause shall be deemed to include any relevant subsidiary agreement further to the Project Document, including those with responsible parties, subcontractors and sub-recipients.

- i.* Each contract issued by the responsible party, subcontractor or sub-recipient in connection with this Project Document shall include a provision representing that no fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the proposal, have been given, received, or promised in connection with the selection process or in contract execution, and that the recipient of funds from it shall cooperate with any and all investigations and post-payment audits.
- j.* Should UNDP refer to the relevant national authorities for appropriate legal action any alleged wrongdoing relating to the project or programme, the Government will ensure that the relevant national authorities shall actively investigate the same and take appropriate legal action against all individuals found to have participated in the wrongdoing, recover and return any recovered funds to UNDP.
- k.* Each responsible party, subcontractor and sub-recipient shall ensure that all of its obligations set forth under this section entitled "Risk Management" are passed on to its subcontractors and sub-recipients and that all the clauses under this section entitled "Risk Management Standard Clauses" are adequately reflected, *mutatis mutandis*, in all its sub-contracts or sub-agreements entered into further to this Project Document.

XI. ANNEXES

- 1. Project Quality Assurance Report**
- 2. Social and Environmental Screening Template** [\[English\]](#) including additional Social and Environmental Assessments or Management Plans as relevant.
- 3. Risk Analysis.** Use the standard [Risk Register template](#). Please refer to the [Deliverable Description of the Risk Register](#) for instructions