

**KINGDOM OF CAMBODIA
NATION RELIGION KING**



Ministry of Planning

**Guidance on Development of Adaptation Indicators
for National and Sector Climate Change Action Plans**

**TA 8179: Mainstreaming Climate Resilience into Development Planning
Package C**

Gender, Monitoring and Evaluation (M&E), and Mainstreaming at Sub-National Levels

**Prepared by the
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Preface

It is a great honor for me on behalf of the Royal Government of Cambodia to present a Guidance Manual on the Development of Adaptation Indicators for Integration in National and Sector systems. The guidance is one of a series of knowledge products produced under the TA CAM 8179 “Mainstreaming Climate Resilience into Development Plan”. The Ministry of Planning has played a leading role in development of this guidance in broad consultation with key sector ministries, sub-national administrations, stakeholders and development partners under the technical and financial support of the Nordic Development Fund through the Asian Development Bank. The guidance provides a pragmatic approach and directions for effective design and implementation of adaptation indicators by key sectors, namely MOWRAM, MAFF, MRD and MPWT. It is built on the National Results Framework adopted for tracking implementation of the NSDP, and specific steps and guidance for designing the M&E of adaptation are developed for the four sectors.

The Ministry of Planning is now beginning development of the NSDP 2019-23 in coordination with all sector ministries at the time when the sector climate change action plans are approaching the final stage of their implementation. Cambodia’s main national development goals (NSDP, 2014) continue to put emphasis on poverty reduction, infrastructure and public services development and job creation while fostering economic growth at a steady rate of 7-8% per year. A review of the achievements against baselines presents good macro-economic performance, indicating Cambodia readiness for a gradual move from a least-developed country to a lower-middle income economy. However, there are still many challenges owing to many factors: enhancing Cambodia’s competitiveness through human resource development, sustainable management of the environment and its natural resources, improved public access to affordable water and energy supplies, an effective climate change response and resource-use efficiency. Cambodia’s Rectangular Strategy for “Growth, Employment, Equity and Efficiency” puts emphasis on good governance, peace and security as core pillars conducive to stable growth of all four development factors.

The M&E framework is an important part of the NSDP and sector plans as it helps us understand and learn about the implementation progress and the performance. Although our knowledge and experience of M&E in general is well enhanced, there are still gaps and constraints in the effective implementation of many aspects of M&E, including data collection and sharing. Even more challenges are encountered in the context of M&E of adaptation. I believe this guidance, together with the previous M&E guidance on adaptation investments, would address this knowledge gap and assist all M&E practitioners, and planning and management officers to integrate several adaptation indicators into sector systems, as well as in the upcoming NSDP 2019-23. Successful and sustainable M&E cannot be achieved without your cooperation, support, and commitment. The guidance is regarded as a living document, which will be improved through your shared experience and learning.

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Senior Minister, Minister of Planning

Acknowledgements

This manual for “Guidance on Development of Adaptation Indicators for National and Sector Climate Change Action Plans” for integration in the National and Sector systems is produced with contribution and inputs from various stakeholders and experts involved in climate change mainstreaming, implementation, and M&E reporting. The guidance is designed to support sector M&E units to develop and integrate a number of adaptation indicators into the NSDP and CCAPs. On behalf of the implementation team, first of all we would like to express our high appreciation to H.E. Dr. Say Samal, Minister of Environment and Chairman of the National Council for Sustainable Development for his continuous support and guidance to overcome many challenges during the project implementation. Our deep thanks are given to H.E. Prof. Dr. Sabo Ojano, chairman of the SPCR Coordination Team for his continuous support and coordination conducive to successful consultation with relevant specialists and experts. High appreciation goes to H.E. Tin Ponlok, Secretary General of the NCSD, H.E. Chuop Paris, Deputy Secretary General of the NCSD, and Mr. Sum Thy, Director of the DCC for recommendations and practical ideas for harmonization and alignment of the M&E framework. Many thanks are owed to Mr. Meas Sophal, Director of the MCRDP, and his management team for guidance and support during the entire consultation process. We also express sincere gratitude to technical officers and project managers in charge of the SPCR Investment Projects of the pilot sector ministries, especially MAFF, MOWRAM, MRD, MPWT, NCDD and MOWA for consultation and inputs on many aspects of climate change mainstreaming and M&E. We also highly appreciate the guidance and recommendations provided by Dr. Srinivasan Ancha, without which the technical report would not have been possible.

Finally, we also express our thanks to all experts and specialists from Development Partners, NGOs and CSOs for valuable contributions and experience in climate change activities and M&E reporting. We hope this Knowledge Product will guide future work on monitoring and reporting and improve the planning of climate change projects and programs in Cambodia

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Executive Summary

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Abbreviation

ADB	Asian Development Bank
CCA	Climate Change Adaptation
CCAP	Climate Change Action Plan
CCCA	Cambodia Climate Change Alliance
CCCSP	Cambodia Climate Change Strategic Plan
CCTWG	Climate Change Technical Working Group
CDC	Council for Development of Cambodia
CIF	Climate Investment Fund
CBADRR	Community Based Adaptation and Disaster Risk Reduction
DCC	Department of Climate Change
DRR	Disaster Risk Reduction
EWS	Earlier Warning System
FWUC	Farmer Water User Committee
GCF	Green Climate Fund
GDP	General Directorate of Planning (MOP)
GEF	Global Environment Facility
GHG	Green House Gas
MAFF	Ministry of Agriculture, Forestry and Fisheries
MDB	Multilateral Development Bank
MEF	Ministry of Economy and Finance
MEMR	Ministry of Energy and Mineral Resources
MIH	Ministry of Industry and Handicraft
MOE	Ministry of Environment
MOP	Ministry of Planning
MOWA	Ministry of Women's Affairs
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
MPWT	Ministry of Public Works and Transport
NAPA	National Adaptation Program of Action
NCDD	National Committee for Sub-national Democratic Development
NCDM	National Committee for Disaster Management
NCSD	National Council for Sustainable Development
NDF	Nordic Development Fund
ND-GAIN	Notre Dame Global Adaptation Index
NGO	Non-Governmental Organization
NIS	National Institute of Statistics (MOP)
NRF	National Result Framework
NSDP	National Strategic Development Plan
NM&EWG	National Monitoring and Evaluation Working Group (MOP)
PPCR	Pilot Program for Climate Resilience
PPCRRF	PPCR Results Framework
OECD	Organization for Economic Co-operation and Development
SPCR	Strategic Program for Climate Resilience
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlements Program
WB	World Bank

Executive Summary

This Guidance on Development of Adaptation Indicators for National and Sector Climate Change Action Plans is another important knowledge product produced under Package C of TA 8179 concerning monitoring, reporting and evaluation of adaptation investments. This guidance is designed to provide a pragmatic approach and steps for the development of key adaptation indicators based on priority adaptation measures and action plans for key sectors involved in the SPCR adaptation investments, namely the Ministry of Water Resources and Meteorology, the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Rural development and the Ministry of Public Works and Transport.

The guidance is developed based on an extensive review of national development and climate change policy, the sector climate change strategic plans and action plans, the sector adaptation priorities and the existing M&E practice. This guidance can be used by sector M&E units, the M&E specialists working for sector programs and projects, and the managers and senior officers in charge of resources planning and budgeting.

Building on the common principle of the National Result Framework (NRF) of the NSDP, several steps in sequence have been proposed to guide development of adaptation indicators that could be potentially integrated into the upcoming planning cycle of the NSDP (2019-2023) that are not only limited to the following, but also include:

- Review the current Sector Climate Change Strategic Plans and Action Plans in terms of their vision, expected goals, outcomes and objectives; analysis of existing adaptation programs and projects, and future priority adaptation investments (sector vulnerability, specific adaptation measures and budget allocation) and the current practice of Sector M&E of adaptation, data collection and data management. It is important to understand the logical relationship between the climate change strategic plans that provide overall policy goals and objectives while programs and projects are designed to support the implementation of strategic plans or action plans.
- Defining possible adaptation indicators that can measure the key results of adaptation interventions leading to decreased climate exposure, climate sensitivity, climate change vulnerability, and increased adaptive capacity. The indicators are aligned with the NRF so that a harmonized framework can be commonly understood by all relevant stakeholders. Each adaptation indicator or sub-indicator has clear definitions, baselines, potential source of data and data collection tools, frequency of measurements, and responsibility.
- Participatory consultations are an important step to discuss and assess the feasibility of proposed adaptation indicators, institutional responsibilities and cost implications. Sector specialists from technical departments, planning and budgeting officers, data managers, M&E officers, and expert opinion can provide essential inputs to substantiate the most relevant adaptation indicators.
- Operationalization is a critical part of putting adaptation indicators into implementation. It involves construction of baselines, defining targets, developing data collection tools and data management, and the financial and human resources planning for data collection, analysis,

aggregation and validation. If possible, the mechanism for quality assurance and quality control should be established to ensure the appropriateness and reliability of indicators presented at the NSDP and within the National System.

- Simple databases or spreadsheets can be developed to appropriately record time-series values for aggregation and analysis at specific locations, for sectors or programs, or country wide. Source of data for indicators can come from key government and sector databases (MOP 2017), national statistics, sector administrative data, Cambodia Socio-Economic Survey (CSES), and Population Census.

With reference to the targeted line-ministries listed above, based on field consultations and discussions at sub-national and local levels, it was observed that only rainfall data is regularly collected by the PDWRAMs while other meteorological parameters are largely absent, for example temperature, evaporation and moisture. Besides, not all meteorological stations functional, especially those in remote areas. As a result data collection is often interrupted. For instance, the PDWRAM in Pursat has rainfall data for all stations while in Battambang only some stations have data.

The road inventory datasets of the PDRD and PDPWT do not specify clearly the amount of climate proofed roads, only the type of surface provided. Therefore, improvement is required to track the climate resilience of roads in terms of VRA, climate proofed design, type of road surface, causes of damaged to the roads, and short-term and long-term maintenance requirements. Some officers suggest that roads are often damaged not only by floods, but by overloaded trucks. Rural roads with surfaces of asphalt, DBST and concrete are considered climate resilient although other factors need to be considered for a road to be climate proofed according to best practices, such as road height, drainage, erosion control, etc. Other modes of transport need to be promoted and invested in to complement and ease stress on the roads from the burden of traffic loads, such as rail and water-borne transport.

Indicators related to access to safe drinking water are collected by several entities, namely the PDRD, Commune Council (CBD), and the Water Supply Unit, which may result in different figures. It is important to note also that the MRD and MIH have ambitious goals to ensure access to improved water sources (e.g. piped water systems and protected water systems) for 100% of Cambodia's population by 2025. As a result, access to water is an important indicator in the context of the development goals of the Royal Government of Cambodia (RGC) and climate change targets.

In the agriculture sector, short-term rice varieties introduced by the CARDI are considered climate resilient, and can be subject to measurement as an adaptation indicator. Pkar Romdoul, Rangchey, IR66, Chulsar, Sen kra Ob, Kha14 and Kha15 are practiced across the country coinciding with a shift in more farmers adopting their cultivation.

Increased numbers of crops being cultivated per year is a good outcome of any irrigation project whether it be for climate resilience or business-as-usual monocropping. However, the advantage of short-term rice in the context of climate change supported by increased accessibility to irrigation schemes is the basis for designing adaptation indicators for the agriculture sector.

The Cambodia Climate Change Strategic Plan (CCCSP) is a key priority action by the RGC to address climate change in Cambodia. It was developed under the guidelines of the Council of Ministers, and is consistent

with the planning cycle of the National Strategic Development Plan (NSDP). Line ministries responsible for climate change and related water sectors provided inputs to the CCCSP and contributed to the development of the sector CCSPs, which then become a concrete policy platform for climate change integration at the national and sub-national levels.

Adhering to the principle of sustainable development, the CCCSP is designed to be a cohesive strategic framework aligned with other plans, such as the National Adaptation Programme of Action [NAPA], the National Policy on Green Growth and sector development plans. The CCCSP addresses a wide range of climate change issues including adaptation, greenhouse gas mitigation and low-carbon development. A strong emphasis is placed on building institutional capacity and science-based knowledge for projecting climate change impacts and for adaptation and disaster risk reduction. Such initiatives will have far-reaching implications on vulnerable sectors, such as agriculture, fisheries and water supply, and thus rural livelihoods.

Several indicators at the outcome and impact level of the NRF are proposed for key sector CCAPs based on possible present and future adaptation priorities as follows:

- i) Ministry of Water Resources and Meteorology**
 - Changes in livelihoods and poverty rate (impact).
 - Changes in loss and damage due to floods and droughts.
 - % of families having access to year-round water supply from irrigation schemes.
 - Agricultural areas covered by climate resilience irrigation schemes.
 - % of families or FWUCs increase the number of crops due to available irrigated water.
 - % of population with access to effective EWS and climate information.
 - % of families or areas exposed to drought and flood risks.
 - Number of FWUCs or communes having DRR Preparedness Plans and access to EWS (output).
 - Changes in agricultural areas free of saline intrusion and sea level rise.
 - Change in productivity of farming in coastal areas.
 - % of women headed households or females having access to a year-round water supply.
- ii) Ministry of Agriculture, Forestry and Fisheries**
 - Changes in livelihoods and poverty rate (impact).
 - Changes in loss and damage (productivity) in the areas of adaptation intervention (floods, droughts, and pest).
 - Number of model farmers adopted climate smart agriculture and integrated farming.
 - % of areas of crop diversification and smart/ integrated farming in the command areas of irrigation schemes.
 - Areas or % of farmers adopted climate resistant rice varieties (short-term rice).
 - % of farmers having access to crop-insurance schemes.
 - % of Forestry Committees trained on CBADRR (output).
 - % of Fishery Committees trained on CBADRR (output).
- iii) Ministry of Rural Development**
 - % of families with improved livelihoods or poverty rate (impact).
 - % of families having access to safe drinking water supplies from protected wells and rain harvesting tanks.

- Length of climate resilient rural roads (VRA, improved drainage, bio-engineering, improved pavement).
 - Number of families having access to small-scale irrigation schemes (community ponds, reservoirs, wells, tertiary irrigation canals) incorporating climate considerations.
 - % of families having access to improved latrines (above flooding and equipped with collection tanks).
 - Number of rural road engineers trained on climate proofed/resilient road design standards (output).
 - Number of VDCs having access to EWS and climate information to cope with disasters.
- iv) Ministry of Public Works and Transport**
- Length of climate resilient road incorporating climate considerations.
 - Proportion of urban families (including poor and vulnerable groups) having adequate flood control and sanitation infrastructure.
 - Number of road engineers trained on climate risk assessment and climate proofed design standards.

The list of sector adaptation indicators is not exhaustive, rather it is to provide a range of sample adaptation indicators for sectors to enrich, re-design and select to suit the specific adaptation activities, outputs and outcomes. Operationalization of those indicators must be based on the availability of data, possible new data collection methods or improvements, and human and financial resources. Indicators with implementation feasibility should be the first priority followed by the second priority indicators. The cost for data collection methods should not be used as a pretext not to introduce more indicators of relevance to adaptation as business-as-usual indicators may not be sufficient to monitor the success of adaptation interventions.

The guidance provides a possible list of the most important adaptation indicators for integration into the NSDP 2019-23 subject to further discussions and consultations on the practicality, commitment and sustainability of operation in the long term. The following adaptation indicators for the NSDP are listed as follows:

- i) % of families or areas having access to year-round water supply from irrigation schemes (PPCR Optional Indicator).
- ii) Agricultural areas covered by climate resilient irrigation schemes (existing and new schemes).
- iii) Number of FWUCs or communes having DRR Preparedness Plans and EWS.
- iv) % of families adopted climate resilient rice varieties.
- v) % of families adopted climate smart/resilient agriculture and integrated farming (crop diversification, rice-field fisheries, water conservation, seed purification and organic fertilization).
- vi) Changes in losses and damages due to floods, droughts and pests (3 sub-indicators).
- vii) Length of climate resilient rural roads (VRA, improved drainage, improved DBST/concrete road surface).
- viii) % of families having access to piped water.
- ix) % of families having access to protected improved wells.
- x) % of families having access to improved latrines.

- xi) Length of national and provincial roads with climate proofed design (VRA, improved drainage, improved maintenance, and DBST/concrete road surface)

As all CCAPs of the sector ministries and the NSDP 2019-23 will be soon updated, the guidance comes at the right time to provide an approach and a tool for the sector ministries to test and learn to develop the adaptation indicators for the next CCAPs and select a small number of adaptation indicators for integration into the NSDP 2019-23. Although this guidance is designed for four key sectors, it is of relevance for other sectors such as the Ministry of Health, the Ministry of Environment, and the Ministry of Land Management, Urban Planning, and Construction, and the Ministry of Women Affairs to use it as the approach and steps are the same. The guidance is regarded as a living document for improvement through testing and learning-by-doing.

I. Introduction

Cambodia is highly vulnerable to climate change due to its low adaptation capacity and its heavy reliance on climate-sensitive sectors, such as water resources and agriculture. Between 1998 and 2002, as much as 70% of rice production loss was attributed to floods, and another 20% to drought.

Infrastructure-related losses from impacts of climate change, including floods, are also high. Significant natural disasters in Cambodia include:

- severe floods in 2000-2002 caused 438 casualties and approximately US \$205 million in damages (PPCR 1, 2013);
- Typhoon Ketsana in 2009 affected 14 out of 24 provinces (about 180,000 people) and cost the Cambodian economy USD \$132 million in lost production and damage to infrastructure;
- floods in 2011 affected 354,217 households in Cambodia (more than 1.7 million people in 18 provinces) and cost between US\$ 521 million to \$624 million in lost assets;
- in 2012, droughts affected more than 2500 communities in Cambodia (MoP, 2013);
- the 2013 flooding caused significant economic damage, estimated at US \$700 to 750 million (NCDM 2014); and
- an estimated 1.7 million people were affected by flooding in 2013 in 20 out of 24 provinces (www.reliefweb.int: Cambodia Humanitarian Response Forum, 8 Nov 2013).

Although a country such as Cambodia has accumulated good experience in planning and mainstreaming of climate change responses, there is considerable scope for effective and efficient planning and implementation of actual adaptation plans and investments. Access to reliable climate change variables and modeling, adequate human resources and skills at national and sub-national levels, institutional coordination, available technologies and adequate infrastructure, and improved good governance with a proper M&E framework are the common challenges for effective climate change mainstreaming.

In response to the present and potential climate change impacts in Cambodia, the first comprehensive Cambodia Climate Change Strategic Plan (CCCSP) was adopted in 2013. Adhering to the principle of sustainable development, the CCCSP is designed to have a cohesive strategic framework with other plans (such as the National Adaptation Program of Action [NAPA], the National Policy on Green Growth and sector development plans). It addresses a wide range of climate change issues including adaptation, greenhouse gas mitigation and low-carbon development. A strong emphasis is put on building institutional capacity and science-based knowledge for projecting climate change impacts as well as for adaptation and disaster risk reduction; these will have far-reaching implications on vulnerable sectors such as agriculture, fisheries and water supply, and thus rural livelihoods.

The goals of the CCCSP are to (i) reduce the vulnerability of critical (natural and societal) systems and of highly vulnerable groups to climate change impacts; and (ii) shift towards greener development by promoting low-carbon development and technologies.

It is worth noting Cambodia's economic achievements during the last decade, which have been a solid foundation upon which the country has been able to move from a least developed country to a more

climate resilient economy. Cambodia has adopted a five year development planning process since the first general election in 1993, and now the NSDP 2014-18 will be evaluated against its baselines and targets to form the basis on which the updated NASP 2019-23 will be developed. Likewise, the CCAPs of 15 sector ministries are also in the final year of their implementation and their evaluation and update would follow suit. M&E is a tool practiced by the NSDP under the coordination of the General Directorate of Planning and the National Institute of Statistics at MOP. However, capacity gaps and funding shortages hamper the effective operation of M&E in terms of both development and climate change.

This guidance manual is developed to assist managers and specialists of sector ministries to develop and design an adaptation M&E framework consistent with the National Results Framework based on specific adaptation needs and priorities. It provides a pragmatic approach and steps, an extensive analysis of sector plans and adaptation priorities, and the possible adaptation indicators for integration in the CCAPs and NSDP. Operationalization of adaptation indicators requires preparing M&E workplans with routine data collection schedules and clear staff assignments. Capacity development and training are an important part of the workplan so that indicators and data of good quality is collected and managed. The most important aspect of the Adaptation M&E framework is learning. This refers to learning about the climate change impacts and implications for social and economic sectors, and the effectiveness of adaptation and disaster risk reduction measures. In turn, this learning will be included in the next CC project and action planning. Implementation of the M&E of adaptation has, however, a number of challenges, including the lengthy time scales for observable impacts and outcomes, the lack of a one-size-fits-all adaptation M&E methodology, the attribution of climate change factors, and the selection of the most suitable adaptation indicators and identification of baselines (Lola Vallejo, OECD 2017). Good practice of selection and integration of adaptation indicators at the national level varies from country to country: only a small number of national-level monitoring systems propose to collect new data, and a common denominator between the monitoring systems is that they all use data from existing systems (Prakriti Naswa et al, UNEP DTU 2015). The approach of the current guidance would rely on existing data systems but provide a set of potential adaptation indicators for the consideration of key sectors.

The guidance comes at the right time of the development planning cycle, which can be used by sector M&E units at national and provincial levels to design a harmonized and achievable M&E framework for measuring the progress and effectiveness of adaptation investments and plans, as well as to compile lessons learned from the implementation. Climate change now becomes an important ingredient of the Sustainable Development Goals of the Rectangular Strategy IV, and thus integration of adaptation M&E into the national M&E system of the NSDP 2019-23 would serve as evidence-based practices for both effective budgeting and climate change mainstreaming in the national planning process. The rationale also stems from the requirements of international financing mechanisms, such as the Green Climate Fund, Climate Investment Fund, or Adaptation Fund, for measuring efficient and effective adaptation investments.

This guidance is designed to support four key sector ministries in identification and operation of sector adaptation indicators, but it can be used by other sector ministries such as the Ministry of Health, Ministry of Environment, and Ministry of Land Management, Urban Planning and Construction, etc. since the basic approach and essential steps are the same. The guidance is regarded as a living document for the M&E practitioners to test and improve through feedback and participatory consultation.

II. Cambodia Climate Change Policy Response and Mainstreaming

To fully address climate change adaptation, it requires good adaptation policies in place, and it must seriously consider adequate institutional arrangements, coordination, mainstreaming strategies, community participation, ecosystem-based adaptation options, sound financing mechanisms, monitoring and evaluation (M&E), and a specific iterative review over time (Pittock 2014; Mackey 2014; Bamsey 2014; Dovers 2014). In this regard, adaptation policies should develop a mainstreaming framework across different scales in the form of policy integration rather than a ‘stand-alone’ approach (Dovers and Hezri 2010; Ayers et al., 2014).

Mainstreaming refers to the integration of climate change adaptation into existing development policies (Ayers et al., 2014). In practice, mainstreaming is very challenging in LCDs where the governance and institutional capacity are very weak (UNFCCC 2002; UNDP 2009; Huq et al., 2004; Chong 2013). For example, many NAPAs are not aligned with their national development plans due to different policy cycles and different leadership in policy formulation by different ministries, and these are also very obvious in the case of the Cambodia NAPA (Hardee and Mutunga 2009; Saito 2013).

Understanding the current Cambodian development process and key priority outcomes of the development goals is an important part of the development of adaptation indicators, particularly for integration into the NSDP. The overarching government climate change policy responses are articulated in three key documents namely, the Rectangular¹ Strategy (RS), The National Strategic Development Plan (NSDP) and the Cambodia Climate Change Strategic Plan (CCCSP). The upcoming RS IV is expected to be updated although the key pillars may not change much as they remain valid for the next five-year cycle. The RS III for “Growth, Employment, Equity and Efficiency” outlines the key strategic objectives as follows:

- Ensuring an average annual economic growth of 7%. This growth should be sustainable, inclusive, equitable and resilient to shocks through diversifying the economic base to achieve a more broad-based and competitive structure with low and manageable inflation, a stable exchange rate and steady growth in international reserves.
- Creating more jobs for people especially the youth through further improvement in Cambodia’s competitiveness to attract and encourage both domestic and foreign investments.
- Achieving more than 1 percentage point reduction in poverty incidence annually, including the realization of other CMDG targets, while placing higher priority on the development of human resources and sustainable management and the use of environmental and natural resources.
- Further strengthening institutional capacity and governance, at both national and sub-national levels, and ensuring the effectiveness and efficiency of public services to better serve people.

Across all these objectives, Roads, Water, Electricity and People are the key priority targets of the previous national development plans and will remain priorities in the years to come. Recognizing the challenge of environmental management and climate change response, the RS III adopted the following measures:

¹ The “Rectangular” consists of four angles: 1) Promoting agriculture sector growth, 2) Development of physical infrastructure, 3) Private sector development and employment, and 4) Capacity building and human resources development (NSDP 2014). Good Governance is placed in the center as the core of the four RS angles.

- Sustainable management of natural resources.
- Intensifying efforts to reduce the impacts of climate change by strengthening adaptation capacity and resilience to climate change, particularly by implementing the “National Policy on Green Development” and the “National Strategic Plan on Green Development 2013-2030”.
- Continuing to strengthen technical and institutional capacity to promote the mainstreaming of climate change responses into the policies, laws and plans at national and sub-national levels.
- Continuing to introduce measures to control environment and ecosystem pollution.

The RS serves as a development framework for NSDP, which in turn guides all sector development plans and investments, including climate change investments. Beginning in 1996 as the first Socio-Economic Development Plan (SEDP) following the first general election in 1993, the NSDP now enters its fifth cycle and its next NSDP 2019-23 will soon be updated this year based on the RS IV. The key macro-economic performance will be updated based on actual growth against targets as summarized in Table 1.

Table 1: Macro-Economic Indicators

No	Key Macro-Economic Indicator, NSDP	Unit	Baselines	Targets				
			2013	2014	2015	2016	2017	2018
1	Poverty head count		17.9	16.9	15.9	14.9	13.9	12.9
	Urban		13.5	12.5	11.5	10.5	9.5	8.5
	Rural		19.0	18.0	17.0	16.0	15.0	14.0
2	Annual GDP at Constant 2000 Prices ²	US\$	15,229	16,796	18,078	19,843		
3	Real GDP growth rate (constant prices 2000)	%	7.6	7.93	7.1	8.9		
4	Per capita GDP	US\$	1,036	1,139	1,237	1,347	1,451	1,579

Source: NSDP 2014-18

The key actions related to the climate change and natural resources management are the same as specified above in the RS, but a new policy document, the “Cambodia Climate Change Strategic Plan”, has been added. The NSDP however lacks specific sector climate change actions, although the CCCSP may serve a policy platform for all sectors. Designed for implementation until 2024, the CCCSP has 8 strategic objectives (MOE 2013) as the following:

1. Promote climate resilience through improving food, water and energy securities.
2. Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts.
3. Ensure climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal ecosystems, highlands, etc.), biodiversity, protected areas and cultural heritage.
4. Promote low-carbon planning and technologies to support sustainable development of the country.
5. Improve capacities, knowledge and awareness of climate change responses.
6. Promote adaptive social protection and participatory approaches in reducing loss and damage due to climate change.
7. Strengthen institutions and coordination frameworks for national climate change responses.

² Mid-term assessment 2016, MEF.

8. Strengthen collaboration and active participation in regional and global climate change processes.

The CCCSP is a 10-year planning cycle with two 5-year operational phases that can broaden adaptation policy and make adaptation mainstreaming compatible with the 5-year cycle of the Sectoral Development Plans and the National Strategic Development Plan (2014-2018). Therefore, the iterative review of the CCCSP needs to be conducted over a 5-year period in order to evaluate adaptation in terms of success 'as good practices' and failure 'as maladaptation' (Pittock 2013; RGC 2013).

Mainstreaming the CCCSP can be achieved across national, sub-national and sectoral jurisdictions via the NSDP 2019-2023, Sectoral Development Plans and the Framework for Decentralization and De-concentration. However, the coordination across different scales is very complex, and it requires good governance, leadership, institutional arrangements and capacity and collaboration among multi-stakeholders over a long period. Also, both explicit recognition and M&E contribute to a conducive good enabling environment to support the implementation of mainstreaming and ensure its effectiveness.

The medium and long term policy horizon is a good option to build a broad adaptation policy that can be compatibly integrated into various related policies, and can accommodate the implementation of various mainstreaming and adaptation forms, especially soft, community-based, and ecosystem-based adaptation. Also, adaptation policy intervention can be implemented by the integrated program-based, participatory and multi-stakeholder approaches that can potentially benefit the most vulnerable communities. The 5-year policy review can make adaptation policy an effective response to climate change adaptation, and it should be aligned with other policy timeframes in order for the rapid integration of new adaptation issues.

Sector climate change strategic plans (CCSPs) and climate change action plans (CCAPs) are developed to guide implementation of climate change response in both mitigation and adaptation. The first round of CCSPs and CCAPs for 2013-2018 have been adopted by 15 sector ministries with various degrees of achievement of their respective goals and objectives. The Disaster Risk Reduction Strategy and Action Plan has been adopted by the National Committee for Disaster Management to manage DRR. The M&E Framework for adaptation is also included in the CCSPs and CCAPs, but only a small number of adaptation indicators have been put into operation. With the possible update of the CCSPs and CCAPs for the next cycle along with the development of the NSDP 2019-23, there is ample opportunity for identification and design of a suit of adaptation indicators for integration into both the sector CCAPs and the NSDP 2019-23.

Of overarching importance for these efforts has been Cambodia's partnership in the implementation of the PPCR (Pilot Program for Climate Resilience). This Program had the long term objective to strengthen capacities at the national and subnational levels, and to integrate climate resilience into the respective development planning as well demonstrating approaches for the integration of climate risk and resilience into the Government's development policies and planning. The Technical Assistance component within the PPCR has the clear objectives of institutional strengthening, mainstreaming policies and policy reform within the participating countries.

The nature of the TA's priorities also substantially correlate with the strengthening of national coordination within the country and the extent to which climate resilience has been mainstreamed into their development plans. For example, countries with the least evidence of mainstreaming, such as

Tajikistan, have three out of the six TA components focusing on building capacities, institutional strengthening, etc., while in Bangladesh technical assistance is a very small component among the sector projects prioritized by the country's development planning.

Some early outcomes can be seen as a result of the assistance in the preparatory phase. Zambia, for instance, has been the first country to have mainstreamed climate resilience within their 6th National Development Plan, and they have also established a cross-ministerial technical stakeholder group. Mozambique established its National Climate Change Strategy in November 2012. More specifically, Cambodia's Climate Change Strategy has been developed and implementation is underway, and this provides a clear vision of how to integrate climate resilience within the next NSDP. Although some early results of mainstreaming within the participating countries can be observed, attributing them to the implementation of the PPCR would be based upon a rudimentary judgment at this stage without rigorous monitoring and evaluation of the activities, outputs, outcomes and longer-term impacts, for which this guidance document is intended to be an initial step in achieving this.

The M&E for adaptation has been practiced at different levels (MOP, 2017), but there is no common approach and understanding. The current guidance is designed to fill the current gap and provide a pragmatic approach for selection of some adaptation indicators for four key sectors involved in the SPCR projects that have emerged from the PPCR and funded by the CIF through ADB, namely agriculture, water resources, rural development and public works. The latter also includes urban sanitation and water supply in conjunction with rural water supply and sanitation. The proposed indicators for the key sectors are aligned with three levels of the NRF and are not exhaustive depending on the nature of adaptation interventions and priority in each sector. The most important indicators are selected based on present and future priorities and the potential size of investments.

III. Experience and Lessons from Other Countries in Selection and Integration of Adaptation Indicators in National and Sector M&E Systems

There are still few countries that have designed and implemented national systems for adaptation investments (Lola Vallejo, 2017), and most frameworks are in the earlier stage of development. Some countries are now working on the M&E of adaptation under the Nationally Determined Contributions (NDC). Most frameworks focus on monitoring though a few countries include an evaluation aspect. Regardless of many challenges, experience and good practices have been gained through implementation and integration of the M&E of adaptation at national and sub-national levels by various countries. A number of guidance manuals, guidelines, knowledge portals and repositories of adaptation indicators have been produced and available online.

A set of lessons from the implementation of the M&E of adaptation by various countries can be summarized as follows:

- The objectives of monitoring and evaluating adaptation vary by country, but two common themes include learning and accountability. Learning aims to enhance stakeholders' understanding of the country's climate change risks and vulnerabilities and the effectiveness of interventions in reducing those risks, while accountability is associated with efficiency and effectiveness of resource utilization (OECD, 2015). In France, the objective of the monitoring system is to monitor progress in implementing actions under their National Adaptation Plan (NAP) and the achievement of specified NAP outcomes (UNEP 2017). NAP implementation is a policy platform for development and implementation of the M&E of adaptation/resilience to monitor the resilience of the country to climate change or reduction of the country's vulnerability to climate change (OECD 2015).
- Common approaches and M&E Frameworks for national monitoring and evaluation are a combination of qualitative, quantitative indicators, and process indicators³ (UNEP DTU 2017). The number of indicators can range between three (Mexico) and over a hundred (such as France, Germany, Kenya and the Philippines) with qualitative analysis (Lola Vallejo, 2017). Table 4 below provides a snapshot of national M&E frameworks for adaptation/resilience.
- A variety of M&E framework/methodologies has been used, for example at the level of international financing mechanisms, for example the GEF, Adaptation Fund, Green Climate Fund, have formulated monitoring and evaluation frameworks to assess the impact of their portfolio of activities. The CIF has introduced the PPCR Results Framework to monitor SPCR investment projects at country and programmatic level. This means the selection of indicators depends on the specific outcomes and impacts of the portfolio.
- The adopted adaptation M&E framework also varies at the country level (<https://www.adaptationcommunity.net>), and most frameworks are still at an early stage with

³ A focus on process refers to monitoring advancement in implementing policies, plans and/or interventions that address climate change adaptation, and/or institutional capacity to do so.

development and planning are in progress (UNEP, 2017). Norway relies on existing initiatives and systems as a learning mechanism for assessing effective means of reducing climate change vulnerability and risk. The Philippines and France have designed their frameworks to measure the desired outputs and outcomes of adaptation, while those in Mozambique and Nepal are based on other major adaptation initiatives, such as the PPCR Framework. The Philippine framework includes the desired results chain as identified in the Philippines National Climate Change Action Plan 2011-2028, including ultimate, intermediate and immediate outcomes, activities, outputs and complementary indicators (UNEP 2017). In Kenya, the National Climate Change Action Plan (NCCAP) covers both mitigation and adaptation, and has included a supplementary framework (the National Performance and Benefits Measurement Framework, NPBMF) to track both mitigation and adaptation activities. The UK and Germany target their frameworks to a number of selected priority areas.

- There are a number of categories of indicators adopted by various countries to measure the result of specific adaptation measures. Table 2 illustrates several indicators developed for a climate resilient crop.

Table 2: Categories of Indicators

Categories	Indicators
Quantitative Indicators	Cost of additional resources vs. additional crop production; Number of beneficiaries
Qualitative Indicators	Acceptability of crop type; Legal acceptance of the drought-resistant crop
Process	Frequency of adding fertilizer; Sowing process
Outcome	Number of beneficiaries; Increase in production
Impact	Increase in income levels; Increase in health standards
Efficiency	Cost of additional resources vs. additional crop production; Additional labour hours vs. additional crop production
Effectiveness	Water requirement; Soil moisture requirement

Source: UNEP, 2015

- Data collection for adaptation indicators varies also from country to country. Some countries rely on existing data sources while others are more inventive in their use of resources (Table 3).

Table 3: Examples of Data Collection Practices from a Variety of Countries

Country	Existing use of data	Resources and institutional arrangement	Resources inventiveness
Morocco	Drawing exclusively on data already available in pilot phase.	Process supported by GIZ; national & international consultants; Prioritized indicators based on data that was already available.	Low
Kenya	Integrating into existing national M&E structures;	Set-up of the system will involve approximately 100 people. Any delays or	High

	drawing on data from relevant sectors.	challenges in operationalization of national M&E structures may slow down or complicate implementation of the M&E system for adaptation.	
France	Collecting data from focal point in 20 relevant sectors.	Implementation coordinated by one full-time staff member; in-kind contributions from ministries.	Low
UK	Cyclical process of assessment, planning, and reporting, including detailed annual vulnerability assessments.	Part of an ongoing learning process.	Low
Norway	Lessons from implementation of interventions gathered through both formal and informal methods, including surveys, research, pilots & consultations.	Lessons consolidated and fed into national assessments every five years.	Low

Source: UNEP 2015

- Some adaptation indicators for national level M&E are listed in Table 4 below as an example of reference for development of a suite of adaptation/resilience indicators. More examples can be found in the repository of adaptation indicators (GIZ 2014).

Table 4: Examples of Adaptation Indicators from a Variety of Countries

Country	Name of Indicators	Data Sources	Spatial scale
Kenya	Percentage of total livestock killed by drought; Number of hectares of productive land lost to soil erosion	Ministry of Agriculture and Livestock; national database, insurance records; Ministry of Agriculture	National or sub-national
France	Number of inventories of climate change impacts on biodiversity; Establishment of green label for neighborhoods requiring climate change vulnerability assessments	Ministry of Environment, civil society organizations working on biodiversity conservation, national databases; City authorities	National
UK	Number of people at high risk of heat stress	Health insurance companies, national health service, national census, national agencies responsible for climate risk	National and sub-national

		management, heat stress maps, health records	
MRC Countries	Number of people living in flood prone areas	National Bureau of Statistics; population census	National and sub-national
Mexico	Areas covered by vegetation affected by plagues or fires	Ministry for Environment and Natural Resources (SEMARNAT), National Forest Commission, management of forest fires, National Institute for Environmental Information and Natural Resources (SNIARN)	National
Germany	Distribution of warmth-adapted marine species; Funding for climate-adapted construction and refurbishment	Long term surveys of the GSBTS (German Small-scale Bottom Trawl Survey) of theIfS (Institut für Seefischerei); Subsidy statistics of KfW	National
Morocco	Number of cases of water-borne diseases	Regional Directorate for Health (DRS) Marrakech	Regional or provincial level

Source: UNEP 2015

In reference to specific SPCR experience, most pilot countries had completed their SPCR Investment planning by the end of 2012, and the SPCR for 14 countries were endorsed by mid-2012. However, participating countries are at very different stages in addressing climate risks within their development planning and budgeting processes, including implementing PPCR Reporting tools.

Country readiness has, thus, significantly influenced the time taken by the countries to complete Phase 1. The indicative time frame for Phase 1 was 3-18 months, with an understanding that most countries would choose and be able to achieve the aims of this process in less than 12 months. In reality, over six countries were not expected to complete their Phase 1 by 2013 and many countries experienced overlapping phases.

The PPCR was posed with two dilemmas for defining national government's institutional arrangements: (1) PPCR's location within government, and (2) establishing the PPCR with a permanent structure within the government's institutions.

The responsibility for the decision to select a focal agency and a coordinating body for the PPCR has significantly rested on the convening authority of the selected Ministry and their existing relationships with the Multi-Donor Banks. Traditionally, MDBs have had strong relationships with ministries with a financial mandate, and it is also believed that Finance Ministries have higher convening authority as they control budgets and finance across ministries. It is generally felt that climate change being a cross sectoral issue, the operationalization of PPCR requires bestowing control on an entity that has the convening authority to implement projects across ministries.

IV. Approach and Steps for Identification of Suitable Adaptation Indicators for integration in the NSDP and Sector Plans

Like most countries, in Cambodia implementation of the M&E of adaptation at national and sector levels is still in its earlier stages of learning and development. Development of adaptation indicators has been initially coordinated by the Ministry of Environment following the adoption of the Cambodia Climate Change Strategic Plan (CCCSP), Sector Climate Change Strategic Plans (SCCSP) and Action Plans (CCAPs). Currently, the National Council for Sustainable Development has introduced the TAMD approach “Tracking Adaptation and Measuring Development”, which measures institutional readiness and impact indicators. At the same time, the PPCR Results Framework has been implemented to track progress of national climate change mainstreaming, as well as progress of the SPCR investment projects to complement the TAMD. Only a few indicators submitted by MOE have been integrated in the NSDP 2014-18 (see Annex 1), and no sector adaptation indicators are found in the NSDP’s M&E system. Moreover, the adaptation indicators of the CCAPs have not been operationalized due to limited common understanding of the M&E framework, a lack of clear definitions, and lack of guidance on the M&E of adaptation and data collection tools.

The approach for designing the M&E of adaptation is proposed to build on common principles outlined in the Technical Report “Harmonized Climate Resilient M&E Framework in Cambodia: A Guidance for Tracking Adaptation Investments” (MOP 2017). Those principles are also well-suited for designing the M&E Framework for Adaptation for the NSDP and Sector Climate Change Action Plans as summarized in the following:

- **Nationally appropriate systems:** The results framework is designed to operate within existing national monitoring and evaluation systems. Therefore, the National Results Framework of the NSDP (Figure 1) would be the blue print for harmonization;
- **Flexible and pragmatic approach:** Application of various practices and M&E tools (TAMD, PPCRRF, Log-frame, DMF) can be flexible depending on the nature of the adaptation projects and programs as long as the results are well aligned with the NRF and practice. Combination of qualitative (process), quantitative, and binary indicators with periodic project evaluation can improve learning progress and the effectiveness of the outcomes and impacts of the adaptation investments.
- **Consistency with national and sector goals and objectives:** This means that the adaptation indicators should be aligned with the overall goals and outcomes of the national and sectoral strategies and plans, such as the SDGs, NSDP, CCCSPs, and CCAPs;
- **Data collection and reporting standards:** To be able to aggregate country-level results of programs and projects, a set of common adaptation indicators with clear definitions will be measured using existing data collection methodologies and existing databases with enhancements to ensure consistency and quality.

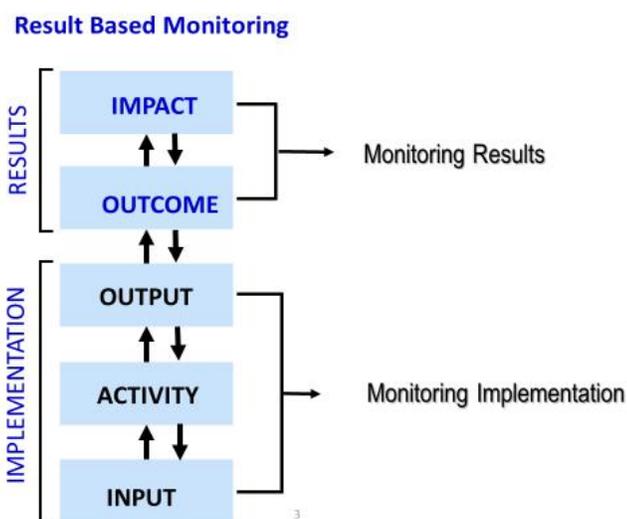
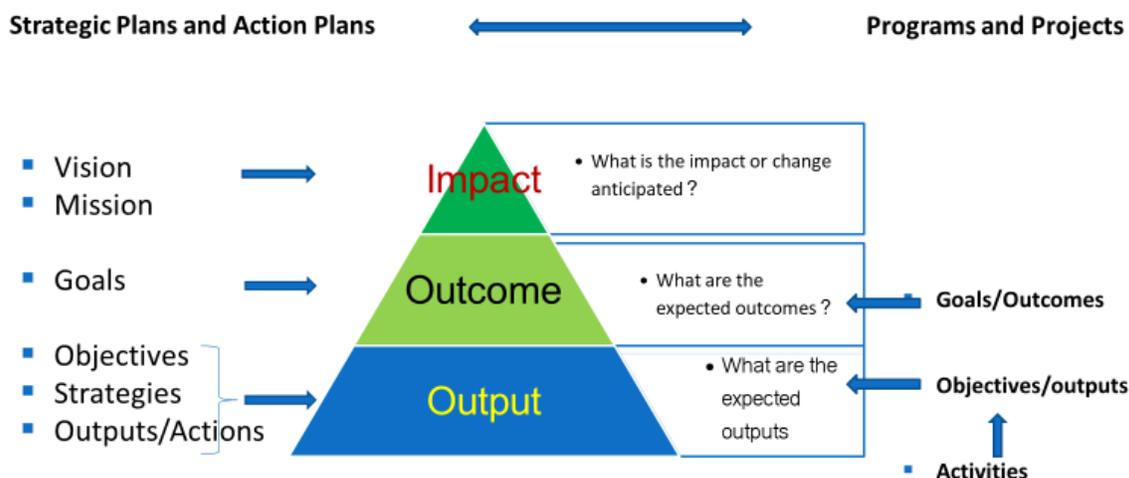


Figure 1: National Results Framework (NRF)

Based on the common principles described above the key steps for identification and operationalization of the adaptation indicators can be proposed as follows:

- Reviewing the current Sector Climate Change Strategic Plans and Action Plans in terms of its vision, expected goals, outcomes and objectives; analysis of existing adaptation programs and projects, and future priority adaptation investments (sector vulnerability, specific adaptation measures and budget allocation) and the current practice of the various sectors for the M&E of adaptation, data collection and data management. It is important to understand the logical relationships between climate change strategic plans, which provide overall policy goals and objectives while programs and projects are designed to support the implementation of strategic plans or action plans.
- Defining possible adaptation indicators that can measure the key results of adaptation interventions leading to decreased climate exposure, climate sensitivity, climate change vulnerability, and increased adaptive capacity. The indicators should be aligned with the NRF (figure 2) so that a harmonized framework can be commonly understood by all relevant stakeholders. Each adaptation indicator or sub-indicator must have clear definitions, baselines, potential sources of data and appropriate data collection tool, frequency of measurements, and those with the relevant responsibility.
- Participatory consultation is an important step to discuss and assess the feasibility of proposed adaptation indicators, institutional responsibility and cost implications. Sector specialists from technical departments, planning and budgeting officers, data managers, M&E officers, and expert opinion can provide essential inputs to substantiate the most relevant adaptation indicators (see the Annex).

Structure and Relationship of Adaptation Plans, Programs and Projects



3

Figure 2: Relationship between Adaptation Plans and Programs/Projects

- Operationalization is a critical part of putting adaptation indicators into implementation. It involves construction of baselines, defining targets, developing data collection tools and data management, and financial and human resources planning for data collection, analysis, aggregation and validation. If possible, the mechanism for quality assurance and quality control should be established to ensure the appropriateness and reliability of indicators presented at the NSDP and National Systems.
- Simple databases or spreadsheets can be developed to appropriately record time-series values for aggregation and analysis at specific locations, by sector or program, or country wide. Sources of data for indicators can come from key government and sector databases (MOP 2017), National statistics, sector administrative data, Cambodia Socio-economic Survey (CSES) data, and Population Census data. Some adaptation indicators require improvements to data collection tools and methods, and sampling survey in addition to what is described above.

There is no one-size-fits-all criteria for selection of adaptation indicators; however, key considerations can be proposed as follows:

- Indicators should be consistent with SMART principles: Specific, Measurable, Attainable, Relevant and Time-bound;
- The indicators contribute to tracking overall outcomes and impacts of the national and sector development goals (RS, NSDP), effectiveness and efficiency of national and sector climate change interventions or actions (CCCSP, CCAPs, NAP, INDC), and the improved climate change resilience capacity of institutions or natural systems;

- The indicators should have links with existing data collection tools and practices, and be acceptable by technical departments for additional data collection and cost implications;
- Implementation of the indicators is feasible in terms of institutional coordination, human resources, cost efficiency and sustainable data collection and management;
- For indicators that require new data collection tools, additional staff and capacity, for which there is no existing data, or the reliability of the data flow is dependent on many agencies, they must be carefully selected following a much broader stakeholder consultation.

Entry points for the integration of a small number of adaptation indicators into national systems can be the following:

- Existing institutional arrangements for M&E, especially the National M&E Working Group under MOP;
- Existing database systems established under MOP, such as CAMINFO, Population Census, Commune Database, IDPoor, and Public Investment Program;
- Existing databases of sector ministries that provide relevant adaptation data and variables, such as AgriStat, CAMDI, Road Inventory, Meteorological data, HYMOS, etc.;
- Building on the national M&E of adaptation proposed by the NCSD, especially the TAMD and PPCR Framework.

The Climate Change Department together with key stakeholders engaged in the implementation of Cambodia's climate change response and in collaboration with the International Institute for Environment and Development (IIED) and Cambodia Climate Change Alliance (CCCA) to develop Cambodia's national M&E framework to track the country's progress in addressing the challenges posed by climate change. It consists of a core set of 8 national level indicators from which 2 to 3 indicators per sector will be included.

The national M&E framework for climate change adopts a twin-track approach: on the one hand measuring how well the national institutions are able to manage climate risks – through institutional readiness indicators, and on the other hand measuring how successful climate interventions are in reducing vulnerability or lowering carbon emissions – through impact indicators.

V. Guidance on Development of Adaptation Indicators for MOWRAM CCAP

Water is a prerequisite for the normal growth of many aspects of socio-economic development, and it is an essential asset in the context of climate change. The increase in the global temperature, even if restricted to 1.5°C, is expected to result in significant changes in rainfall patterns. Competition for water use by various sectors is on the increase, which adds more pressure on water availability in the context of climate change. Water can be a source of both opportunity and threat as climate change may cause heavy floods and frequent droughts, however sufficient water availability in both quantity and quality can support the productive function of human and natural systems. Given its significant role in achieving the goals of sustainable development, water is placed as a top priority for development in the RS and NSDP.

4.1 Analysis of Sector Plan and Adaptation Priority

MOWRAM is responsible for water resources management in the areas of the river basin, sub-basins, watershed run-off, ground water and aquifers in collaboration with all concerned ministries (Water Law, 2007). However, water use and management falls under the jurisdiction of several ministries, such as MAFF, MRD, MOE, MIH, and Ministry of Energy and Mineral Resources (MEMR). The Strategic Development Plan on Water Resources and Meteorology 2009-13 (MOWRAM, 2009) identifies five strategic areas for development as follows:

- Water resources management and development;
- Flood and drought management;
- Water-related legislation and regulation;
- Water resource information management; and
- Administration, management and human resource development.

The cost of its implementation is estimated at US\$1,250,024,000 for 2009-2013, but financial shortages may hamper its expected outcomes. The five areas are of relevance to adaptation as they can be the basis for transformation into the climate change action plan and specific adaptation programs/projects. The Ministry also adopted the CCSP and the CCAP in 2014 through the technical and financial assistance of the Cambodia Climate Change Alliance (CCCA).

Since water is regarded as an important asset for both development and climate change, there is a potential for mixing business-as-usual interventions with climate change resilience interventions. This would present a challenge in designing the M&E framework for adaptation to track the outcome and effectiveness (attribution) of adaptation measures, especially with regards to climate resilience irrigation infrastructure.

16 adaptation actions are proposed in the CCAP, which can be grouped by thematic theme. The cost of the CCAP is estimated at US\$272,500, where a large proportion (about 90%), is allocated for hard measures (see Table 5). It is obvious that construction of irrigation infrastructure is expensive, but it may be more costly if water is not used by intended users in an effective way. Soft measures in the form of capacity building on water use efficiency and management for farmers in general, or for Farmer Water User Committees (FWUC) in particular, can yield better economic returns from the investment, especially as far as climate change is concerned.

The development of the CCAP for MOWRAM is still relatively new as it is the first policy document ever adopted by MOWRAM through the technical assistance of the Cambodia Climate Change Alliance (CCCA). Preparation of the CCAPs in all sector ministries follows a general format provided by the Council of Ministers (see Box 1). Steps for development of the CCAPs are defined based on the general format as per the following (DCC/Bonheur 2014, unpublished presentation):

Situation analysis (policy, climate risks, priority areas)

- Review of existing policies, reports, studies , programs (NSDP, SNC, NAPA, Sector plans, CCCSP, SCCSP, PIP);
- Identification of climate risks and impacts on Sectors; and
- Identification of priority areas for response actions.

Formulation of Actions

- Formulation of strategies based on priority areas;
- Long list of actions based on strategies, guiding definition, and categories;
- Short listing of actions by reviewing actions against climate risks;

Scoring of actions

- 9 indicators for scoring;

Planning Matrix

- Costing of action based on activities, indicative ceiling and CCFF scenario;
- Devising detailed activities for each action to help estimate costings;
- Review of PIP funding;

Action Fiche

- Drafting of the rationale, short description of activities and expected benefits, implementation arrangements, M&E indicators, cost–benefit analysis of actions, review of costing, review overlapping actions, possible funding sources (a time consuming process);
- Merging of some actions;

At the current time, there is no progress report or assessment of its achievement against the proposed actions. Likewise, the proposed indicators of the CCAP have not been followed up.

Box 1: CCAP Format

I. Background

- Policy
- Situation
- Priority Issues

II. Strategies

III. Action plan

- Summary of scope of planning
- Planning matrix
- Implications for expenditure for the Ministry
- Expected benefits from implementation of actions

IV. Management and financing mechanism

- Analysis of existing management and financing mechanism
- Analysis of potential sources and volume for climate change financing
- Entry points for climate change mainstreaming in management and financing mechanism

V. Monitoring and Evaluation

- A selection of up to six impact indicators for inclusion in NSDP monitoring.
- A set of not more than about four indicators of the process of managing the CCAP (e.g. actions funded, expenditure, reference to climate change in PIPs and in budget submissions).
- A list of the action indicators defined in the Action Fiches

VI. Law and Regulations Requirement

Table 5: CCAP of MOWRAM, 2014-18

Thematic Areas	Key Action		Total budget (US\$,000)
	Soft Measure	Hard Measure	
Hydro-Meteorology	Strengthening Climate Information and EWS		5,500
	Capacity building for national and provincial department of water resources for climatic data collection, recording, etc.		3,500
	Improving institutional structure, networking with mass media for public weather and climate forecasting dissemination		5,000
		Installation of gauging station to monitor rainfall, wind speed, storms and sea level rise (4 provinces)	3,500
Irrigation Related Works		Climate risk management and rehabilitation of small, medium and large-scale irrigation infrastructure	200,000
		Promoting innovative irrigation technology structure in areas affected by torrential rain (Mondulkiri, Pursat, Sihanouk)	15,000
	Capacity building and awareness raising on CC and DRR for FWUC		2,000
	Capacity development for irrigation engineers on climate risk management		1,500
		Upscaling mobile pumping stations (20) and permanent stations (10) in responding to mini-droughts	20,000
Flood and droughts		Development and rehabilitation of flood protection dikes (Kampong Trabek, Batheay) for agricultural/urban development	4,000
	Improve capacity for flood and drought forecasting and modelling for technical offices at national and subnational level (ADB) GMS		2,000
		Establishment of national hydrology forecasting centre (ADB)	2,000
	Promoting scientific and comprehensive methods on Ground Water Study in responding to drought and climate risks		2,500
Sea level rise/		Promoting climate resilience of agriculture through building sea dikes in coastal areas	3,000

Thematic Areas	Key Action		Total budget (US\$,000)
	Soft Measure	Hard Measure	
Saline intrusion	Assessment of potential impact of sea level rise, salt water intrusion (Mekong delta and coastal areas)		1,500
Climate change and gender	Promoting gender responsiveness in water management, CC impact and adaptation		1,500
Grand Total	25,000	247,500	272,500

Source: CCAP of MOWRAM 2014

It is important to identify the adaptation priorities at present and in the medium-term future so that adaptation indicators can be meaningfully operationalized. Most of the current key actions of the CCAP may remain relevant in the coming 5 years, but in the immediate short-term, certain actions may get more attention, especially soft actions, such as capacity building in water use efficiency, capacity of FWUCs in maintenance and equitable water distribution, agriculture extension, training of water engineers, establishing effective earlier warning system, and climate information collection and management. There are over a hundred hydro-meteorological stations across the country, but not all are properly maintained and functional to record routine climate data in all provinces (MOWRAM 2014). MOWRAM has the ambitious plan to expand irrigation schemes at 25,000ha per annum, including building fixed and mobile pumping stations and the rehabilitation of existing irrigation structures.

MOWRAM has enjoyed reasonable funding from different sources: Public Investment Programs (PIP), government capital budgets, and development partners. Several large projects are implemented through the funding support of ADB, WB, JICA, AusAid, etc., which can provide lessons and potential adaptation options at present and in the future. Currently, MOWRAM is implementing several adaptation models through a number of SPCR investments as the following:

- i) Enhancement of Flood and Drought Management in Pursat
 - Flood and drought forecasting models and early warning systems;
 - Design standards and guidelines for climate resilient infrastructure;
 - Improved flood protection and water management infrastructure;
 - Community-based disaster risk management system;
- ii) Climate-Resilient Rice Commercialization Sector Development Program
 - Climate resilient irrigation infrastructure;
- iii) Promoting Climate-Resilient Agriculture in Koh Kong and Mondulhiri Provinces
 - 40 rainwater harvesting ponds for 60 ha of home garden crop production;
 - One climate resilient irrigation scheme rehabilitated with a command area of 250ha;
 - 15 km of bioengineered sea barriers with self-closing culverts preventing incursion of saline water during winter high tides benefiting 750 ha;
- iv) Flood-resilient Infrastructure Development in Pursat and Kampong Chhnang Towns
 - Embankment protection for flood control (Kampong Chhnang);
 - Community small-scale infrastructure improvements in pre-identified poor and vulnerable areas in each municipality;

The list of adaptation investments above indicates a large share of CIF investments in the water sector. Therefore, adaptation indicators for this sector must be of a high priority and should be well developed to measure possible adaptation outcomes and effectiveness. MOWRAM has enjoyed relatively good funding from both the government and development partners as indicated in the Public Investment Program 2019-2021 (see Annex 4).

The new possible adaptation options proposed in Table 6 will likely involve a variety of agencies, such as NCDM, MRD and MAFF, with coordination ensuring effective economic returns from irrigation investments, as well as effective operation of the M&E of adaptation. There are no established criteria that have been adopted by the MOWRAM so far although a few points can be proposed for selection of priority adaptation interventions as follows:

- Of high relevance in terms of reducing impacts, reducing exposure and sensitivity, and enhancing resilience capacity;
- Consistent with the high level government policy indicated in the Rectangular Strategy, the NSDP, the CCCSP and the INDC (NDC);
- Responsive to a win-win strategy or no-regret options to meet both sector development goals and the local socio-economic needs while addressing climate change issues at the same time;
- Should have cost-effective budget and institutional capacity for implementation.

Table 6: Possible New Adaptation Actions to complement existing CCAP

Key actions	Possible New Actions	Priority
Hydro-Meteorology		
Strengthening Climate Information and EWS	Climate data collection and database management of Meteorological parameters.	1
Capacity building for national and provincial department of water resources for climatic data collection, recording, etc.	Capacity building of FWUCs on use of Climate Information for CBADRR planning or adaptation response in water sector.	2
Improving institutional structure, networking with mass media for public weather and climate forecasting dissemination		2
Installation of gauging station to monitor rainfall, wind speed, storms and sea level rise (4 provinces)	Proper maintenance of existing stations and ensure climate monitoring coverage for the whole country.	1
Irrigation Related Works		
Climate risk management and rehabilitation of small, medium and large-scale irrigation infrastructure	Climate resilience retrofitting of existing schemes.	1
Promoting innovative irrigation technology structures in areas affected by torrential rain (Mondulkiri, Pursat, Sihanouk)	Alternative crop variety and integrated farming should be considered in the new action.	1
Capacity building and awareness raising on CC and DRR for FWUCs	Capacity building on water use efficiency, maintenance, and climate resilience agricultural extension (integrated farming).	1

Key actions	Possible New Actions	Priority
Capacity development for irrigation engineers on climate risk management		1
Upscaling mobile pumping stations (20) and permanent stations (10) in responding to mini-droughts	Cost benefit analysis of using pumping stations against several crops, and alternative options such as rain-harvest, reservoir/ponds and ground water.	2
Flood and droughts		
Development and rehabilitation of flood protection dikes (Kampong Trabek, Bateay) for agricultural/urban development	Awareness raising and early warning system for FWUC and research or introduction of flood and drought crop varieties, alternative crop to rice (short term rice varieties).	1
Improve capacity for flood and drought forecasting and modelling for technical offices at national and subnational level (ADB) GMS		2
Establishment of national hydrology forecasting centre (ADB)		3
Promoting scientific and comprehensive methods for Ground Water Study in responding to drought and climate risks		3
Climate change and gender		
Promoting climate resilience of agriculture through building sea dikes in coastal areas		1
Assessment of potential impact of sea level rise, salt water intrusion (Mekong delta and coastal areas)		2
Climate change and gender		
Promoting gender responsiveness in water management, CC impact and adaptation		2

Note: 1=high, 2=Medium, 3=low

4.2 Possible Adaptation Indicators

The proposed adaptation indicators are based on their adaptation priority and the possible outcomes that build on the existing indicators listed in the CCAP. The current CCAP adaptation indicators are already well defined to measure activity outputs (see Annex 1), but there is no indicator proposed at the outcome and impact level. As a result, a small number of adaptation indicators for the outcome and impact level are suggested in Table 8 below.

Table 7: Proposed Adaptation Indicators against Adaptation Priority

Key actions	Possible New Actions	Output Indicator	Outcome Indicator	Impact Indicator
Hydro-Meteorology				
Strengthening Climate Information and EWS	Climate data collection and database management of Meteorological parameters.		% population accessible to effective EWS and climate information.	

Key actions	Possible New Actions	Output Indicator	Outcome Indicator	Impact Indicator
Capacity building for national and provincial department of water resources for climatic data collection, recording, etc.	Capacity building on CBADRR planning			
Improving institutional structure, networking with mass media for public weather and climate forecasting dissemination				
Installation of gauging station to monitor rainfall, wind speed, storms and sea level rise (4 provinces)	Proper maintenance of existing stations and ensure climate monitoring coverage for the whole country.			
Irrigation Related Works				
Climate risk management and rehabilitation of small, medium and large-scale irrigation infrastructure	Climate resilience retrofitting of existing schemes.		% of families having access to year-round water supply from irrigation scheme.	Change in livelihoods and poverty rate.
Promoting innovative irrigation technology structure in areas affected by torrential rain (Mondulkiri, Pursat, Sihanouk)			Agricultural areas covered by climate resilience irrigation schemes.	
Capacity building and awareness raising on CC and DRR for FWUC	Capacity building on water use efficiency, maintenance, and climate resilience agricultural extension (integrated farming).	Number FWUCs trained on water use efficiency and maintenance of irrigation canals, and DRR.	% of families or FWUCs increase number of crops due to available irrigated water.	
Capacity development for irrigation engineers on climate risk management				

Key actions	Possible New Actions	Output Indicator	Outcome Indicator	Impact Indicator
Scaling up mobile pumping stations (20) and permanent stations (10) in responding to mini-droughts	Cost benefit analysis of using pumping stations against several crops. Alternative technology may including solar pumping, rain harvesting and changing crop pattern.			
Flood and droughts				
Development and rehabilitation of flood protection dikes (Kampong Trabek, Bateay) for agricultural/urban development	Awareness raising, earlier warning system and DDR plans for FWUC, research or introduction of flood and drought crop varieties, alternative crop to rice.		% of families or areas exposing to drought and flood risks. Number of FWUCs or communes having DRR Preparedness Plans and access to EWS.	Change in loss and damage due to floods and droughts.
Improve capacity for flood and drought forecasting and modelling for technical offices at national and subnational level (ADB) GMS				
Establishment of national hydrology forecasting centre (ADB)				
Promoting scientific and comprehensive methods on Ground Water Study in responding to drought and climate risks				
Flood protection dykes/Sea level rise				
Promoting climate resilience of agriculture through building sea dikes in coastal areas	Introduction or research on saline resistant crop varieties.		Change in agricultural areas free of saline intrusion and sea level rise.	
Assessment of potential impact of sea level rise, salt water intrusion (Mekong delta and coastal areas)			Change in productivity of farming in coastal areas.	

Key actions	Possible New Actions	Output Indicator	Outcome Indicator	Impact Indicator
Climate change and gender				
Promoting gender responsiveness in water management, CC impact and adaptation			% of women headed households or females having access to a year-round water supply	

It is important to note that impact indicators are resource intensive and are often part of the evaluation process which includes both qualitative and quantitative assessment of the project impacts, which can be difficult to measure during project implementation in the context of climate change.

4.3 Operationalization and Data Collection Methods

Following the NRF and best practices, the list of adaptation indicators is summarized in the matrix in Table 9. Each indicator should have a clear definition, baseline, annual, frequency of measurement, method of measurement and source of data. A clear definition can define the nature of a variable or the data and data collection method.

While some indicators have obvious definitions, some indicators need to have good elaboration, e.g. a climate resilient irrigation systems. As climate vulnerability/risk assessment is a prerequisite in the context of climate change, design and construction of climate resilient irrigation systems may need to address several key elements (MOE/DHI, 2013) as follows:

- High overall efficiencies of water-dependent production systems: high output and high value per m³ of water (for example 10,000m³ is required for 1 ha of rice, but other cash crops may have less water requirements and a higher market value).
- Adequate hydraulic feasibility: good structure design and operation.
- Balance between water demand and raw water availability (some schemes may function during the rainy season but become obsolete during the dry period).
- Limited reliance on pumping.
- Adequate drainage.
- Good control of water allocation over time and within the system.
- Limited losses, for the sake of flow capacity and scour control.
- For predictable and reliable water allocation among different needs, river catchment management should be considered. Wetlands are sometimes more productive and fetch more value than draining for agriculture.
- Good access to information about the normal and actual weather.
- Good knowledge about management options, covering both cultivation and water management.

In addition, cost recovery for maintenance and operation should be considered as the cost of irrigation schemes are expensive. MOWRAM already has adopted a regulation to set up Farmer Water User Committees (FWUC) to maintain the secondary and tertiary canals and share the cost of maintenance and operation, which has proven to be an effective cost-sharing practice. Moreover, the climate risk assessment should be conducted and incorporated into the design.

A possible qualitative indicator on climate resilient irrigation schemes can be developed using the above elements with a score value of 1 for each element.

Table 8: Matrix of Adaptation Indicators

Level of Results Framework	Indicator	Definition	Unit	Baselines	Targets	Frequency of Measurement	Source of Data/ Collection Method
Impact	Change in livelihoods and poverty rate.	5 groups of proxy variables can determine the status of livelihoods, namely assets, housing, income, health, and education (MOP).	Poverty index	BAU		Annually	Poverty Index of key variables (assets, housing, income, health expense, and education); IDpoor
	Change in loss and damage.	Areas or productivity is lost or damaged.	Hectare; Ton	BAU		Annually	CAMDI database
	Evidence of improved livelihoods of women headed households.	The poverty index can be determined by computation of 5 groups of proxy variables. (MOP).	Poverty index	No data		5 years	Poverty Index of key variables (assets, income, health expense, and education); IDpoor
Outcome	% population accessible to effective EWS and climate information.	Number of families are aware of or use weather forecasting and climate data through different means.	%	KAP can be the baseline		3 years	Sample survey using statistical sampling method; Knowledge, Attitude and Practices (KAP)
	% of families having access to year-round water supply from irrigation scheme.	Number of families use water from irrigation schemes for year-round farming.	%	No data		Annually	Administrative data; Commune database
	Agricultural areas covered by climate resilience irrigation schemes.	Command areas under climate resilience schemes.	Hectare	No data		Annually	Survey questionnaires; Commune database.
	% of families or FWUCs increase number of crops due to available irrigated water.	Number of families practice more than one crop per year.	%	No data		3 years	Survey questionnaires

	% of areas of crop diversification and integrated farming in the command areas of irrigation schemes.	Number of families practice crops other than rice and integrated farming.	%	No data		3 years	Survey questionnaires
	% of families or areas exposing to drought and flood risks.	Percentage of families used to expose to floods and droughts.	%	CAMDI		Annually	GIS mapping and flood modeling; CAMDI
	Number of FWUCs or communes having DRR Preparedness Plan.	Number of FWUCs or communes with DRR plans.	Number	No data		Annually	Administrative data
	Change in agricultural areas free of saline intrusion and sea level rise.	Areas under sea protection dikes.	Hectare	No data		Annually	Administrative data; Commune database
	Change in productivity in the coastal agricultural areas under sea protection dykes.	Yield per unit area	Ton/ha			Annually	Sampling survey using MAFF method.
	% of women headed households or females having access to year-round water supply.	Number of women headed household use year-round water for farming	Number	No data			Commune database; Sample survey

Note: BAU=Business as Usual Data

VI. Guidance on Development of Adaptation Indicators for integration in MAFF CCAP

Based on a new approach and with a change in scope and pace, the Royal Government's vision is to modernize Cambodia's agriculture sector to transform this sector from an extensive stage of development, i.e. primarily depending on an expanded use of available resources (such as land and other natural resources) and traditional agricultural inputs, into an intensive stage of development that primarily depends on the application of techniques, new technologies, R&D, mechanization and an increased irrigation capacity to improve productivity and diversify into high value crops and other agricultural products. This will include livestock farming and aquaculture while taking into account the need to ensure efficient management of land and sustainability of the environment and natural resources. Moreover, further promotion of commercialization and agro-industry development will increase added-value of agricultural products and the income of people.

There are five sub-sectors that fall within the jurisdiction of MAFF, namely agriculture, animal production, fisheries, forestry, and rubber and all are dependent on water for growth. These assets are controlled by a large pool of stakeholders, such as MAFF, private investors, community-based organizations (FiC, FC, FWUC) and households. It is obvious MAFF relies largely on water supply and irrigation systems built by MOWRAM. Therefore, MAFF needs to work closely with MOWRAM to design irrigation infrastructure in a coordinated manner. Concerning climate change responses, MAFF is responsible for both mitigation and adaptation, yet this guidance is only focused on the M&E framework for adaptation.

5.1 Analysis of MAFF Sector Plan and Adaptation Priorities

Over the last decade, the Cambodian agricultural sector has played an important role in reducing poverty, generated employment for rural people, contributed to national development goals and regional market integration. However, this sector is sensitive to on-going climate change mainly due to the fact that the majority of its main production areas are dependent on rainfall and seasonal flood plains associated with the Mekong and its tributaries.

The Cambodian floodplain supports a diverse rice-based farming system, where the different cropping patterns for rice depend on flood duration and receding waters. In this ecosystem, investments in agricultural intensification have developed or rehabilitated irrigation areas. Between 2001 and 2010, the harvested area of dry season rice increased by 5% per annum to 404,800 ha. Other commercial crops such as maize, soya or cassava, are increasingly important but mostly rainfed (ICEM and DAI 2018).

Cambodian agriculture is extremely vulnerable to climate change. Below is the summary of projected impacts on crop productivity (IPCC, 2014):

- Increase in temperature can reduce yield: the yield of rice decreases by 10% for every 1°C increase in the minimum temperature during the growing season (CCCSP, 2013).
- Increase in pest and diseases, due to a longer growth cycle, warmer winters, higher growth rates of pathogens and increased weeds due to an increase in CO₂.
- Fertilization effects of increased CO₂: plants can react with increased vegetative growth, but the response varies according to the plant species and nitrogen being the main limitation factors.

- Increases in water demand: due to higher temperatures inducing higher evapotranspiration. Irrigation demand in semi-arid regions of Asia is estimated to increase by at least 10% for each 1°C rise in temperature (Fischer et al. 2002).
- Increases in incidences of extreme events with aggravate flooding.
- Seas level rise and saline water intrusion will reduce viable crop areas in the Mekong Delta, with flooding in the tidally influenced areas and increased areas affected by saline water intrusion (1.4 M ha today).
- Changes in rainfall patterns. Predictions suggest that wet seasons will be shorter but with higher levels of rainfall, while the dry seasons will be longer and drier. This will result in shifts in the distribution of rainfall between areas. The changes to the length of seasons, combined with the delayed onset of the wet season after a longer dry season, will affect traditional cropping practices.
- Increases in floods and droughts.

In response to potential impacts on the agriculture sector, MAFF has adopted the Agriculture Sector Strategic Development Plan 2014-18 (ASSD), (MAFF 2015), the Climate Change Strategic Plan 2014-18 (MAFF 2013), and the Climate Change Action Plan 2014-18 (MAFF 2013), which complement each other to fulfill their goals. Agriculture is considered the most important sub-sector in terms of investment and growth values. The ASSD has the overall goal of increasing agricultural growth at around 5% per annum through the implementation of 5 specific programs as follows:

1. Enhancement of Agricultural Productivity, Diversification and Commercialization;
2. Promotion of Animal Health and Production;
3. Sustainable Fishery Resources Management;
4. Sustainable Forestry and Wildlife Management; and
5. Strengthening Institutional Capacity, Enhancing Efficiency of Supporting Services and Human Resources Development.

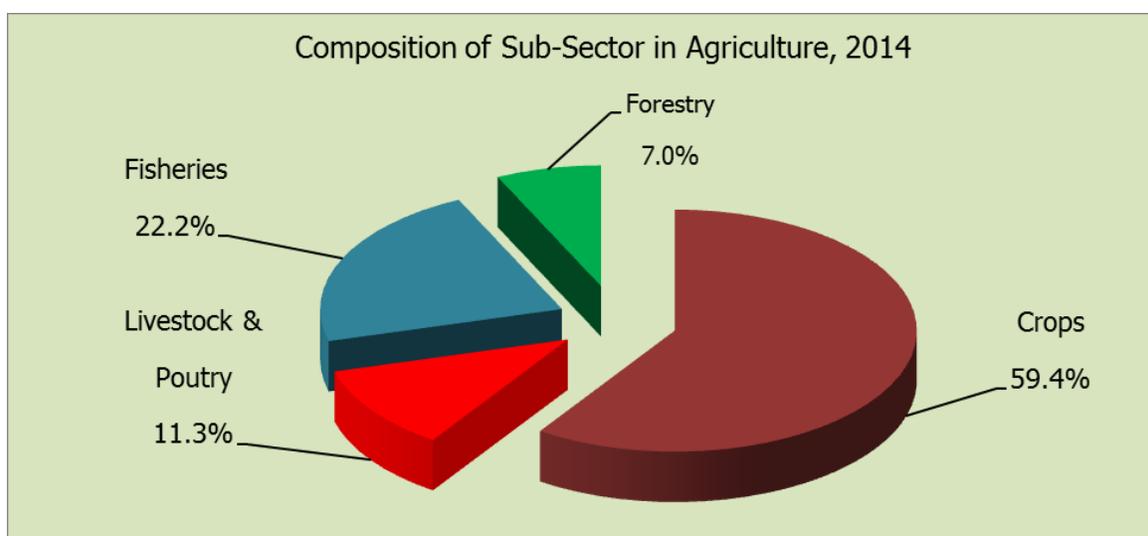


Figure 3: Composition of Sub-Sector in Agriculture, 2014

The agriculture and animal production programs are considered high priorities in the context of sector growth and climate change adaptation. Fisheries and forestry are also important to contribute to food security, but they do not have a big share in terms of present and future climate investments. Table 10 and 11 provide a snapshot of potential growth and possible areas for climate change intervention in terms of specific actions. The share of crops (agriculture) accounts for nearly 60% of overall MAFF revenue generation (Figure 4).

Table 9: Baselines and targets for agricultural productivity program

Indicator	2014	2015	2016	2017	2018
Areas under all type of crops (million ha)	4.81	5.02	5.23	5.44	5.65
Rice yield (ton/ha)	3.17	3.18	3.21	3.23	3.25
Rice surplus (million ton)	5.24	5.41	5.6	5.79	6.0

Source: ASSD 2015.

Table 10: Baselines and targets for animal production

Indicator	2014	2015	2016	2017	2018
Animal production (million head)	35.86	36.93	38.03	39.17	40.34
Rate of vaccinated animals (%)	10	12	15	17	20

Source: ASSD 2015.

The strategic framework for climate change is proposed in the CCAP as follows:

- To ensure food security and farmers' livelihood improvement through an increase in agro-industrial crop production at 10% per year. To enhance development, the use of appropriate technology, renewable energy, the effective use of water, adaptation and mitigation will be promoted.

- To increase livestock production by 3% per year through health system improvement and to reduce emissions from animal waste.
- To enhance sustainable forest management through reforestation that reduces emissions from forest degradation and deforestation, to obtain carbon credit, to enhance the local community whose livelihoods depend on forestry, and to regain 60% forest cover by 2030.
- Enhance management, conservation and development of fishery resources in a sustainable way through capacity building and actively participating in dealing with climate change impacts at the local level, national level and the trans-boundary Mekong flood plain.

Rice surplus continues to grow (Table 10), yet the rice export target of 1 million ton by 2015 has not been achieved. This has potentially happened for a number of reasons, namely poor quality (e.g. European Commission brings down the maximum residue on Tricyclazole) and unstable production targets. Agriculture's contribution to GDP has experienced a decline over the last five years (Figure 5) despite increased production in the sub-sectors. Animal production is also steadily growing, but the low proportion of vaccinated animals indicates possible exposure to disease outbreaks, especially in the event of frequent changes in climate variables. Possible adaptation options in animal production may include outcrossing breeding, improved sanitation and vaccination. All these have been successfully piloted by one of the Community-Based Adaptation Projects supporting CSO mechanisms funded by ADB (PI, 2018).

Table 11: MAFF's BAU Key Indicators

No	Key Indicator, NSDP	Unit	Baselines	Targets				
			2013	2014	2015	2016	2017	2018
1	All agriculture areas	million ha		4.81	5.02	5.23	5.44	5.65
1	Cultivated area (paddy)	million ha		3.1	3.15	3.2	3.28	3.34
2	Yield	ton/ha		3.15	3.18	3.21	3.23	3.25
	Rice production	Million ton		9.76	10.01	10.28	10.56	10.85
	Rice surplus	Million ton		5.24	5.41	5.60	5.79	8.00
	% Vaccinated animal	%		10	12	15	17	20
	Animal production							

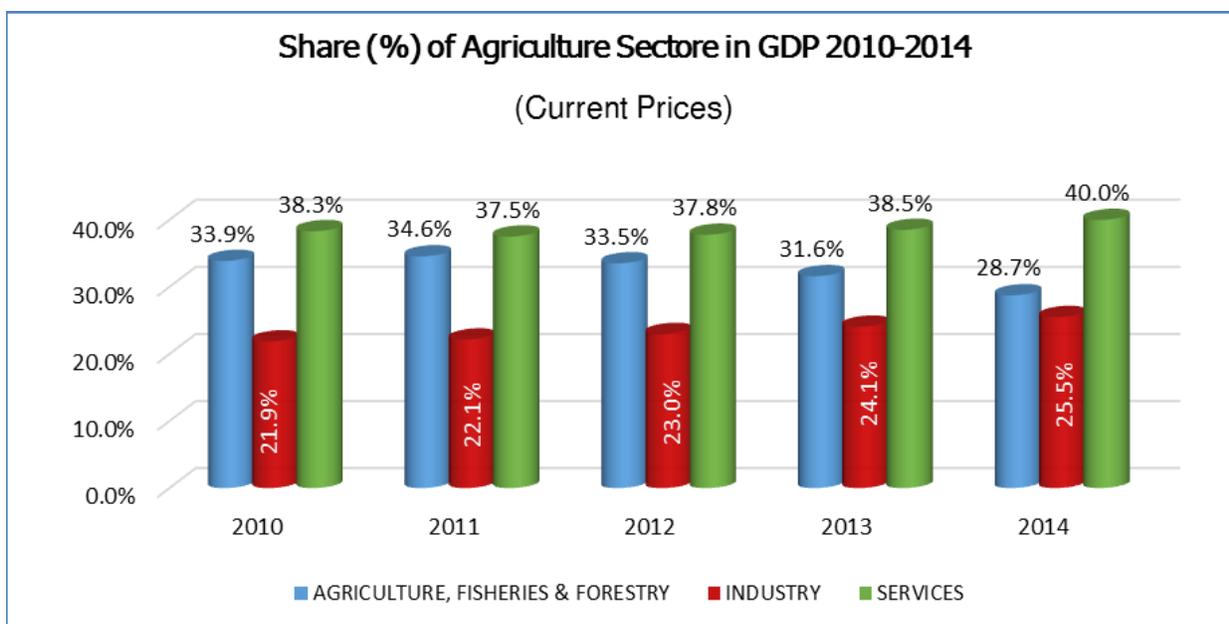


Figure 4: Share (%) of Agriculture Sector in GDP 2010-2014 (Current Prices)

According to ADB (ADB 2012), adaptation options in the agriculture sector can include engineering options or hard measures (climate proof drainage and irrigation, water storage structure, post-harvest infrastructure, such as drying, storage and packaging facilities, etc.), non-engineering options or soft measures (e.g. changes in cropping patterns, soil, landscape, water management and conservation techniques, organic farming techniques, and training on integrated farming, etc.), and biophysical options (e.g. introduction of new climate resilient crop varieties, integrated pest management, etc.). The sector in fact depends on climate resilient water supply systems that secure water availability for farming during periods of water stress and also provides a means for flood control and drainage of the excess water from the crop fields during the flooding.

Table 12: Adaptation Strategies of MAFF CCAP

Thematic Areas	Adaptation Strategies/Response			Cost estimate (M\$)
	Engineering Options	Non-engineering Options	Biophysical Options	
AGRICULTURE AND AGRO-INDUSTRY		Promoting and up-scaling climate smart farming systems resilient to climate change		13.47
	Promote post-harvest technology for cereal crops and tuber crops, and conduct the research and transfer appropriate post-harvest technology			3.5
			Develop crop variety suitable to AEZ	13.38

Thematic Areas	Adaptation Strategies/Response			Cost estimate (M\$)
	Engineering Options	Non-engineering Options	Biophysical Options	
			resilient to climate change (include coastal zone)	
		Promote research work on appropriate climate smart agriculture technology/ techniques to adapt and mitigate climate change		18.77
		Development of knowledge and information systems on climate change		2.6
		Institutional Capacity Development for natural disaster coordination and intervention		0.70
		Strengthening capacity of Agricultural and Agro-industry development entrepreneurs and the agricultural cooperative in low carbon production.		1.55
Sub-total				53.97
RUBBER SECTOR		Promoting, piloting and scaling up rubber clones from an IRRDB (International Rubber Research Development Board) member country in responding to climate change		1.97
			Promoting new rubber clone trial	2.9
			Established Experimental networking sites and develop growth, yield, biomass, and carbon stock within existing rubber plantation in five AEZs	1.52
		Modifying existing Agricultural Good Practice (GAP) through additional training to technical staff related to climate change		0.35
		Promoting an integrated approach in efficiency		0.25

Thematic Areas	Adaptation Strategies/Response			Cost estimate (M\$)
	Engineering Options	Non-engineering Options	Biophysical Options	
		energy and inputs used in latex and rubber wood production		
Sub-total				6.99
LIVESTOCK SECTOR		Promoting resilience in animal production and adaptation to climate change (technical package)		8
		Enhancing animal waste management and climate change emission mitigation		6.50
			Promoting and enhancing technology development of the improvement of animal breeds, animal feed, and animal health to adapt to climate change	11
Sub-total				25.55
FORESTRY SECTOR		Promoting sustainable forest management		2.25
	Promoting reforestation and afforestation to increase carbon stock			8.20
		Conducting capacity development, research and awareness raising on REDD+		1.60
		Developing and implementing regulations and mechanisms on REDD+		2.25
		Building climate resilient capacity in the forestry sector		2.10
Sub-Total				16.4
FISHERY SECTOR		Promoting aquaculture production systems and practices that are more adaptive to climate change		3.40
		Promoting climate resilience of wild fishery resources		1.30

Thematic Areas	Adaptation Strategies/Response			Cost estimate (M\$)
	Engineering Options	Non-engineering Options	Biophysical Options	
		Enhancing the climate resilience in the fishery sector (ECRF)		3
		Promoting aquaculture production systems and practices that are more adaptive to climate change		3
Sub-total				10.70
CROSS-CUTTING ISSUES		Mapping of agricultural production (rubber, livestock, forestry and fisheries) and of land use		19.40
		Developing and using integrated socio-economic and climate scenarios with climate, and land use models and establishment of Carbon Accounting Systems for agriculture, forestry and fisheries		7.85
		Institutional Mainstreaming Climate Change Adaptation by building capacity and scaling up community resilience		30.99
		Promote marginalized groups and women's participation to climate change adaptation and mitigation strategy		5.75
		Enhance knowledge management related to climate change adaptation and promote innovation that is needs based		10
Sub-total				73.99
Grand Total	11.7	147.05	28.8	187.55

Similar to MOWRAM, development of the CCAP of MAFF follows the same format and steps. MAFF's CCAP contains a large number of indicators and almost all of them have not been operationalized. There is no evaluation report of the CCAP.

Analysis of adaptation actions of the CCAP, SPCR Adaptation Investments and lessons from adaptation intervention elsewhere can help pinpoint adaptation priorities in the four sub-sectors of MAFF as

presented in Table 13 although it should be noted that GHG mitigation actions are removed from the list since this guidance focuses only on adaptation indicators.

MAFF is one of the key implementing agencies responsible for implementation several climate related projects funded by various sources as listed below.

- Climate-Resilient Rice Commercialization Sector Development Program (SPCR)
 - Weather-indexed crop insurance scheme in three provinces (Battambang, Kampong Thom, and Prey Veng)
 - Laser Land leveling to improve water-use efficiency.
- Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE) is funded by the RGC and IFAD aiming for “Reduced Poverty and Increased Resilience of Poor and Vulnerable Smallholder Farmers in Cambodia”. It has four components as follows:
 - Evidence-based policy;
 - Capacity development for extension;
 - Improved extension services; and
 - Infrastructure supporting climate resilient agriculture.
- Strengthening Resilient Livelihoods Project is funded by UNDP with the objective to reduce the vulnerability of Cambodian rural livelihoods through enhanced sub-national climate change planning and execution of climate smart agriculture, rural livelihood development/resilient irrigation, and rural water supply services.
- Boosting Food Production Program (BFP). BFP is a government financing program fully funded by MEF with an implementation period 2016-2019 in the first phase. BFP has two main objectives: i) Increased productivity of aromatic rice seeds; and ii) Boosting productivity of vegetables with more completeness and safety.
- Climate Friendly Agribusiness Value Chains Sector Project will be financed by the Green Climate Fund through ADB. The project concept has been approved and the full proposal is under development.

Some thoughts are elaborated on several potential adaptation options and its climate adaptation relevance and their benefits below.

Climate Smart Agriculture (CSA) is often discussed and brought to attention as one of the priority adaptation models in the agriculture sector, but there seems to be more discussion of theory than practical interventions. The terms “Smart” can be understood as the utilization of professionalized knowledge on various aspects of agriculture development that are currently not broadly practiced or understood by current farming practitioners, such as farming techniques, production systems, knowledge of water management, understanding of soils and the bio-physical requirements of various crops. According to FAO (FAO 2013), CSA consists of three main pillars as follows:

- a) Sustainably increasing agricultural productivity and incomes;
- b) Adapting and building resilience to climate change;
- c) Reducing and/or removing greenhouse gases emissions where possible.

Each pillar comprises many elements and practices dealing with a wide range of agricultural technologies, resource use efficiency, farming techniques, green concepts, and water management, including landscape

and natural resource management. It requires an integrated approach responsive to the local socio-economic and environmental conditions and potential climate change impacts. This means that capacity building and extension services must be well established at different levels, especially in the rural areas where they are most needed. Climate data and earlier warning systems should be accessible for the proper planning of climate smart agriculture.

Integrated farming is considered more resilient to change in climate variables. The basic concept is to maximize the use of resources within the system by a combination of several farming techniques, e.g. rice farming with aquaculture, chicken farming with aquaculture, etc. New research from Africa on the impacts of climate change on production systems (monoculture and integrated farming) by the European Commission (UNEP, 2011) identified that in response to climate change integrated farming has significant advantages in regards retention of profits compared to predictions that profits from monoculture will fall by as much as 75 per cent by 2060. In Cambodia, integrated farming is practiced, such as rice-field fisheries, have resulted in good yields. It is considered more resilient partly because some fish species, such as carps and tilapias, can be raised in rice fields during the raining season encouraging diversification that brings greater economic resilience in the face of climate shocks.

Crop Diversification (CD) is defined as the practice of growing different crops in a given farming area. CD is considered an adaptation option (Vernooy R. 2015) to increase the agricultural resilience capacity of the community. CD also allows for better economic return per dollar and labor inputs compared to traditional rice crops. According to the World Bank study (WB, 2015), in 2013 the average farm’s gross margins were \$506/ha (\$9.4/day) for cassava, \$303/ha (\$8.8/day) for maize, and \$1,393/ha (\$7.2/day) for vegetable production, compared to \$245/ha (\$4.6/day) for wet season rice and \$296/ha (\$9.6/day) for dry season rice. Crop diversification should be addressed as part of climate resilient irrigation design so that costs and benefits can be assessed against irrigated rice, which requires about 10,000 m³ of water per hectare of crop.

Short-term rice varieties are proven well adapted to climate change as statistics have revealed less damage compared to long-term rice paddy. During a short discussion with commune councils of Phteh Rong commune in Pursat and Wat Tamoem commune in Battambang, about 70-80% of farmers grow short-term rice varieties (Pkar Romdoul, Rangchey, IR66, Chulsar, Sen kraa Ob, Ka14 and Kha15) introduced by CARDI (MOP Field Report, 2018). Such trends can be a basis for designing an adaptation indicator to track outcome and impacts.

Table 13: Adaptation Priorities

PRIORITIES STRATEGIES BY COMPONENTS			
Proposed Actions by CCAP		Possible New Adaptation Actions	Priority
AGRICULTURE AND AGRO-INDUSTRY			
1	Promoting and scaling-up climate smart farming systems that are resilient to climate change		1
2	Promote post-harvest technology for cereal crops and tuber crops, and conduct research and transfer appropriate post-harvest technology	Climate resilient post-harvest technology and infrastructure for improved rice commercialization and export.	1

PRIORITIES STRATEGIES BY COMPONENTS			
Proposed Actions by CCAP		Possible New Adaptation Actions	Priority
3	Develop crop variety suitable to AEZ resilient to climate change (include coastal zone)	Research on drought and saline resistant rice varieties.	1
4	Promote research work on appropriate climate smart agriculture technology/ techniques to adapt and mitigate climate change	Possible options related to integrated farming, crop diversification, and energy and water use efficiency.	1
5	Development of knowledge and information system on climate change		1
6	Institutional Capacity Development for natural disaster coordination and intervention		3
LIVESTOCK SECTOR			
7	Promoting resilience in animal production and adaptation to climate change (technical package)		2
8	Promoting and enhancing technology development on the improvement of animal breed, animal feed, and animal health to adapt to climate change	Climate resilience animal production (breeding, vaccination, feed production, and sanitation)	1
FORESTRY SECTOR			
9	Building climate resilient capacity in forestry sector	Enhancing forest fire control and capacity building of forestry community organizations on CBADRR	1
FISHERY SECTOR			
10	Promoting climate resilience of wild fishery resources	Reforestation of flooded forest and mangroves, and promoting capacity building of Fishery Community Organizations on CBADRR	1

Note: 1=high, 2=Medium, 3=low

Note: Criteria for selection of adaptation measures are almost similar to that of MOWRAM.

5.2 Possible Adaptation Indicators

The adaptation indicators are proposed to measure results of the adaptation priorities listed in Table 15. As with water resources, it is also important to understand and distinguish the business-as-usual agriculture from the climate adaptation and resilient agriculture.

Table 14: Possible Adaptation Indicators

Thematic Sub-sector	Adaptation Actions by CCAP	New Adaptation Actions	Outcome Indicator	Impact Indicator
AGRICULTURE AND AGRO-INDUSTRY				
	Promoting and scaling-up climate smart		Number of model farmers with	

Thematic Sub-sector	Adaptation Actions by CCAP	New Adaptation Actions	Outcome Indicator	Impact Indicator
	farming systems that are resilient to climate change		knowledge of climate smart agriculture and integrated farming	Change in livelihoods and poverty rates
	Promote post-harvest technology for cereal crops and tuber crops, and conduct research and transfer appropriate post-harvest technology	Climate resilient post-harvest technology and infrastructure for improved rice commercialization and export. (GCF)	Areas or % of farmers adopting climate resilient rice varieties (short-term)	Change in loss and damage in the areas of adaptation intervention
	Develop crop varieties suitable to AEZ resilient to climate change (include coastal zone)	Research on drought and saline resistant rice varieties.	% of farmers having access to crop-insurance schemes	
	Promote research work on appropriate climate smart agriculture technology/ techniques to adapt and mitigate climate change	Possible options related to integrated farming, crop diversification, and energy and water use efficiency.	% of areas covered by crop diversification and smart/integrated farming in the command areas of irrigation schemes.	
	Development of knowledge and information systems on climate change	Index crop-insurance		
	Institutional Capacity Development for natural disaster coordination and intervention			
LIVESTOCK SECTOR				
	Promoting resilience in animal production and adaptation to climate change (technical package)		Number of farmers trained on climate resilient animal production. (output)	
	Promoting and enhancing technology development of improvements in animal breeds, animal feed, and animal health to adapt to climate change	Climate resilient animal production (breeding, vaccination, feed production, and sanitation)		
FORESTRY SECTOR				
	Building climate resilient capacity in forestry sector	Enhancing forest fire control and capacity building of forestry community organizations on CBADRR	% of FCs trained on CBADRR (output)	
FISHERY SECTOR				

Thematic Sub-sector	Adaptation Actions by CCAP	New Adaptation Actions	Outcome Indicator	Impact Indicator
	Promoting climate resilience of wild fishery resources	Rehabilitation of flooded forest and mangroves, and capacity building of Fishery Community Organizations on CBADRR	% of FiCs trained on CBADRR (output)	

Development of indicators must consider all possible outputs and outcomes resulting from various adaptation elements. However, too many indicators would become cumbersome and costly for operation. Agencies may need to prioritize the indicators based on capacity, size of investments and adaptation priority.

5.3 Operationalization and Data Collection Methods

MAFF has established two databases: AGRISTAT and AMIS that contain many indicators, some of which are related to climate change. A set of normal indicators has been integrated in the NSDP (Annex 1), and these can serve as the entry points for adding new adaptation indicators (Table 16). The new adaptation indicators can be added to the existing database without creating a new one, but data collection methods should be clearly defined to ensure the quality of the collected data.

Table 15: Matrix of MAFF Adaptation Indicators

Level of Results Framework	Indicator	Definition	Unit	Baselines	Targets	Frequency of Measurement	Source of Data/ Collection Method
Impact	Change in livelihoods and poverty rate as a result of increased productivity.	5 groups of proxy variables can determine the status of livelihoods, namely assets, housing, income, health, and education (MOP).	Poverty index	No data		Annually	Poverty Index of key variables (assets, housing, income, health expense, and education); IDpoor
	Change in loss and damage.	Areas or productivity lost or damaged.	Hectare; Ton	CAMDI		Annually	CAMDI database
Outcome	Number of model farmers with knowledge of climate smart agriculture and integrated farming	Number of farmers applying climate smart agriculture techniques.	%	No data		3 years	Sample survey using statistical sampling method; Commune database
	Areas or % of farmers adopted climate resistant rice varieties	Number of families use water from irrigation schemes for year-round farming.	%	No data		Annually	Administrative data; Commune database
	Number of farmers with access to weather crop-insurance	Number	Number	No data		Annually	Administrative data
	% of areas under crop diversification and smart/integrated farming in the command areas of irrigation schemes.	The irrigated land integrated farming and crop diversification.	%	No data		Annually	Sample survey; Commune database; Administrative data
Output	Number of farmers trained on climate resilience animal production.		Hectare	No data		Annually	Survey questionnaires; Commune database.
	% of FCs trained on CBADRR		%	No data		3 years	Administrative data

	% of FiCs trained on CBADRR		%	No data		3 years	Administrative data
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VII. Guidance on Development of Adaptation Indicators for integration in MRD CCAP

Overarching rural development is addressed by several sectors, especially water resources, rural agriculture, health and sanitation, rural water supplies and rural roads. All are vulnerable to climate change impacts and hazards. Given a large proportion of Cambodia's population live in rural areas (80%), rural development is given great attention in the NSDP aligning with the pending localization of the Sustainable Development Goals as it can play a significant role in poverty alleviation, the promotion of better living standards and development of capacity to reduce the vulnerability of rural populations to economic and climate related shocks. In this regard, the Ministry of Rural Development's (MRD) mission is to promote the improved quality of rural living standards and the reduction of poverty through the implementation of key strategic programs related to water supply and sanitation, rehabilitation and construction of rural roads, small-scale irrigation, and community economic development.

6.1 Analysis of Sector Plan and Adaptation Priorities

MRD has adopted several Strategic Plans for development of its key sub-sectors, including climate change response, to meet the needs of rural public services. In 2007, The Ministry adopted a Strategic Plan for Rural Roads and in 2012 a National Strategy for Rural Water Supply, Sanitation and Hygiene 2011-2025 (NSRWSSH). The NSRWSSH set out key strategic objectives (MRD 2012) as follows:

- **Water Supply:** 50% of the rural population will have access to improved water supply by 2015, and 100% by 2025.
- **Sanitation:** 30% of the rural population will have access to improved sanitation and live in a hygienic environment by 2015, and 100% by 2025.
- **Hygiene:** 30% of the rural population will practice basic safe hygiene behavior by 2015, and 100% by 2025.
- **Enabling environment:** By 2015, institutional arrangements, legal instruments and human resources will be in place and able to rapidly increase and sustain services.
- **Financing:** Funding for capital and recurrent expenditure will be available.

The NSRWSSH provides ambitious goals and targets which become common indicators for the national and sub-national levels. For example, indicators on safe drinking water supplies and sanitation are collected by the provincial line departments via commune and district councils. Provision of safe drinking water supply is considered an important adaptive capacity to cope with climate change impacts, especially in the event of disasters. As of 2016, about 50% and 40% of the population has access to improved water supplies and sanitation respectively, but there is still a large gap in access to improved water supply when comparisons between rural and urban areas are made.

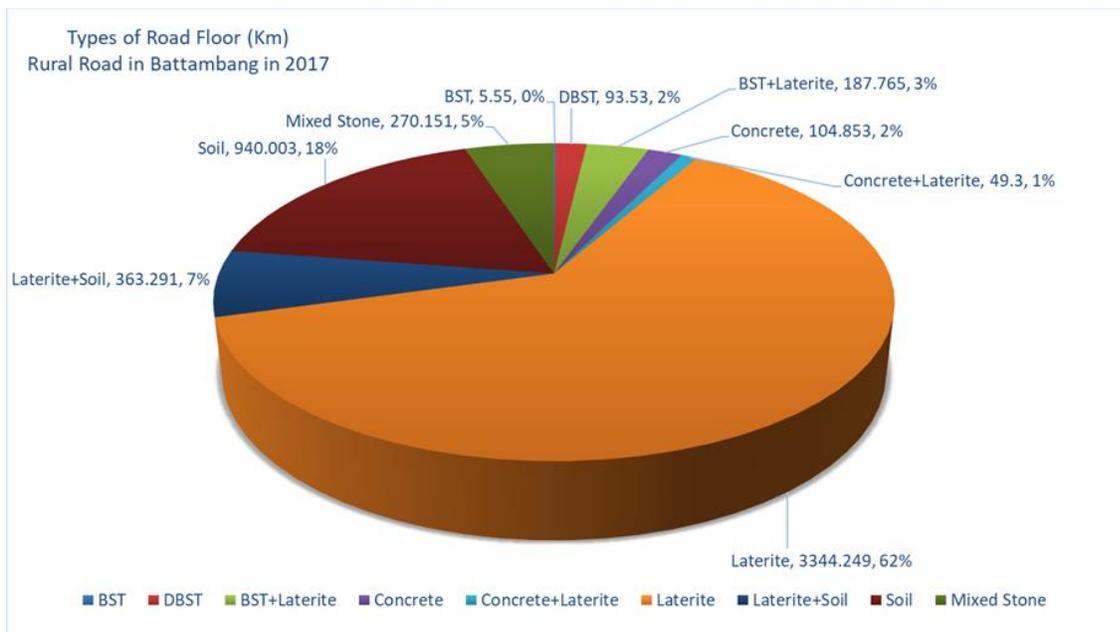


Figure 5: Type of Rural Roads in Pursat

Rural road rehabilitation is a development priority for MRD, and it is also an important sub-sector highly vulnerable to climate change impacts. As of 2015, the total length of rural roads total 41,825 km recorded by MRD’s road inventory database (www.mrd.gov.kh). This is classified into four categories in terms of type of pavement: earthen road, laterite, bituminous surface treatment and double bituminous treatment (DBST), and concrete pavement with a large proportion (95%) of roads being laterite. Laterite and earthen roads are easily degraded and washed away by heavy rain and runoff, therefore they are not considered resilient in the context of climate change. The Ministry has the ambitious plan to upgrade those roads to bituminous roads, but funding shortages remain a constraint to achieve the targets (Table 17).

Table 16: MRD Indicators presented in NSDP

No	Key Indicator, MRD	Unit	Baselines	Targets				
			2013	2014	2015	2016	2017	2018
1	Rehabilitation of Rural Roads – out of total 40,000km	Km	26,900	28,600	29,450	30,300	31,150	32,000
2	Rural road covered with double bituminous surface treatment (DBST) or concrete		125	550	980	1,430	1,880	2,330
3	Access to Improved Drinking Water - % of Rural Population		44.2	46.7	50	53	56	60
4	Access to Sanitation – % of Rural Population		37.5	42	46	50	55	60

Source: NSDP 2014-18

The Ministry adopted the Climate Change Strategic Plan comprising four strategic priorities with a total cost of US\$323 million.

- **Strategic Priority #1:** Creating policies and study profiles to make rural infrastructure development (roads, irrigation schemes, wells, ponds and bridges) resilient to climate change. (Policy design for quality-based rural infrastructure against extreme climate events.)
- **Strategic Priority #2:** Support adaptation to climate change through creating local business opportunities that focus on micro-credit provisions for socioeconomic development. The increase of families' income from local businesses will create preparedness to compensate for the loss of income during flood and drought periods. (Policy design and project implementation.)
- **Strategic Priority #3:** Support resilience to climate change through strengthening the quality of rural infrastructure (roads, irrigation, wells and culverts) to be resilient to flood and drought. (Pilot project implementation.)
- **Strategic Priority #4:** Support adaptation to climate change through increasing rural awareness of the concepts of climate change and response/adaptation options. To provide capacity development to village development committee members on climate change adaptation and mitigation options, and to use other scientific knowledge that can be adapted for use by local people. (Primary health care, water sanitation, dissemination of research results and community development.)

The MRD's CCAP identifies 10 actions, some of which are implemented through projects (Action 5 and 9), with cost estimates as summarised in Table 18.

Table 17: Adaptation Actions of MRD

MRD Actions		Cost, US\$000
1	Mapping vulnerable rural infrastructure (road, water supply facilities) in provinces with high risk of climate change.	400
2	Developing adaptation options and guidelines to improve climate change resilience of rural infrastructure	500
3	Build awareness and capacity at national and sub-national level for mainstreaming climate change into rural development planning processes.	2,500
4	Scale up microfinance to support GHG mitigation and reduce climate change impacts in vulnerable areas (currently 3 provinces)	4,000
5	Carry out risk assessments and management for the improvement of water supply and sanitation (WATSAN) in the Tonle Sap Great Lake provinces.	8,500
6	Build capacity on climate proofing rural infrastructure design, construction and maintenance for civil engineers (250) at national and sub-national level	600
7	Raising awareness of climate change for Village Development Committees (VDCs)	5,500
8	Pilot community-based climate change adaptation for VDCs in the Cambodian Mekong Delta (Takeo, Svay Rieng, Prey Veng).	4,000
9	Climate proofing Mekong river islands' connectivity (roads and jetties).	30,000

10	Climate-Proof Tertiary-community Irrigation Development to enhance agricultural production of paddy field in four communes of a Mekong Delta Province.	530
	Grand Total	56,530

Source: CCAP 2014-18, MRD

Adaptive capacity building and awareness raising on climate change impacts, construction of climate resilient water supply and sanitation, and construction of climate resilient roads can be of high adaption relevance and will continue to be significant in the next 5 years. It is important to identify the key distinction between business-as-usual rural development and the climate resilience development, whether it be roads or water supplies. The common climate risks are associated with floods and droughts (NAPA, 2006), and, therefore, a Vulnerability Risk Assessment (VRA) is a tool to incorporate climate risks into the design so that the assets can be more climate resilient. For roads to be resilient (ADB Guidelines, 2011), the design must at least consider four interrelated components: i) increased road height above flooding level and drainage with improved bridges and culverts; ii) improved road surfaces with better construction materials, such as DBST or concrete treatment; iii) bio-engineering measures (planting grass or trees at base of the road); and iv) regular road maintenance/asset management. MRD has a plan to transform all rural roads to bituminous as such it can make roads more resilient to flooding. Concerning safe drinking water supplies, rain-harvest tanks and protected wells are considered safe⁴ for drinking if appropriately operated and maintained. Climate resilient, improved, protected wells are those that are not submerged during flooding and have water during the dry season. The same is applied to hygiene latrines equipped with septic tanks and are not flooded during flooding.

Similar to MOWRAM, development of the MRD's CCAP follows the same format and steps. The MRD's CCAP contains some indicators of relevance to adaptation and are integrated in the NSDP. There is no evaluation report of the CCAP.

Future adaptation options for MRD still have a focus on the provision of safe drinking water supplies and sanitation, and incorporating climate proofed designs into rural road infrastructure. Other resilient rural livelihoods and community-based emergency management are often implemented in collaboration with other sector departments such as agriculture, water resources and health. For piped water supply systems, the Ministry of Industry and Handicraft (MIH) is responsible for the provision of safe drinking water supply. These systems are considered more resilient to climate change than wells or ponds, particularly in regards the hygienic nature of the water and the water source's sustainability.

MRD is implementing several climate adaptation projects consistent with the CCAP with the most relevant below:

- i) Tonle Sap Water Supply and Sanitation Project Phase II (ADB)
- ii) Rural Roads Improvement Project Phase II (ADB)
 - 240 km of rural roads, including 193.9 km in Tboung Khmum and 50 km in the five Mekong River islands, rehabilitated to climate-resilient conditions;
 - 11 jetties with climate resilient standards rehabilitated or developed;

⁴ Meeting the drinking water quality parameters set out by the MIME (2011) National Drinking Water Quality Standards and Guidelines - DRAFT

- Community-based emergency management systems established.

6.2 Possible Adaptation Indicators for MRD's CCAP and the NSDP

The proposed adaptation indicators (Table 19) are also based on the adaptation priorities now and in the near future, especially at the outcome and impact level of the NRF. They are based on existing indicators proposed under the CCAP and the NSDP with adjustments to incorporate the adaptation.

Table 18: Possible Adaptation Indicators

No	Adaptation Priority	Adaptation Indicators	
		Outcome	Impact
1	Mapping vulnerable rural infrastructure (road, water supply facilities) in provinces with high risk of climate change.	% of families having access to safe drinking water supplies from protected wells and rain harvest tanks	% of families with improved livelihoods or poverty rate
2	Developing adaptation options and guidelines to improve climate change resilience of rural infrastructure		
3	Build awareness and capacity at national and sub-national level for mainstreaming climate change into rural development planning processes.		
4	Scale up microfinance to support GHG mitigation and reduce climate change impact in vulnerable areas (currently 3 provinces)		
5	Carry out risk assessment and management for the improvement of water supply and sanitation (WATSAN) in the Tonle Sap Great Lake provinces.		
6	Build capacity on climate proofing rural infrastructure design, construction and maintenance for civil engineers (250) at national and sub-national level		
7	Raising awareness of climate change for Village Development Committees (VDCs)		
8	Pilot community-based climate change adaptation for VDCs in the Cambodia Mekong Delta (Takeo, Svay Rieng, Prey Veng).		
9	Climate proofing Mekong river islands' connectivity (roads and jetties).		

10	Climate-Proof Tertiary-community Irrigation Development to enhance agricultural production of paddy field in four communes of Mekong Delta Province.		
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Source: CCAP 2014-18, MRD

6.3 Operationalization and Data Collection Methods

MRD has developed a long list of adaptation indicators for the CCAP and has integrated several indicators into the NSDP 2014-18. Table 20 provides a number of adaptation indicators that can measure possible outcomes for adaptation priorities in the coming 5 years and the possible data collection methods for each indicator. The existing road inventory and water supply database can be improved to add elements of climate resilience and related variables.

Table 19: Operationalization and Data Collection

Level of Results Framework	Indicator	Definition	Unit	Baselines	Targets	Frequency of Measurement	Source of Data/ Collection Method
Impact	Change in livelihoods and poverty rate as a result of water supplies, rural roads and sanitation.	Increased income or reduced expense on health care	Index	No data		5 years	Sample survey using statistical sampling method; Commune database; IDpoor
Outcome	% of families having access to safe drinking water supplies from protected wells and rain harvesting tanks	Improved water supply from protected wells and rain harvesting that are not flooded or dry up.	%	Existing data on BAU water supplies		Annually	Sample survey using statistical sampling method; Commune database
	% of families having access to improved latrines	Latrines equipped with suitably designed collection tanks and built above flood level	%	Existing data on BAU latrines		Annually	Building on existing data collection
	Length of climate resilient rural roads	Roads that incorporate improved drainage, improved surfacing and good maintenance	Km	Existing data on BAU roads		Annually	Administrative data and road inventory database
	Number of families having access to small-scale irrigation schemes incorporating climate considerations.	Irrigation incorporates VRA and climate change considerations.	Number	No data		Annually	Sample survey.
Output	Number of rural road engineers trained on climate proofed road design.		Number	Existing report on all trained personnel		Annually	Annual report and Administrative data

Note: BAU=business as usual

VIII. Guidance on Development of Adaptation Indicators for integration in MPWT's CCAP and the NSDP

7.1 Analysis of Sector Plan and Adaptation Priorities

The Ministry of Public Works and Transport has a broad mandate to rehabilitate and construct national and provincial roads based on a shared responsibility with MRD (table 21). Transport sector can emit greenhouse gas (GHG) but it is also vulnerable to floods and droughts, therefore the sector deals with both mitigation and adaptation.

Table 20: Shared Responsibility between MRD and MPWT

Type	Definition	Responsibility
National Road	Roads that connect the capital to the main international border crossings and/or provincial capitals.	MPWT
Provincial Road	<ol style="list-style-type: none"> 1. District centers to provincial centers or to primary roads 2. A provincial center to another adjacent provincial center 3. Industrial, commercial, tourist and other centers that have large transport needs 	MPWT
Tertiary Road	District to district roads	MRD
Sub-tertiary road type 1	➤ District to commune	MRD
Sub-tertiary road type 2	➤ Commune to commune	
Sub-tertiary road type 3	➤ Commune to village or village to village	

Source: MRD.

Besides roads and railways, urban sanitation infrastructure also falls within the jurisdiction of the MPWT, which deals with construction of sewers and water treatment plants. As of 2017, MPWT managed about 16,292km of national and provincial roads, which will be upgraded to DBST and concrete.

Table 21: MPWT's Indicators as of 2017

Type	Length, Km	%	Resilience Degree
AC	1,298	7.97	3
DBST	7,114	43.66	2
Concrete	114	0.7	1
Laterite	6,697	41.1	
Gravel	1,070	6.57	

Source: MPWT Annual Report 2017

The Ministry adopted the Climate Change Strategic Plan and Climate Change Action Plan in 2014 to address both mitigation and adaptation through two main strategies as follows:

- i) Promote climate resilience in transport infrastructure;
- ii) Promote low-carbon consumption for Greenhouse Gas reduction in the transport sector.

Strategy (i) is of relevance to adaptation and identifies three actions for the road sub-sector.

Table 22: MPWT's CCAP

No	CC Action	Cost,000Ú\$
1	Develop national road construction and maintenance design standards for national and provincial roads, taking into account climate change impact	500
2	Repair and rehabilitate existing road infrastructure and ensure effective operation and maintenance systems taking into account climate change impact	170,000
3	Capacity building and institutional strengthening for addressing climate change impacts.	3,000
	Total	173,500

Similar to MOWRAM, development of MPWT's CCAP follows the same format and steps. MPWT's CCAP does not have many indicators, and the characteristics of national roads have been recorded in a road database that can be entry points for the M&E of adaptation. No evaluation report of the CCAP has been developed.

Similar to MRD, key adaptation measures for climate resilient road construction would follow the same design standards with more stringent requirements. Many national roads have been upgraded to have more lanes with DBST and concrete surfaces of high quality. MPWT is one of the pilot ministries involved in implementation of the SPCR investments with several adaptation elements for roads and urban infrastructure included, and these can potentially feature in the next CCAP. Those projects are listed below.

- Flood-resilient Infrastructure Development in Pursat and Kampong Chhnang Towns
 - Embankment protection for flood control (Kampong Chhnang);
 - Drainage improvements (Pursat);
 - Community small-scale infrastructure improvements in pre-identified poor and vulnerable areas in each municipality.
- Climate Proofing of Roads in Prey Veng, Svay Rieng, Kampong Chang and Kampong Speu Provinces
 - Rehabilitated and upgraded roads/dykes and dredging of lake in flood-prone parts of 4 provinces;
 - Bioengineering and other ecosystem-based adaptation measures;
 - Community-based emergency management system pilot in Kampong Chhnang.
- Climate Proofing Infrastructure in the Southern Economic Corridor Towns
 - Wastewater treatment facilities in 3 towns (Battambang, Bavet, Poipet);

- Flood control and flood protection structures in Battambang and Neak Loeng.

7.2 Possible Adaptation Indicators

A few indicators can be proposed for the CCAP as follows:

Table 23: MPWT's Adaptation Indicators

No	Existing Adaptation Action	Possible new adaptation option	Outcome	Impact
1	Develop national road construction and maintenance design standards for national and provincial roads, taking into account climate change impact			
2	Repair and rehabilitate existing road infrastructure and ensure effective operation and maintenance systems taking into account climate change impact	Climate proof road infrastructure	Length of climate resilient roads incorporating climate considerations.	
3	Capacity building and institutional strengthening for addressing climate change impacts.		Number of road engineers trained on climate risk assessment and climate proofed design standards.	
4		Climate resilient Flood control and sanitation infrastructure	Length of urban drainage canals; Volume of waste water treated per annum	% of urban population with access to flood control infrastructure and waste treatment plants

7.3 Operationalization and data Collection Methods

The same guidance and data collection methods described in the section on MRD can be applied to MPWT's indicators.

IX. Guidance on Integration of Adaptation Indicators into the NSDP 2019-23

8.1 Potential Adaptation Indicators for the NSDP

From the proposed long-list of adaptation indicators for the four sector ministries elaborated above, a small number of indicators are selected for integration into the NSDP as follows:

- a) Water Resources**
 - i) % of families or areas having access to year-round water supply from irrigation schemes (PPCR Optional Indicator).
 - ii) Agricultural areas covered by climate resilient irrigation schemes (existing and new schemes).
 - iii) Number of FWUCs or communes having DRR Preparedness Plans and EWS.
- b) Agriculture, Forestry and Fisheries**
 - i) % of families adopted climate resilient rice varieties.
 - ii) % of families adopted climate smart/resilient agriculture and integrated farming (crop diversification, integrated farming techniques, water conservation, seed purification and organic fertilization).
 - iii) Changes in loss and damage due to floods, droughts and pests (3 sub-indicators).
- c) Rural Development**
 - i) Length of climate resilient rural roads (VRA, improved drainage, improved DBST/concrete surfaces).
 - ii) % of families having access to piped water.
 - iii) % of families having access to improved protected wells.
 - iv) % of families having access to improved latrines.
- d) Public Works and Urban Sanitation**
 - i) Length of national roads with climate proof design (VRA, improved drainage, improved maintenance, and improved pavement).

These indicators are subject to greater consultation and a more in-depth analysis of possible data availability and data collection methods adopted by sector M&E units. Training is organized to select and define definitions, baselines and targets for integration into the NSDP 2019-23.

A small number of national adaptation indicators (1 or 2) can be included to measure success of climate change mainstreaming at the national level to aggregate all sector contributions. Some SDG indicators are of climate change relevance, but lack of data represents a challenge for long term operation. At least two adaptation indicators have been discussed during MOP's quarterly meeting as listed below.

Table 24: National Adaptation Indicators

No.	Name of Indicators	Definitions/Criteria	Year of Baseline	Responsibility
1	Direct disaster economic loss in relation to global gross domestic product (GDP)	Health, infrastructure, agricultural crops, livelihoods		CDC, MEF, MOP, NCDM and key sectors

		damaged by floods, droughts, and storms		
2	Percentage of growth in public expenditure for climate change, disaggregated by key CC sensitive sectors:			MoWRAM, MPWT, MRD, MAFF, and MoH

Source: SDG List, MOP.

Potential Adaptation FrameworksThe University of Notre-Dame’s Global Adaptation Index (ND-GAIN) potentially provides a national level indicator dataset for the NSDP system. The Index is a global dataset and tool explicitly designed to summarize and compare country-level climate change vulnerability and adaptation readiness. The ND-GAIN⁵ brings together over 74 variables to form 45 core indicators to measure vulnerability and readiness in 192 UN countries from 1995 to the present (Chen C. et al, 2015). The ND-GAIN is a typical composite index combining 45 indicators categorized by readiness and vulnerability aspects (exposure, sensitivity and adaptive capacity) as follows:

- Social (4);
- Economic (1);
- Governance (4);
- Health (6);
- Food (6);
- Ecosystem (6);
- Habitat (6);
- Water (6);
- Infrastructure (6).

The data for quantification of the ND-GAIN indicators have the following features to ensure transparency, reliability and consistency:

- Available for a high proportion of United Nations countries.
- Time-series so that changes and trends in country vulnerability and readiness can be tracked.
- Indicators with data from 1995 to the present are preferred.
- Freely accessible to the public.
- Collected and maintained by reliable and authoritative organizations that carry out quality checks on their data.
- Are transparent and conceptually appropriate.

As a tool, the Index particularly targets the private sector and the development sector to raise awareness of the impacts of climate change in order to better manage the related risks. Change over time is explicitly built into the tool’s methodological structure, with over 15 years of data and rankings based on progress as well as current scores. The index is built around vulnerability theory, and includes two key pillars:

⁵ ND-GAIN’s framework categorizes the measurement of vulnerability into exposure, sensitivity and adaptive capacity, and the measure for readiness into economic, governance and social components.

vulnerability (including exposure, sensitivity, and adaptive capacity), and readiness. However, the trade-off between aggregation and feasibility within the index results in relatively poor adaptation proxies. While dimensions, components, and concepts are guided by adaptation theory, the selection of indicators is primarily driven by the availability of global datasets, of which many of the proxies are not adaptation-explicit. The ND-GAIN's index is one of the few pre-aggregated global datasets, but the generalized nature of its adaptation indicators is poorly suited to documenting adaptation activities and progress by national governments (Ford and King, 2015). In addition, the scoring is dependent on primarily quantitative data, and this limits the potential for context specificity and engagement with sources of qualitative knowledge. Nonetheless, the data may be adjusted to monitor outcomes or vulnerability reductions at the global level.

No country has been assessed by all four of the frameworks listed in [Table 26](#), primarily because the TAMD and PPCR frameworks are predominantly used in lower and middle income countries whereas the EU scoreboard has not been applied outside of the EU. Two countries, Cambodia and Mozambique, have been assessed by both TAMD and PPCR, and, furthermore, ND-GAIN data are available for most countries allowing for a comparison of results for these countries across three of the four frameworks. Both the TAMD and PPCR frameworks include reporting on adaptation activities and results while the ND-GAIN index reports on proxies of adaptation. The most directly comparable components between the TAMD and PPCR frameworks are for climate interventions, particularly climate integration into national planning and national coordination of climate change.

In the case of Cambodia, there is relatively limited consistency in the results, with TAMD identifying integration as a greater weakness than coordination and the PPCR scoring integration higher. While TAMD reported relatively strong coordination (~70%), the PPCR indicates low scores (2.5/10) although this result is combined with the strengthening of the government's capacity making direct comparison between the frameworks challenging.

Moreover, neither TAMD nor PPCR provide specific detailed data on the results of adaptation, with existing reporting predominantly confined to establishing baselines, targets, and some quantification or reporting of the relevant tools used. This has the consequence of there being less comparability of the adaptation results assessed by these differing frameworks although it's recognized that the overall narratives of progress and the related strengths/weaknesses are similar.

While the PPCR framework is stronger on quantitative scoring and reporting on progress over multiple time periods, the TAMD framework focuses on developing a narrative for national learning through M&E. While global assessments may not be preoccupied with ranking countries, the discrepancy in results between differing frameworks indicate that national-level scoring may be inconsistent and unreliable for systematic synthesis, especially when countries construct indicators and scoring rubrics by themselves and self-report the results with no external evaluation of those results.

Both the PPCR and ND-GAIN frameworks provide progress data, while TAMD has not yet implemented assessments substantially beyond the establishment of baselines. Cambodia's has PPCR results over several years, reporting on progress across indicators for the country as a whole and for individual sectors. ND-GAIN uses indicators that are assumed to be proxies for adaptation, such as patents/capita and mobile phone subscriptions and are typically those that are publically available for a large number of countries and are presumed to reflect measures coinciding with adaptation. ND-GAIN also has a longer longitudinal

time frame, with data reported since 1995 and results compared with other countries globally or with comparable countries by income group or region (UNEP, 2017). A summary of key indicators, results, and reported progress is presented in [Table 26](#).

Table 25: Comparison of results from the TAMD, PPCR, and ND-GAIN frameworks for Cambodia and Mozambique

	TAMD	PPCR	ND-GAIN
Cambodia	<p>Track 1: Adaptation efforts¹ (2013 baseline) Climate policy & strategy: ~30% Climate integration into planning: ~20% Coordination: ~45% Climate information: ~20% Climate integration into financing: ~25%</p> <p>Track 2: Adaptation results Baseline data established and with emerging results. Tracked using proxies for flood, storm, and drought vulnerability vis-à-vis poverty and agriculture.</p> <p>Key messages: Government Climate Change Strategic Plan recently released. As this is the first evaluation, the framework currently has only established baselines for future assessment. Track 1 baselines show that Cambodia is still some distance away from meeting all of their selected indicators/goals. Track 2 identifies vulnerable regions and drivers of vulnerability.</p> <p>Progress: Not yet available</p>	<p>Core indicator 1¹: Integration of climate change into national planning: 3.6/10 (2014), 4/10 (2015), 4.0/10 (2016).</p> <p>Core indicator 2²: Strengthened government capacity 1.75/10 (2014), 3/10 (2015), 4.25/10 (2016); coordination to mainstream 1.9/10 (2014), 1.9/10 (2015), 2/10 (2016).</p> <p>Core indicators 3-5: report on instruments tested; use of instruments at household, community, business, and public sector level; and number of people supported by PPCR.</p> <p>Key messages: Indicators 1 and 2 demonstrate moderate progress in national institutional strengthening. Establishment of National Council for Sustainable Development to coordinate adaptation, strong government commitment, establishment of ministerial coordination, establishment of a financing framework. National plans and 14 sectoral plans completed. Legislation for mainstreaming in 3 ministries. Mainstreaming climate change into budgetary processes has been initiated by some ministries. Despite some progress, strengthening capacity and coordination mechanisms to mainstream climate change into development planning remains a challenge. It is too early to report progress on core indicators 3-5.</p> <p>Progress: Modest but positive since previous reporting periods (2015 and 2014). Scoring available for 2014, 2014, and 2016.</p>	<p>Overall score³: 43.4/100 High vulnerability score (0.495) and low readiness score (0.362). Cambodia is the 51st most vulnerable country and the 56th least ready country.</p> <p>Key messages: Weaknesses in readiness are associated with ICT infrastructure, education, and innovation. It has both a great need for investment and innovations to improve readiness and a great urgency for action. Innovation proxied using patents/capita; education based on ratio of enrollment to eligible population for tertiary education; IT infrastructure proxied using mobile phone/fixed home/ internet subscriptions and use per 100 persons.</p> <p>Progress: Country has increased readiness since 1995 in absolute terms (from ~0.23) and relative to similar countries. Progress has been comparable with the average progress across Asia.</p>
Mozambique	<p>Track 1: Adaptation efforts⁴ Climate change mainstreaming/ integration into planning: ~35% Coordination: ~70% Budgeting and finance: ~10% Institutional knowledge/capacity: ~35% Climate information: ~60% Planning under uncertainty: ~35% Participation: 75% Awareness among stakeholders: ~70%</p> <p>Track 2: Adaptation results Only baseline data established. Tracked using 3 incidences of vulnerability: disaster risk index; climate vulnerability index; vulnerability index.</p> <p>Key messages: Finds that the institutional indicators on integration, coordination and knowledge management are all relatively weak, except a strong gender equality participation. Some evidence of climate risks informing planning decisions. Each ministry has a focal point for climate change, but there is no formal calendar for regular meetings. Technical expertise limited but growing.</p> <p>Progress: not reported</p>	<p>Core indicator 1¹: Integration of climate change into national planning 1.6/10 (2014), 2.6/10 (2015)</p> <p>Core indicator 2²: Strengthened government capacity and coordination to mainstream 1.25/10 (2014), 2.5/10 (2015)</p> <p>Core indicators 3-5: report on instruments used and % implemented, and number of people using instruments and supported by PPCR.</p> <p>Key messages: Indicators 1 and 2 demonstrate moderate progress in national institutional strengthening. National Adaptation Programme of Action and National Strategy developed; Disaster Risk Reduction response approved by cabinet. Moving towards climate change integration into sectors, and climate change now Priority 5 on the National Agenda. Inter-ministerial group established. Financing/ budgeting mechanisms developing in key sectors. Technical climate expertise still limited. Despite some progress, strengthening capacity and coordination mechanisms to mainstream climate change into development planning remains a challenge. Core indicators 3-5 provide a range of estimates of numbers affected and instruments used/tested.</p> <p>Progress: Progress across all but one indicator (expertise) since previous reporting period (2014). Scoring available for 2013 baseline, 2014, and 2015.</p>	<p>Overall score⁴: 38.6/100 High vulnerability score (0.552) and low readiness score (0.324). Mozambique is the 31st most vulnerable country and the 32nd least ready country.</p> <p>Key messages: Readiness weaknesses are associated with ICT infrastructure, education, and innovation. It has both a great need for investment and innovations to improve readiness and a great urgency for action. Innovation proxied using patents/capita; education based on ratio of enrollment to eligible population for tertiary education; IT infrastructure proxied using mobile phone/fixed home/ internet subscriptions and use per 100 persons.</p> <p>Progress: Country has increased readiness since 1995 in absolute terms (from ~0.24) and relative to similar countries. Progress has modestly exceeded the average progress across Africa.</p>

Overall, given the lack of climate related data and resources, it would be a significant challenge for Cambodia to compile all these indicators and prepare them for analysis in the next few years. These global indicators can be subject to more stakeholder consultation to assess their feasibility, cost implications, capacity and the resources required for implementation. Prospects for their integration into the NSDP 2019-23 may not be possible, but it is preparatory work for the next NSDP 2023-27 if all indicators and data are made available.

8.2 Process of Integration

The process of integration of new indicators into the NSDP evolves through 'learning by doing', which is summarized as follows:

- MOP issues an official letter requesting all sector ministries to submit indicators for measuring progress and targets of the sector plans. A matrix of indicators is attached to guide development of indicators (see Annex 2).
- The sector planning department with their M&E unit works with all relevant technical departments under the sector ministry to identify the indicators following the guidance from MOP.
- The National M&E Working Group (NM&EWG) established under MOP reviews the indicators, baselines and sources of data for the submitted indicators. MOP can make the decision to accept indicators for integration based on data of acceptable quality. The NM&EWG is assisted by a Technical Secretariat comprising the GDP and the NIS.
- After acceptance, the sector M&E unit of each sector ministry will develop an M&E workplan and budget for data collection and management for the indicators.
- The NM&EWG and National Working Group on Statistics convene quarterly meetings to discuss and update the values of the indicators.

Additional Terms of Reference are proposed to improve the capacity of NM&EWG to coordinate climate change adaptation indicators as follows:

- Provide guidance on definitions, identification of indicators, data collection methodology for monitoring climate change adaptation plans, programs and projects to member Ministries and institutions.
- Conduct training on identification and selection of indicators and data collection methodology for monitoring climate change adaptation plans, programs and projects for member Ministries and institutions.
- Develop a National M&E system for monitoring and evaluation of the climate change adaptation programs and projects to be integrated into the NSDP, and to be used at national, sector, and sub-national levels.
- Organize semester meetings to update climate change adaptation indicators with participation of key government officers, development partners, civil society, NGOs, and the private sector.

It is important to highlight the need for adequate resources in both staff and budget to appropriately operate the indicators, especially data collection and management. Some ministries such as MAFF and MOWRAM have databases established and data collection methods, but there is no mechanism for data quality assurance and control (QA/QC). Some databases may need improvements to include additional climate variables and adaptation statistics to supplement data gaps.

X. Conclusion and Recommendations

The NSDP is organized on a sector-wide rather than a ministry-wide basis, and, therefore, motivates ministries towards planning in a cross-sectoral and coordinated manner. Further, the RGC's Strategic Framework for Decentralization and Deconcentration Reform mandates a progressive transfer of responsibilities and resources to councils at provincial, municipal, district and commune levels. It is acknowledged that Cambodia's arrangements for public administration presently are not ideal with some gaps, overlaps and poor coordination of functions. However, with improved governance including identifying development bottlenecks, such as climate change, and mainstreaming them in the upcoming planning and investment cycles should be an overriding priority for the government.

There is a significant gap between the annual workplan activities being carried out by line ministries and the information available to administrative departments, which hampers the planning and budgeting functions. For example, the planning departments under MAFF and MOWRAM do not have a clear idea of the particular projects or activities being implemented by the various technical departments and thus cannot align these activities with the national strategies being developed at higher levels of MAFF and MOWRAM. Similarly, the finance departments are only responsible for being the liaison between technical departments and MEF in passing on budgetary requests and the subsequent budget allocations, but have no oversight of actual expenditures.

At the provincial level the gap is even more pronounced as the Decentralization & Deconcentration system has resulted in provincial departments being responsible to the Provincial Governor for expenditures and reports on plans and budgets are not provided to the central level. While the Department of Finance is responsible for passing on MEF allocations, they are unable to receive adequate feedback from the provincial level to enable a proper M&E system to be established. The asset management procedures follow MEF guidelines, but are limited in that there are no policies on asset replacement or asset maintenance. Therefore, more coordination between line ministries and provincial departments is urgently required.

The development of adaptation indicators is still new for many sectors although sector ministries have incorporated several adaptation indicators into their CCAPs. Those indicators however are not yet put into the sector system and many are not of relevance to adaptation. This can be understood by the general lack of understanding of climate change adaptation and of the M&E of adaptation in particular. Moving away from the business as usual indicators toward relevant adaptation indicators is a challenging task for some sectors. For example, water resources and water supply can be relevant for both development and adaptation.

This guidance is developed to fill the gap and enhance capacity of sector institutions to design a harmonized M&E framework with clear definitions responsive to adaptation priorities. It is an important outcome of the SPCR TA 8179 to support four key sector ministries in identification and operation of sector adaptation indicators. However, the guidance can be used by other sector ministries, such as Ministry of Health, Ministry of Environment, and Ministry of Land Management, Urban Planning and Construction, the Ministry of Women Affairs, etc. since the basic approach and steps are the same.

This guidance comes at the right time in Cambodia's development planning cycle as it can be tested by sector M&E units designing a small number of indicators for sector plans and CCAPs. It also provides opportunity for selection of a similar number of adaptation indicators with clear definitions and reliable data collection methods and tools to be integrated into NSDP 2019-23. Sufficient funding and adequate human resources must be put in place to ensure effective and sustainable operation of the indicator.

Mainstreaming the PPCR Results Framework into the national M&E system is critical to ensure a sense of ownership for the RGC. Hence regular monitoring and evaluation is required to ensure that the NSDP implementation proceeds as planned and at the required pace to achieve its goals and targets, which has been increasingly encouraged by the RGC. Coordinating effective monitoring and evaluation of progress is a core component of the MOP's overall responsibility for oversight of the NSDP. It is fortunate that development of the next NSDP 2019-2023 will start soon as this provides momentum for mainstreaming climate resilience into the new NSDP through M&E implementation of the PPCR Phase 2. The last five years of PPCR implementation coincides with the upcoming NSDP (2019-2023) implementation period to apply, learn and improve mainstreaming strategies, coordination and intended results.

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Annex 1: CCAP Indicators and Priority Adaptation Indicators for NSDP 2019-23

a	b	c	d
Indicators proposed under CCAP	Adaptation Indicators Submitted to MOP (2018)	Existing Indicators integrated in NSDP 2014-18	Priority Adaptation Indicators for NSDP 2019-23 (in reference to b)
MOE/NCSD			
I. CCAP delivery Total funding mobilized/total CCAP budget % Actions successfully funded Degree of inclusion of CCAP actions into PIPs Degree of involvement of MoE in CCAP implementation	Indicator 13.1.1: Percentage of Communes vulnerable to climate change	Number of communes vulnerable to climate change (2014 baseline)	1
II. Institutional readiness Status of development of environment policy and planning % Coordination of CC response and CCAP implementation % Status of climate information management % Climate integration into Financing % (ladder approach)	Indicator 13.1.2: Number of deaths, missing persons, and persons affected by disaster per 100,000 people		
III. Result indicators Action 1: Technologies for FEW security piloted (number) Action 2: Coverage and availability of vulnerability assessments % (ladder approach) Action 3: Protected Area Management Plans with adaptation measures (number) Action 4: Dialogue on Natural Capital Accounting system Action 5: Participation of Technical Working Groups in GHG Inventory (number) Action 6: Functionality of the Emission Reduction Facility % (ladder approach)	Indicator 13.2.1 Amount of GHG reduced from the national REDD+ Program implementation		2

<p>Action 7: Cities with urban development plans and programs addressing CC</p> <p>Action 8: Satisfaction with MoE's CC Knowledge Portal (survey)</p> <p>Action 9: Teachers trained on updated proposed CC curricula</p> <p>Action 10: CC awareness initiatives jointly implemented by MoE and stakeholders</p> <p>Action 11: Funding from Commune/Sangkat Fund allocated to climate interventions in CIPs %</p> <p>Action 12: Functionality of CC M&E system % (ladder approach)</p> <p>Action 13: Capacity and Functionality of national coordinating mechanisms for CC: GSSD Secretariat, CCTT, TWGs % (ladder approach)</p> <p>Action 14: Ministries reporting on CCAP implementation at MoE's National M&E annual learning event (number)</p> <p>Action 15: Ministries involved in reviewing sectoral legislation with a CC lens (number)</p> <p>Action 16: Project/program proposals submitted for climate financing under the new procedures for CF</p> <p>Action 17: Functionality of Climate Reporting Teams</p>			
<p>Impact Indicators:</p> <p>1 Public awareness of CC issues KAP surveys</p> <p>2 Mainstreaming climate change issues into national and subnational plans (number)</p> <p>3 Commune Vulnerability Index</p> <p>4 Carbon credits issued from carbon offset projects</p>	<p>Indicator 13.2.2 Carbon intensity of the economy</p>	<p>Carbon credit from CDM and other mechanisms</p>	<p>2</p>
	<p>Indicator 13.2.3 Prevalence of climate related diseases,</p>		

	disaggregated by vector, water -borne diseases (sex-disaggregated)		
	Indicator 13.2.4 Climate Change Public Expenditure	Ratio of climate-related expenditure to total public expenditure	1
	Indicator 13.3.1 Percentage of population with understanding of climate change (sex-disaggregated)		1
	Indicator 13.3.2 Level of institutional readiness for climate change response	Mainstreaming climate change issues into national and subnational plans	1
	Indicator 13.3.3 Education opportunities in the fields of climate change and Disaster Risk Reduction		
	Indicator 13.a.1: New and additional climate funds under UNFCCC mobilized through GCF		
MRD			
Mapping vulnerable rural infrastructure (roads, water facilities) in provinces at high risk from climate change	Length of road with climate resilience/proofing design will be constructed	1. Access to safe water source of urban population (CSES)	1
Guideline and standard for infrastructure resilient to climate change developed	Number of road engineers trained on climate risk assessment and climate resilience design standard	2. Access to improved sanitation of urban population	2
Climate maps and climate vulnerability index developed for rural infrastructure, communities, and location	Percentage of people have access to resilience rural sanitation and safe drinking water supplies.	3. Rural roads rehabilitated (out of the total rural roads)	1
Develop adaptation options and guidelines to improve climate		4. Access to safe drinking water sources (rural) and	

change resilience of rural infrastructure		to improved sanitation (rural)	
Adaptation option guideline developed and adopted by the ministry		5. Studied and pilot constructed Pave Rural Road 450Km that have capacity to protect against climate change 100%	
Build awareness and capacity at national and sub-national level for mainstreaming climate change into rural development planning processes.		6. Capacity Building for Village development Committee on the option of resistant and reduce climate change and the on acceptable science awareness in the rural areas.	
Rural roads and water facilities inventories and quality indexes		7. Access to safe water in lowest 25% expenditure group	
Rural infrastructure vulnerability maps for all provinces.		8. Access to improved sanitation in lowest 25% expenditure group	
Climate proofing of Mekong river islands' connectivity (roads and jetties).			
At least 50 km of rural roads rehabilitation in the islands will be climate resilient and provide year-round access to markets and other social services for communities.			
At least 11 jetties with climate resilient standards.			
Vulnerability maps of rural roads climate proofed developed			
Adaptation guideline and planning option including cost and benefits of road development.			
Engineering designs, standards and guidelines of resilience to			

climate change are jointly developed by MRD and MWPT.			
Local early warning systems and pilot program for emergency management for rural roads developed.			
Climate-Proof tertiary-community Irrigation Development to enhance			
5 community-based irrigation system developed and implemented			
50% of entire technical staffs will be trained during the first 2-year project implementation, and 100% will be trained during these five years period.			
Four assessments will be first year conducted which include climate change vulnerability assessment, vulnerability mapping, and capacity need assessment, and socioeconomics survey of vulnerability group and gender. Technical guidelines for designing infrastructure will be completed during the first 2-year that include project manual, technical guidelines, checklist of climate change risk reduction.			
5% of the current total water wells, 5% of current rural roads and irrigation schemes will be constructed by using proposed technical guideline resilient to climate change.			
20% of current poor families that accessed to existing loan, will be improved their living incomes better off after access to this soft loan for biogas application.			
30% of whole rural population, in the target to most climate change vulnerability areas, will			

be trained and educated on climate change, climate resilience, and infrastructure planning for rural public assets.			
75% of households in vulnerable areas with year-round access to water supply (agricultural)			
Length (120 Km) of climate proofed rural roads will be improved and constructed resilient to climate change.			
MPWT			
Develop national road construction and maintenance design standards for national and provincial roads, taking into account climate change impact	National road and provincial road integrating climate resilience consideration	Paved roads, Km	1
Future national transport infrastructure is climate proofed, especially in vulnerable areas where new standards have been used in design phase of construction projects	Number of road engineers (at national and sub-national level) receiving training on vulnerability and risk assessment and climate resilient road construction	Railways rehabilitated and constructed, Km	1
Repair and rehabilitate existing road infrastructure and ensure effective operation and maintenance system, taking into account climate change impacts	Urban sewage system integrating climate resilience consideration		1
Cost effectiveness of maintenance and rehabilitation of national and provincial roads			
Reduction in damages to transport infrastructure caused by floods due to climate change, especially in vulnerable areas			
MOWRAM			
Effective hydrology and meteorology networks and stations upgraded and installed nationwide	Areas of rice farmland irrigated (expansion of potential irrigation each year) (ha)	Agricultural irrigated land, Ha	1
Climate risk management and rehabilitation of small, medium and large-scale irrigation infrastructure	Number of Farmer Water User Committees established and	Agricultural irrigated land, Percent	1

	strengthened (each year target)		
Increase irrigated areas by 25,000 ha per year	Mitigate and prevent flooding in agricultural areas (ha)	Establish and strengthen Farmer Water User Community, Number	
Increase rice production in line with government targets to export 1 million tons of rice per year from 2015	Mitigate and prevent saline intrusion in agricultural (ha)	Paddy-cultivated areas irrigated, Hectares	
Percentage of irrigation engineers with adequate CC knowledge and skills	Areas of rice farming rescued during drought and lack of water (ha)	Set up hydrological stations, Number	1
Percentage of FWUC staff with adequate CC knowledge and skills	Number of pumping stations installed (number)	Set up meteorological stations, Number	
Promotion of innovative irrigation technology structure in areas affected by torrential rain (Mondulkiri, Pursat and Sihanouk)	Number of pumping stations rehabilitated (locations)	Set up pumping stations, Number	
3 demonstration sites are fully functional and operated with AWG (use of electricity and hydraulics)	Number of pumping machines repaired each year (number)		
Capacity of irrigation engineers and FWUCs developed	Number of gauging stations installed each year (locations)		
Percentage reduction of loss/damage of crop productions, public assets and human lives	Number of gauging stations repaired each year (locations)		
Upscaling mobile pumping stations and permanent stations in responding to mini-droughts	Number of meteorological stations each year (locations)		
Increase access to irrigation services to provinces with less access to formal irrigation systems	Number of meteorological stations repaired each year (locations)		
~70,000 ha of potential rice crops affected by seasonal drought rescued.	Number of trained people each year (person)		
Farmers will reduce cost of pumping in provinces such as Prey Veng and Svay Rieng	Number of Workshops organized each year		

Development and rehabilitation of flood protection dikes (Kampong Trabek, Bateay) for agricultural and urban development.	Gender and climate change mainstreaming each year		
Baseline and guideline for development, flood protection and diversion for climate resilience in urban infrastructure development			
Pilot sites established for flood diversion in newly established urban areas in proposed provinces			
At least 24% of the target beneficiaries which include local traders and farmers will benefit from flood diversions			
Guideline development and lesson learnt on climate resilience in urban infrastructure development (multi-purpose dikes)			
Promoting climate resilience of agriculture through building sea dikes in coastal areas			
At least 3 dikes from coastal areas are renovated and modified against salt water intrusion, floods and drought			
10,000 ha of paddy will increase yield			
10,000 farmers received agricultural extension related agricultural practices resilient to climate change			
MAFF			
1,000 model farms (Key promoters) established and activated 1,000 communes throughout the 23 provinces.		Rice Paddy: Cultivated area, Hectares	1
Income of the participated rural households improved		Rice Paddy: Harvested area, Hectares	
10% of total loss and damage of agricultural products reduced.		Rice Paddy: Production, Tones	

Technological and innovation improved and available for farmers	Almost all CCAP indicators are submitted.	% of animals having vaccination,	
At least four crop varieties released which are more adaptable to climate change than ever.		Percent All kinds of animal production in 3% increment,	1
Capacity of bio-technology research improved, especially for R&D institutions.		Million heads Aquaculture, ton	
Crop yields are improved, and productions are more stable under climate variability.		Crop diversification Index, Percent	1
At least 4 types of improved technology related to sustainable soil management, crop protection, and low C emission were developed and use in the Climate Smart ecosystem (areas defined by the Gov).		Cultivated area for fruit and other permanent crops, Hectares	
Improved knowledge on the impact of current farming practices on CC, soil degradation, adaptation option for different farming typologies, and strategy for bio-energy crop development.		Cultivated area for paddy affected by natural calamities (Wet Season), Hectares	
Crop yields are improved and its productions are more stable, and the uses of soil resources are more sustainable under climate variability.		Cultivated areas for rubber, Hectares	
The damage and losses of quantity and quality of agricultural products will be reduced 10% a year.		Dried rubber production, Tons	
Adaptation and mitigation to the climate change will be improved		Fish catch, Tones	
Agro climatic information has collected and interpreted according to the Agro-ecological		Fishery communities, Number	

zone and disseminated to famers			
Conservation agriculture practice has been expanded, water saving technique has been enhanced and soil fertility has improved.		Forest boundary demarcation, Km	
The damage and losses of quantity and quality of agricultural products will be reduced.		Forestry communities, Number	
Appropriated technologies with good practices will be applied to adaptation and mitigation the impact of climate change.		Land under all crops, Ha	
(50 persons) x 10 TOTs including M&E will be trained		Livestock by type, Number	
Stakeholders (100 persons x 2 times/year) will be trained		Milled rice, Tones	
Institutional capacity development on M&E (50 persons x 2 times).		Milled rice surplus or deficit, Tones	
40 ha of clones experimented and scaled up into 5 AEZ in Cambodia.		Non-rice: Cultivated area, Hectares	
1750 rubber farmers equipped with better knowledge and skills (An average 4.86 ha/family).		Non-rice: Cultivated area (Dry Season), Hectares	
1,200 copies of lesson learned to be published and disseminated.		Non-rice: Cultivated area (Wet Season), Hectares	
Economic return will be US\$20.40 million		Non-rice: Harvested area, Hectares	
New rubber clones will be created and scaled them up to planters throughout the country.		Non-rice: Harvested area (Dry Season), Hectares	
Result from the investigation of 5 AEZ will be published through paper documentation or seminars.		Non-rice: Harvested area (Wet Season), Hectares	
At least 200 students will use the proposed areas for their research work and graduation.		Non-rice: Production, Tones	
Stakeholders' capacities and awareness of mechanism to adapt or to mitigate on climate		Non-rice: Production (Dry Season), Tones	

change impacts will be trained and improved.			
Latex and rubber wood processors' capacities and awareness of mechanism to adapt or to mitigate on climate change impacts will be trained and improved.		Non-rice: Production (Wet Season), Tones	
Active participation of animal raisers		Number of slaughterhouses that have good standard,	
Capability of Technical Staffs to operate full function.		Paddy Marketable Surplus Index, Percent	
Available guideline on animal raising can be used for adaptation in time		Paddy yield per hectare, Tons	
Active participation from bio-digester users and animal raiser		Production of cattles and buffaloes, Million heads	
Capacity of technical Staffs to operate full function.		Proportion of fishing lots released to local communities, Percent	
Available guideline related to animal waste management can be used for mitigating greenhouse gas emission		Proportion of land areas covered by forest, Percent	
Technologies on improving animal breed, animal feed and animal health will be developed.		Reforestation, Ha	
Active participation from bio-digester users and animal raiser.			
Capacity of technical Staffs to operate full function.			
Available budget			
500 copies of forest cover with map			
5 Community Forestry participated in REDD+ management			
Formulation of policy note on benefits received from the selling of carbon credit.			

Production forest strategy development for 2019-2032			
12,500 ha of degraded forest land for reforestation rehabilitation and restoration.			
10 million tree seedlings produced			
Increase carbon stock in proposed 2,000 ha of tree plantation			
4 Research stations established			
Formulation of policy note on reforestation			
Formulation of policy note on bamboo and rattan plantation			
10,000 copies of assessment results on volunteer and compliance carbon market development and distributed.			
10,000 copies of alternative livelihoods studies development and distributed.			
10,000 copies of the Cost and Benefit Analysis Research on community base REDD+ published and distributed.			
Case studies from five CC related to forestry are published and disseminated and 20 students participated.			
REDD+ policies and related documents were disseminated to at least 2,000 stakeholders/year.			
Forestry crime in REDD+ areas reduced.			
Monitoring system and data collection are in place.			
2 mitigation projects implemented as model			
Tissue culture and DNA analysis laboratory established and operated.			
At least 5 climate resilient tree species identified and produced for plantation.			

At least 10 forestry officials have improved knowledge on tissue culture techniques and DNA analysis.			
Number of aquatic genetic resources for climate resilient aquaculture production systems secured through conservation aquaculture and selective breeding in either medium or long-term aquaculture and conservation facilities.			
Number of climate resilient aquaculture technologies produced.			
Climate Smart and Resilient Aquaculture Program adapted by relevant Agricultural Universities under MAFF and MOEYS.			
Aquaculture production increases 20% annually.			
Number of fisheries education and outreach program set up and operated.			
Favorable coastal areas zoned for aquaculture activities.			
Number of intensive aquaculture farm increased.			
2800 ha of coral reef and 30000 ha of seagrass in healthy condition.			
172,746 ha of fisheries conservation area in the appropriated form of protection by 2024.			
100 ha of flooded forest and mangrove area replanted per year.			
At least 10% of fisheries domain (both inland and marine), and 30% deep pools effectively protected (and enhanced if needed).			
At least 500 Community fish refuges and refugia effectively managed.			

Major migratory routes in Mekong mainstream and significant tributaries maintained.			
At least population of 10 species of fisheries endangered resources increased by 10% in the natural water body.			
<ul style="list-style-type: none"> • Scientific based knowledge are ready for prioritization and adaptation. • At least 50% of 516 CFis and 864 Community Fish Refuges adaptive capacity (institution, knowledge, skills, financial, infrastructure) have been strengthened. • At least 1,000 fishery staff from national and sub-national gain more knowledge on CCA and DRR. • Percentage of expenditure on climate sensitive activity (climate sensitive budgeting). • At least 200 FiA staff fulfilled with capacity on fisheries habitat restoration and monitoring. 			
Increase value of fish and fishery products by 20% annually through promoting diversification and export expansion.			
At least 300 fish processors, traders, and other relevant stakeholders trained on climate change resilience per year.			
Number of established fish processing cooperative associations promoted on climate-resilient small-medium scale infrastructure introducing low-cost climate-resilient processing techniques annually.			
Provide efficient waste management structures for at			

least 10 processing premises at community level annually.			
Number of private-public-producers partnership established.			
Number of local meteorological stations enhanced in order to improve			
Number of aqua culturists and fish folks who received early warning messages			
Number of aquaculture household received post disaster recovery interventions			
Number of response, recovery and rehabilitation initiatives integrated with ORR and CCA			
Number of micro-insurance schemes piloted for fish farmers.			
Number of private hatchery rehabilitated at post disaster			
Interactive maps and Database updated			
Land used, crop yields maps available			
Clear maps on land availability identified			
Reduce tension and cost investment			
Mapping and zoning of key production areas will be available for planning and investment.			
Complete declaration of forest land for conservation, development and restoration.			
Maps for flooded forest and mangrove forest are available for conservation, development and restoration.			
Fish sanctuary and refuges are determined and delegate management to communities.			
Available Data used to support Decision Making Framework for			

Agricultural Development, Planning, and Investment.			
Available data for climate change scenarios will be ready by 2016 for agricultural planning			
Climate impacts are scientifically recorded and projected starting from 2017.			
% of total crops, livestock, and agriculture incident loss will be reduced.			
24 Scientist developed through short term and long-term trainings.			
Interactive maps and Database updated			
Land used, crop yields maps available.			
5,000 farmers are trained through farmer field schools using the 11 training manuals with at least 1000 CSFP (Climate Smart Focal Points or Lok Kruh)			
3,000 extension workers trained by using 11 training manuals developed by the MAFF with the support of other ministers with possible certificate given and acknowledge by the			
500 programs will be broadcasting through local radio and TVs.			
At least 6 E reaction center			
<ul style="list-style-type: none"> • Research on the strength and weakness of women in the Agriculture sector in Cambodia maximising new opportunity • At least 30,000 women are increased adaptive capacity to cope with climate change by maximizing existent adaptive capacity and building new capacities • 30,000 women farmers become climate resilient 			

<p>farmers in agricultural sector by enhancing mental, technical and financial strength. WCRF (women climate resilient farmer) will be the CC resource focal point in each community'</p> <ul style="list-style-type: none"> • 30,000 women are active in farming cooperatives linked with the provincial levels 			
<ul style="list-style-type: none"> • Mapping existing knowledge and resources available • Promote relevant weather forecast at the provincial level direct access to a local number • Developing integrated model of knowledge from need identified to substantive knowledge that support a better adaptation to CC from all levels (research agenda) • Creating a systematic and integrated platform of knowledge exchanges and discussion related to Agriculture and CC • Multi-scales tools that translate information and research developed and being generated • Providing tools box to ease decision makers/ private sectors to deal with trade offs as well as better invest in a fair and sustainable manner • Set of accessible visualisations of the issues of Agriculture and CC in Cambodia as well as key challenges that will be shared 			
<p>Agricultural output increased from 22.85 million tons i 2013 to 36.80 million tons by 2018. Rice yield will increase from 3,117 kg/ha by 2012 to 3,250 kg by 2018. Rice surplus will increased from 4.74 million tons</p>			

in 2012 to 6 million tons by 2018			
Beneficiary income in areas vulnerable to climate change increased by 20% (about \$30/month/household increase in rural areas).			
Employment in agri-business and agro-industrial sector increased by 20%			
Area planted (ha) with cash crops resilient to climate change increased by 20%			
Value of agricultural exports increased by 30%			
Value of formal bank loans for capital investment in agriculture increased by 25%			
Number agri-business SME's increased by 10%			
Mapping areas of cropping land, forest demarcations for agricultural zoning, multi-development areas established.			
10,000 aquaculturists promoted and serves as model farmers for climate resilient and aquaculture expect to increase from 74,000 tonnes in 2012 to 171,160 tons by 2018.			
About 5 million farmers received agricultural extension services aimed at improving resiliency to climate change			
Livestock production increased by 3% per year			
Loss of livestock due to floods, droughts and diseases linked to climate change			
Forest area (ha) affected by forest fires.			
Area (hectares) planted with enhanced rubber clones (by AEZ).			
Area (hectares) managed within the REDD+ schemes and Area			

(hectares) of forest rehabilitated.			
Carbon Credits or avoided emissions (tons of CO2 equivalents) through REDD+ and mitigation in agriculture, rubber, fisheries and livestock sectors.			
Tons and % of crops lost due to droughts and floods			
Ha of healthy mangrove forest			
Number of fish species and their critical habitats that are identified and protected.			

Annex 2: Sample Matrix of Indicators for Integration in NSDP

Indicators	Baselines 2018	Target by Year					Source of data	Responsible agency
		2019	2020	2021	2022	2023		
Indicator 1								
Indicator 2								

**KINGDOM OF CAMBODIA
NATION RELIGION KING**



Ministry of Planning

**National Strategic Development Plan 2019-23: A
Supplementary Document to Integrate and
Operationalize the Adaptation Indicators**

**TA 8179: Mainstreaming Climate Resilience into Development Planning
Package C**

Gender, Monitoring and Evaluation (M&E), and Mainstreaming at Sub-National Levels

**Prepared by the
Consortium of UN Habitat, Forum Syd and Save the Earth Cambodia
Phnom Penh, Cambodia
September 2018**



I. Introduction

The NSDP 2019-23 is building on previous achievements, emerging challenges and new development priorities outlined in the recent adopted Rectangular Strategy IV. In response to the potential risks and experienced impacts of climate change in Cambodia, climate change strategies and action plans become important ingredients of National Strategic Development Plan (NSDP), which has been updated on a five-year cycle. A critical part of development of NSDP 2019-23 is the review of achievements of the NSDP 2014-18 based on a set core development indicators and climate change indicators set out at the beginning of its implementation. There are a few adaptation indicators integrated in the NSDP 2014-18, which are not sufficient to track progress and success of climate change mainstreaming in Cambodia. In light with the increased Cambodia commitment to tackle climate change impact, there is a need for integration of relevant climate change resilience indicators into the new NSDP. Cambodia is one of the 19 countries implementing SPCR projects funded by Climate Investment Fund (CIF), and ample opportunity exists for tapping funding from various international funding mechanism such Green Climate Fund and Adaptation Fund. Therefore appropriate M&E framework must be put in place to measure implementation success, be it adaptation or mitigation. One of the outcomes of Package C of TA 8179 “Mainstreaming Climate Resilience into Development Planning” is to enhance capacity for monitoring and reporting of adaptation investments and adaptation plans and integration of adaptation indicators at various M&E systems. This supplementary document is one of the outputs to guide operationalization of a set adaptation indicators in the new NSDP 2019-23. The Ministry of Planning, through General Directorate of Planning and National Institute of Statistics, will coordinate with relevant sector ministries, sub-national administrations and stakeholders to update data and indicators on a regular basis as proposed in this document.

II. Draft National Strategic Development Plan (NSDP) – 2019-23: Policy priorities of RGC:

The Royal Government of Cambodia (RGC) recognizes that the NSDP is the main policy instrument which plays a central role in implementing its national development visions. At the same time, the RGC will continue to pursue the proven and workable policies and best practices of the past besides formulating new ones in accordance with the changing internal and external environment. The Government Rectangular Strategy IV (RSIV) has been recently adopted which recognizes climate change as one of key global trends. The RSIV provides key policy directions in each Rectangle for the update NSDP 2019-23 as the following:

Rectangle 1 - Human resource development: 1). Improving the quality of education, science and technology; 2). Vocational training; 3). Improving public healthcare and nutrition; and 4). Strengthening gender equality and social protection.

Rectangle 2 - Economic Diversifications: 1). Improving logistics system and enhancing transport, energy and digital connectivity; 2). Developing key and new sources of economic growth; 3). Readiness for digital economy and industrial revolution 4.0; and 4). Promoting financial and banking sector development.

Rectangle 3 – Promotion of private sector development and employment: 1). Job market development; 2). Promotion of SME and entrepreneurship; 3). Public-private partnership; and 4). Enhanced competitiveness.

Rectangle 4 – Inclusive and sustainable development: 1). Promotion of agricultural and rural development; 2). Strengthening sustainable management of natural and cultural resources; 3)

Strengthening management of urbanization; and 4). Ensuring environment sustainability and readiness for climate change.

Specific action priorities related to environment and climate change under Rectangular 4 are set out as follows:

1. Continuing to implement the “National Strategic Plan on Green Growth 2013-2030”, “Cambodia Climate Change Strategic Plan 2014-2023”, “National Environment Strategy and Action Plan 2016-2023”, “National REDD+ Strategy”; and use social and environmental fund effectively to ensure economic development with low-carbon emission and resilience to climate change.
2. Further strengthening the management of protected areas, biodiversity conservation, natural resource conservation, especially the ecosystems of Tonle Sap lake, Mekong river and the coastline areas.
3. Further strengthening the management of solid waste, waste water, gas and lethal substance by implementing principles of reduction, reuse, recycling and non-use as well as strengthening pollution monitoring and control mechanism and control.
4. Promoting resource efficiency and sustainability by implementing the principle of sustainable consumption and production.
5. Increasing the usage of environmental-friendly and climate-friendly technologies in physical infrastructure and socio-economic development.
6. Continuing to promote the implementation of carbon trading mechanisms and related regulatory frameworks, strengthen the capabilities to develop and implement climate change adaptation and resiliency measures as well as explore the possibility of studying financial resiliency to respond to disasters caused by climate change.
7. Further promoting the development and implementation of integrated water resource management plan in order to expand water supply in response to demand, minimize the risks caused by flood and drought, as well as to ensure long-term water security.
8. Continuing to encourage and increase investment in clean energy and renewable energy, especially solar power while reducing the production of energy from unclean sources to ensure long-term energy security.
9. Continuing to strengthen regulatory framework, research, as well as development of skill and capacity for national and sub-national official in terms of environment, green development, climate change, integrated water resource management, and the usage of natural resources in a sustainable manner.

By and large, to ensure the consistency between different national development policy frameworks, the objectives of the NSDP 2019-2023 are to be synchronized with the broad development goals of the Rectangular Strategy IV that focuses on four priority focus – road, water, electricity, and people. Furthermore, to be prepared for the formulation of national policies and strategies that are responsive to the current development contexts, the emerging challenges and opportunities are to be well taken into consideration in the preparation process of this new five year plan. The paper seeks to provide the much needed support to the upcoming NSDP by way of providing guidance and direction to mainstream climate resilience, as well as climate resilience indicators, into national development planning process.

III. Approach and Steps for Identification of Suitable Adaptation Indicators for integration in the NSDP and Sector Plans

The NSDP 2014-2018 is aligned with the Sectorial Climate Change Strategic Plans (SCCSP) developed by line ministries and agencies. In the NSDP 2014-2018, climate change are discussed on sub-sectors via the line ministries' SCCCSP. More specifically, climate change adaptation is noticeably considered in the priority national sectors such agriculture, water, infrastructure, health, rural development and energy. Overall, the country's relevance is assessed 'highly relevant' to national development priorities and is well considered in most development priority sectors.

The national framework for M&E considers a theory of change, an indicators framework with baseline and targets analysis, guidelines for M&E integration within line ministries and institutional arrangements and coordination mechanisms. The National M&E Framework of Climate Change is preparing to develop specific national and sectoral indicators. Six climate related indicators are added into national monitoring indicators of the NSDP 2014-2018, including climate proofing road, climate change capacity building and awareness, climate related gender, involvement of ministries in climate change mainstreaming, commune vulnerability to climate change, and climate-related expenditure.

IV. Guidance on common principles of identifying adaptation indicators by RGC:

The approach for designing M&E of adaptation is proposed building on the common principles outlined in the Technical Report "Harmonized Climate Resilient M&E Framework in Cambodia: A Guidance for Tracking Adaptation Investments" (MOP 2017). Those principles are also well-founded for designing M&E Framework of Adaptation for the NSDP and Sector Climate Change Action Plans as summarized in the followings:

- **Nationally appropriate systems:** The results framework is designed to operate within existing national monitoring and evaluation systems, therefore the National Results Framework of NSDP would be a blue print for harmonization;
- **Flexible and pragmatic approach:** Application of various practice and M&E tools (TAMD, PPCRRF, Log-frame, DMF) can be flexible depending on the nature of adaptation projects and programs, as long as the results are well aligned with the NRF and practice. Combination of qualitative (process), quantitative, and binary indicators with periodic project evaluation can improve learning progress and effectiveness of outcomes and impacts of adaptation investments.
- **Consistency with National and Sector Goals and Objectives:** This means that the adaptation indicators should be aligned with overall goals and outcomes of the national and sectoral strategy and plans such as SDGs, NSDP, CCCSPs, and CCAPs;
- **Data collection and reporting standards:** To be able to aggregate country-level results of programs and projects, a set of common adaptation indicators with clear definitions will be measured using existing data collection methodologies and existing databases, with enhancement to ensure consistency and quality.

Towards this end, the ADB TA 8179 Pack-C team has closely worked with line ministries over the past two years to help them identify climate adaptation indicators that could potentially be incorporated in the upcoming NSDP 2019-23. Adaptation indicators have been identified based on sector climate change adaptation policy priorities and broad consultation with stakeholders through a series of focused group discussions/quarterly meetings, training workshops and multi-

stakeholder consultation workshops. In continuation to the capacity development efforts undertaken by the TA team in supporting and guiding the line ministries develop sectoral indicators, this supplementary document suggests institutional arrangement/responsibility, data collection tools, and a summary of baselines and targets for each indicator.

The official letters drafted by each line ministry's in response to the Ministry of Planning Call for input for identifying respective sectoral indicators by each ministry for possible incorporation into the NSDP 2019-23 is attached as annexures to the document.

V. Adaptation indicators identified by line ministries for NSDP 2019-23

Adaptation indicators for each sector ministries are developed through broad consultation following five steps proposed under the knowledge product "Guidance on development of Adaptation Indicators for National and Sector Climate Change Action Plan". Below is the summary of each step.

- Review (or stock taking) the current Sector Climate Change Strategic Plans and Action Plans in terms of its vision, expected goals, outcomes and objectives; analysis of existing adaptation programs and projects, and future priority adaptation investments (sector vulnerability, specific adaptation measures and budget allocation) and the current practice of Sector M&E of adaptation, data collection and data management. It is important to understand the logic relationship between climate change strategic plans which provides overall policy goals and objectives, while programs and projects are designed to support the implementation of strategic plans or action plans.
- Defining possible adaptation indicators that can measure the key results of adaptation intervention leading to decreased climate exposure, climate sensitivity, climate change vulnerability, and increased adaptive capacity. The indicators should be aligned with the NRF (figure 2) so that a harmonized framework can be commonly understood by all relevant stakeholders. Each adaptation indicator or sub-indicator must have clear definitions, baselines, potential source of data and data collection tool, frequency of measurements, and responsibility.
- Participatory consultation is an important step to discuss and assess the feasibility of proposed adaptation indicators, institutional responsibility and cost implications. Sector specialists from technical departments, planning and budgeting officers, data managers, M&E officers, and expert opinion can provide essential inputs to substantiate the most relevant adaptation indicators.
- Operationalization is a critical part of putting adaptation indicators into implementation. It involves construction of baselines, defining targets, developing data collection tools and data management, and financial and human resources planning for data collection, analysis, aggregation and validation. If possible the mechanism for quality assurance and quality control should be established to ensure the appropriateness and reliability of indicators presented at the NSDP and National System.

- Simple database or spreadsheet can be developed to proper record time-series values for aggregation and analysis at specific locations, sector or program, or country wide. Source of data for indicators can come from key government and sector databases (MOP 2017), National statistics, sector administrative data, Cambodia Socio-economic Survey (CSES), and Population Census. Some adaptation indicators require improvement of data collection tools and methods, and sampling survey in addition to what described above, but careful selection of method must be weighed against cost.

Definitions and criteria for each indicator are developed as summarized in tables below under each institution, and the data collection tables/tools and databases are also proposed as appear in the annex. Sex disaggregated data is also suggested as part of indicators that measure number of people.

Ministry of Rural Development

Table 1: Adaptation Indicators of MRD

Indicator Name	Definition	Baseline Data (2017)	Target (2023)	Frequency	Source
1) Length of climate resilient rural road	Length of road with DBST or concrete pavement, and built with drainage system and flood protection system.	540 Km	1234.48km	Annual	Annual Report and Sector Development Plan
2) Number of persons trained on M&E of climate risk, and trained on standard design for climate change resilient road.	Number of specialized staff capable for road design that resilient to climate change.	0	27 persons	Annual	
3) Percentage of people having access to rural sanitation resilient to climate change.	Constructed toilet that could be used for all seasons throughout the year.			Annual	Annual Report, Sector Development Plan, commune database
4) Percentage of people having access to safe water supply resilient to climate change	Source of water that is improved both in quality and quantity, well protected, and could be used throughout the year.			Annual	Annual Report, Sector Development Plan, commune database

To facilitate data collection for each indicator, the sector M&E unit at the national level and provincial level of MRD should agree on data collection tools as presented in table 2 below.

Table 2: Data collection tool and responsibility

Indicator	Criteria	Data Collection tool	Responsibility	Database
1) Length of climate resilient road	<p>a) VRA is conducted to define vulnerability and history of impact as a basis for designing climate resilient roads; and</p> <p>b) The road structure has good drainage with bridges, culverts and road crest level is higher than maximum flood level; and</p> <p>c) Improved road pavement with DBST, concrete, or use of geo-textile materials to strengthen basement; and</p> <p>d) The road slopes are protected by grasses or trees (bio-engineering)</p>	<p>Inventory of rural road at the provincial, district and commune level based on criteria.</p> <p>A spread sheet or dataset can be prepared with data fields consistent with the criteria (see the last column).</p> <p>There are four types of Rural Roads defined in the rural road inventory database:</p> <p>Type 1 - Connect from National Road or Provincial Road to a district; Rural Type 2 - Connect from district to commune;</p> <p>Type 3 – Connect from commune to commune; and</p> <p>Type 4 – Connect from commune to village or from village to village.</p>	<p>The Department of Rural Road</p> <p>Department of Planning</p> <p>Provincial Department of Rural Development</p> <p>Provincial Office of Rural Road</p>	<p>Data fields can include: total length of rural road, section of road conducted VRA, type of pavement, location of drainage canals, bridges and culverts, length of damaged sections of roads, length of roads repaired, cost of maintenance and rehabilitation.</p>
2) Number of persons trained on M&E of climate risk, and trained on standard design for climate change resilient road.	<p>Topics of training should include Climate risk assessment, M&E</p> <p>Climate resilience design standard</p>	<p>List of trained personals by topics consistent with criteria.</p>	<p>Department of Planning</p> <p>Provincial Department of Rural Development</p>	<p>A spreadsheet of trained officers include data fields: name of officers, sex, date of birth, position, year of training,</p>

				topics, duration, name of modules
3) Percentage of people having access to rural sanitation resilient to climate change.	Latrines are important sanitation measures which should be protected from flooding and are functional in all seasons.	The spread sheet provides additional tables indicating the type of latrines owned by each family. A commune database can be used to get additional information on latrines that are free from flooding with good sanitation (with septic tank).	Department of Planning Provincial Department of Rural Development Village and commune clerks Provincial Office of Rural Sanitation and Health	A spreadsheet can include data fields: name of head household, type of latrines (open pit, latrine without septic tank, latrine with septic tank), year of construction, year of damage by flood.
4) Percentage of people having access to safe drinking water supply resilient to climate change	Safe drinking water that is free from bacteria and other harmful chemicals and well protected from climate change impacts.	Data can be collected building on the current definitions of MRD, where water can be extracted through different treatment methods: piped water, protected wells, rain harvest, community water treatment, water filter appliance...etc.	Department of Planning (MRD) Provincial Department of Rural Development Village and commune clerks Provincial Office of Rural Water Supply Village and Commune Clerks Provincial Department of Planning (MOP)	Database can include data fields: name of household, number of family members, type of drinking water

Ministry of Public Works and Transport

Table 3: Indicators of MPWT

Indicator Name	Definition	Baseline Data (2017)	Target (2023)	Frequency	Source
1) Length of national road with climate resilience design.	Length of road with AC, DBST and concrete pavement, and built with drainage system and flood/disaster protection system.	8,526		Annual	Annual Report and Sector Development Plan
2) Number of technical staff trained on M&E of climate risk, and climate resilient road design standard	Technical staff that received knowledge on climate risk assessment and climate resilience road design .	NA		Annual	
3) Number of water treatment plants and quantity of wastewater treated	The water treatment plant provides both treatment facility and flood control measure (embankment and drainage)	NA		Annual	Annual report

Similar to MRD, table 4 describes data collection tools and responsibility in operationalization of proposed adaptation indicators.

Table 4: Data collection tool and responsibility

Name of Indicators	Criteria	Data collection	Responsibility	Database
1) Length of national and provincial road with climate resilience design.	1. Pavement: concrete, DBST/asphalt, 2. Flood protection: drainage canals in flood risk areas, bridges and culverts, geo-textile materials, bio-engineering 3. regular maintenance.	Inventory of road at the national and provincial level based on criteria. A spread sheet or dataset can be prepared with data fields consistent with the criteria (see the last column)	The Department of Road Department of Planning Provincial Department of Public Work and Transport	Data fields can include: total length of national and provincial road, type of pavement, location of drainage canals, bridges and culverts, length of damaged sections of roads, length of roads repaired, cost of maintenance

				and rehabilitation.
2) Number of technical staff trained on M&E of climate risk, and climate resilient road design standard	Topics of training should include Climate risk assessment, M&E Climate resilience design standard	List of trained personals by topics consistent with criteria.	Department of Planning Provincial Department of Rural Development	A spreadsheet of trained officers include data fields: name of officers, sex, date of birth, position, year of training, topics, duration, name of modules
3) Number of water treatment plant and quantity of wastewater treated	This indicator should be based on criteria of the population census	See the annex		

Ministry of Agriculture Forestry and Fisheries

Table 5: Adaptation Indicators of MAFF

Indicator Name	Definition	Baseline Data	Target (2023)	Source/data collection
1) Areas of climate resilient rice varieties	Shor-term rice varieties (these short-term rice varieties can be grown during wet and dry season, and harvest duration is 3 month or less). 5-6 rice varieties are considered resilience based on CARDI research.	Rainy Season: 660,219 Ha. Dry Season: 484,697 Ha.	TBC	Yield: 3.780 Ton per Ha. (yield is estimated by three steps: by district focal points, by standard evaluation, and by committee) Data: collected at commune level, it is compiled/aggregated at district, it is reviewed and consolidated at the provincial level, and then it is submitted to the Ministry.

Table 6 summarizes data collection tool for operationalization of the two indicators.

Table 6: Data collection tool

Name of Indicator	Criteria	Data collection tool	Responsibility	Database

1) Areas of climate resilient rice varieties	a) Least impacted by floods and droughts (Sen Pidoa, Chulsa, IR66, Kha14...); b) Saline and flood resistant (Floating rice) c) Relatively high Yield/ productivity compared to other rice varieties.	Sample survey to determine the common rice varieties planted by farmers. Areas of each climate rice variety by commune and by year. Average yield by each variety.	Department of Planning and Agriculture Statistics Provincial Department of Agriculture, Forestry and Fisheries Commune council	Data fields include common short-term rice varieties planted by province and district, areas of each variety by commune, average yield, and number of farmer households adopted the rice varieties.

Ministry of Water Resources and Meteorology

Table 7: Indicators of MOWRAM

Indicator Name	Definition	Baseline Data (2018)	Target (2023)	Source
1.Area of rice field that is covered by irrigation system (general)			TBD	Department of Planning; Department of Irrigation
2.Area of rice field that is covered by climate resilient irrigation system	Irrigation schemes with water available for wet and dry season rice crops with well-established FWUC and maintenance .		TBD	Department of Planning; Department of Irrigation, Department of Agriculture Irrigation, and Department for Farmer Water User Community
3.Number of farmer water user communities trained on climate change adaptation and disaster risk reduction.	Farmer Water User Committees officially recognized by MOWRAM and trained on water use techniques and adaptation options to cope with climate change risks.			Department of Planning; Department for Farmer Water User Community

Table 8 below describes the data collection tool and institutional responsibility.

Table 8: Data Collection Tool and Institutional Responsibility

Name of Indicator	Criteria	Data collection	Responsibility	Database
2.Area of rice field covered by climate resilient irrigation system	a) Water is available during both rainy season and dry season, which can meet the needs of those rice crop areas in all seasons; b) The irrigation system has effective structure for distribution and draining of water in the command area; c) There exists institutional mechanism and budget for maintenance and rehabilitation; d) Measure to respond to the needs of water stress in dry season and flooding (mobile water plumbing machines)	The data can be collected through remote sensing, aerial photo, official irrigation dataset.	Department of Planning, Department of Irrigation, Department of FWUC, and Provincial Department of Water Resources and Meteorology	A database can have several data fields: name of irrigation scheme, location, command area, number of beneficiaries sex-disaggregated, wet season rice, dry season rice, name of FWUC,
3.Number of farmer water user communities trained on climate change adaptation and disaster risk reduction.	Topics of training and modules are related to climate change risk planning and implementation for FWUCs.	Training modules, target FWUCs, and number of families participated in training are the subject of measurement.	Department of Planning, Department of FWUC, and Provincial Department of Water Resources and Meteorology	Data field can include: name of FWUC, location, total irrigated areas, total length of secondary canals, length of tertiary canal, member fees, total fee collected, date of

				training, number of participants.

VI. Institutional Coordination and Responsibility

6.1 Institutional Arrangement

Integration of development indicators and climate resilience indicators into NSDP is the responsibility of Ministry of Planning through General Directorate of Planning and General Directorate of National Institute of Statistics. The National M&E Working Group has just been updated with additional member ministries involved in climate change planning and implementation. This NM&EWG continues to play a key role in identification and integration appropriate development and climate related indicators into the new NSDP 2019-23. The MOP has a view that there is no need to set up specific working group on M&E of adaptation and suggests to define additional terms of reference to complement the responsibility of NM&EWG. Since development and implementation of adaptation indicators need additional training, guidance, and improvement to meet the challenges and enhance existing practice, additional TOR and institutional coordination is proposed in section below,

Proposed Additional ToR of the National M&E Working Group for M&E of Adaptation.

- Provide guidance on definitions, identification of indicators, data collection methodology for monitoring climate change adaptation plans, programs and projects to member Ministries and institutions.
- Conduct training on identification and selection of indicators, and data collection methodology for monitoring climate change adaptation plans, programs and projects, for member Ministries and institutions.
- Develop National M&E system for monitoring and evaluation of the climate change adaptation programs and projects to be integrated into the NSDP, and to be used at national, sector, and sub-national levels.
- Organize semester meetings to update climate change adaption indicators with participation of key government officers, development partners, civil society, NGOs,

and private sector.

Key sector ministries and agencies involved in mainstreaming and implementation of adaptation activities and measures are listed as follows:

- Ministry of Planning
- Ministry of Environment
- Ministry of Economy and Finance
- National Committee for Sub-national Democratic Development
- National Committee for Disaster Management
- Ministry of Water Resources and Meteorology
- Ministry of Agriculture, Forestry and Fisheries
- Ministry of Rural Development,
- Ministry of Public Works and Transport
- Ministry of Health
- Ministry of Land Management, Urban Planning and Construction
- Ministry of Women Affairs
- Ministry of Industry and Handicraft.

The NM&EWG can be convened in every semester to update and discuss the data collection, quality and challenge. Additional guidance and awareness training can be included in the agenda of the semester meeting.

6.2 Operational Arrangement

The proposed adaptation indicators listed above may require involvement of various ministries, technical departments and sub-national agencies. It is important to note indicators integrated into NSDP are aggregated from commune level, therefore data collection and capacity of sub-national entities and stakeholders must be put in place. Some data, for example rainfall and temperature, are the responsibility of MOWRAM and mostly collected by automatic rainfall stations, though there is a possibility that local meteorological data can be collected by projects and organizations by its own equipment. Some data is collected through remote sensing, especially those concerned with mapping, thus fall into discrete responsibility of particular institution. However, some indicators, such as safe drinking water supply and sanitation can be shared among several institutions such MRD, MOWRAM, MIH, MPWT and MOP. Therefore data collection tools, data aggregation and analysis must be agreed among those concerned.

- The Ministry of Planning will play a coordination role to compile and aggregate data in close cooperation with relevant ministries. The provincial department of Planning in each province can facilitate data compilation and validation at the provincial level before transferring to the national level.
- Each sector ministry must provide clear data collection tools (as proposed above with appropriate revision) based on guidance from MOP, and data should be properly recorded by a spreadsheet or database.
- The Commune database contains some relevant adaptation indicators, which should be well consistent with the data collected by provincial line departments. District councils can be a focal point for compilation and aggregation of provincial indicators in collaboration with all stakeholders before validation at the provincial offices.

Annex

Data collection table for MOWRAM

Table 9: Climate resilience irrigation scheme

Province	District	Commune	Name of scheme	Length of main canal	Length of secondary canal	Length of Tertiary Canal	Command areas	Type of Crops	Adaptation measure	Areas damaged by floods	areas damaged by drought	Name of FWUC	Number of HH beneficiaries	Number of females	Year

Data Collection Table for MRD

Table 10: climate resilience rural road

Type	Province	district	commune	pavement type	lenth exposing to frequent flood	measure (drainage, geo-textile , bio-	length of damaged section	Recovery cost	Maintenace cost	Total lenth	Climate proof section	Year
Province to district												
District to district												
District to commune												
Commune to commune												

Safe drinking water supply and sanitation (the population census should be the key source)

Sample survey can be used to update the progress based on the data sheet of the population census

Table 11: safe drinking water and sanitation

Province	district	commune	village	Family name	Type of water	Type of latrine

Type of latrine used by HH (Sanitation and hygiene)

1. No latrine
2. Latrine with flushing and connected with sewage system
3. Latrine with septic tank
4. Latrine without septic tank
5. Latrine with pit
6. Open Latrine without
7. Latrine with direct disposal to the surrounding environment
8. Others

Type of safe drinking water supply (Sanitation and hygiene)

1. Piped tube within house
2. Piped tube in the vicinity
3. Public piped tube
4. Pumping well
5. Well with protected cover
6. Well without protected cover
7. Spring with protection
8. Spring without protection
9. Rainwater
10. Buying water from the tank carried by truck
11. Buying water from the tank carried by cart
12. Surface water (river, lake, pond...)
13. Bottle water
14. Others

Data Collection table for MPWT

Table 12: climate resilience national and provincial roads

Type	Province	pavement type	section exposing to frequent flood	(drainage, geotextile, bio-engineering)	length of damaged section	Recovery cost	Maintenance cost	Total length	Climate proof section	Year
National										
Provincial										

Table 8:

Type	Province	District	Name of facility	Length of drainage canal	Capacity of treatment	Number of People Beneficiaries	Female beneficiaries	Areas of Flood control section	Year

Data Collection table for MAFF

Table 13: Climate resilience rice varieties

Name of short term rice (STR)	Province Name	District Name	Commune	HH Number	Farmer HH planting STR	Area, ha	Area damaged by flood	Area damaged by Drought	Area damaged by pest	Yield	Year
Sen Pidoa											
Chulsa											
IR66											
Kha14											
Saline											
Floating											

Annex 4: PIP 2019-21, MOP 2018.

No	Project Title	PIP N°	Total Project Budget	Actual Disbursements in 2017	Total Planned Expenditure				Committed Funds				Additional Funds Required			
					2019	2020	2021	Total 2019-2021	Source of Funds	2019	2020	2021	Total 2019-2021	2019	2020	2021

29. Ministry of Water Resources & Meteorology

On Going

A: Investment project

1.	Hydrology and Bank Protection	241	3,700.0	0.0	500.0	500.0	522.0	1,522.0	ORGC	500.0	500.0	522.0	1,522.0	0.0	0.0	0.0	.0
									Total	500.0	500.0	522.0	1,522.0				
2.	Achang Irrigation Development Project in Kampong Chhnang Province	208	44,994.0	0.0	4,994.0	0.0	0.0	4,994.0						0.0	0.0	0.0	.0
									China	4,994.0	0.0	0.0	4,994.0				
									Total	4,994.0	0.0	0.0	4,994.0				
3.	Bavel Developing Irrigation Systems and Reduce Flood	248	63,919.0	0.0	10,000.0	10,000.0	13,000.0	33,000.0						0.0	0.0	0.0	.0
									Republic of Korea	10,000.0	10,000.0	13,000.0	33,000.0				
									Total	10,000.0	10,000.0	13,000.0	33,000.0				
4.	Dauntri Dam Development in Battambang Province	212	46,700.0	0.0	12,000.0	12,000.0	12,000.0	36,000.0	ORGC	1,800.0	1,800.0	1,800.0	5,400.0	0.0	0.0	0.0	.0
									Republic of Korea	10,200.0	10,200.0	10,200.0	30,600.0				
									Total	12,000.0	12,000.0	12,000.0	36,000.0				
5.	Flood Protection and Irrigation System Development Project in Banthey Meanchey Province	267	85,095.0	0.0	6,523.0	20,513.0	35,892.0	62,928.0	ORGC	2,003.0	4,190.0	6,007.0	12,200.0	0.0	0.0	0.0	.0

								Republic of Korea	4,520.0	16,323.0	29,885.0	50,728.0					
								Total	6,523.0	20,513.0	35,892.0	62,928.0					
6.	Irrigation Section Development and Agriculture Irrigation Rehabilitation in Kampong Thom, Siem Reap and Bantheymeanchey Provinces	213	10,000.0	0.0	1,000.0	0.0	0.0	1,000.0					0.0	0.0	0.0	.0	
								France	1,000.0	0.0	0.0	1,000.0					
								Total	1,000.0	0.0	0.0	1,000.0					
7.	Irrigation Section Development and Agriculture Kolmtages Rehabilitation in Kandal Province	214	10,000.0	0.0	2,000.0	0.0	0.0	2,000.0					0.0	0.0	0.0	.0	
								France	2,000.0	0.0	0.0	2,000.0					
								Total	2,000.0	0.0	0.0	2,000.0					
8.	PDOWNRAM Construction Project	223	2,093.0	0.0	200.0	200.0	200.0	600.0	ORG	200.0	200.0	200.0	600.0	0.0	0.0	0.0	.0
								Total	200.0	200.0	200.0	600.0					
9.	Rehabilitation of 111 Irrigation Systems	227	164,316.0	0.0	15,000.0	15,000.0	16,185.0	46,185.0	ORG	15,000.0	15,000.0	16,185.0	46,185.0	0.0	0.0	0.0	.0
								Total	15,000.0	15,000.0	16,185.0	46,185.0					
10.	Rehabilitation of 123 Irrigation System	225	198,533.0	0.0	18,000.0	18,000.0	19,000.0	55,000.0	ORG	18,000.0	18,000.0	19,000.0	55,000.0	0.0	0.0	0.0	.0
								Total	18,000.0	18,000.0	19,000.0	55,000.0					
11.	Rehabilitation of Irrigation Infrastructure Drainage by Flood	228	11,300.0	0.0	3,000.0	0.0	0.0	3,000.0					0.0	0.0	0.0	.0	
								ADB	3,000.0	0.0	0.0	3,000.0					
								Total	3,000.0	0.0	0.0	3,000.0					

12.	Release and Flood Management and Drought in GMS	217	47,750.0	3,239.0	16,882.0	0.0	0.0	16,882.0	ORGC	844.0	0.0	0.0	844.0	0.0	0.0	0.0	.0
										ADB	16,038.0	0.0	0.0	16,038.0			
										Total	16,882.0	0.0	0.0	16,882.0			
13.	Sala Ta On Irrigation System Development in Battambang Province	229	36,647.0	6,840.0	10,000.0	10,000.0	10,000.0	30,000.0	ORGC	1,000.0	1,000.0	1,000.0	3,000.0	0.0	0.0	0.0	.0
										Republic of Korea	9,000.0	9,000.0	9,000.0	27,000.0			
										Total	10,000.0	10,000.0	10,000.0	30,000.0			
14.	Southwest Phnom Penh Irrigation and Drainage Rehabilitation and Improvement Project	263	57,500.0	1,680.0	1,000.0	17,100.0	17,100.0	35,200.0	ORGC	200.0	3,420.0	3,420.0	7,040.0	0.0	0.0	0.0	.0
										Japan	800.0	13,680.0	13,680.0	28,160.0			
										Total	1,000.0	17,100.0	17,100.0	35,200.0			
15.	Steung Chykreng Water Resources Development in Siem Reap Province	231	44,941.0	0.0	8,000.0	12,941.0	0.0	20,941.0						0.0	0.0	0.0	.0
										China	8,000.0	12,941.0	0.0	20,941.0			
										Total	8,000.0	12,941.0	0.0	20,941.0			
16.	Steung Stong Water Resource Development (Phase 1) in Kampong Thom Province	233	52,044.0	0.0	12,000.0	0.0	0.0	12,000.0						0.0	0.0	0.0	.0
										China	12,000.0	0.0	0.0	12,000.0			
										Total	12,000.0	0.0	0.0	12,000.0			
17.	Steung Sva Hab Irrigation System Development	283	36,920.0	0.0	12,000.0	12,000.0	12,000.0	36,000.0						0.0	0.0	0.0	.0
										India	12,000.0	12,000.0	12,000.0	36,000.0			

								Total	12,000.0	12,000.0	12,000.0	36,000.0					
18.	Third and Fifth Pursat River Water Resources Development (Phase 2)	284	47,000.0	0.0	11,000.0	13,000.0	15,000.0	39,000.0					0.0	0.0	0.0	.0	
								China	11,000.0	13,000.0	15,000.0	39,000.0					
								Total	11,000.0	13,000.0	15,000.0	39,000.0					
19.	Upland Irrigation and Water Resource Management Sector Project	373	66,120.0	0.0	9,120.0	12,520.0	12,000.0	33,640.0	ORGC	90.0	130.0	120.0	340.0	0.0	0.0	0.0	.0
								ADB	9,030.0	12,390.0	11,880.0	33,300.0					
								Total	9,120.0	12,520.0	12,000.0	33,640.0					
20.	Vocio River Basin Water Resource Development (Phase 1) in Svay Rieng and Prey Veng Provinces	234	104,530.0	0.0	10,000.0	4,530.0	0.0	14,530.0					0.0	0.0	0.0	.0	
								China	10,000.0	4,530.0	0.0	14,530.0					
								Total	10,000.0	4,530.0	0.0	14,530.0					
21.	Vocio River Basin Water Resource Development (Phase 2) in Svay Rieng Province	235	97,400.0	0.0	15,000.0	15,000.0	5,000.0	35,000.0					0.0	0.0	0.0	.0	
								China	15,000.0	15,000.0	5,000.0	35,000.0					
								Total	15,000.0	15,000.0	5,000.0	35,000.0					
22.	Water and Agriculture Development Sector	699	50,000.0	0.0	5,000.0	10,000.0	10,000.0	25,000.0					0.0	0.0	0.0	.0	
								France	5,000.0	10,000.0	10,000.0	25,000.0					
								Total	5,000.0	10,000.0	10,000.0	25,000.0					
23.	Water Resource Development and Management	236	43,080.0	0.0	800.0	0.0	0.0	800.0	ORGC	110.0	0.0	0.0	110.0	0.0	0.0	0.0	.0

								ADB	690.0	0.0	0.0	690.0				
								Total	800.0	0.0	0.0	800.0				
24. West Tonle Sap Irrigation and Drainage Rehabilitation and Improvement Project	230	47,150.0	17,610.0	9,630.0	9,630.0	8,000.0	27,260.0	RGC	200.0	200.0	160.0	560.0	0.0	0.0	0.0	.0
								Japan	9,430.0	9,430.0	7,840.0	26,700.0				
								Total	9,630.0	9,630.0	8,000.0	27,260.0				
Sub-Total A: Investment project								RGC	39,947.0	44,440.0	48,414.0	132,801.0				
								DPs	153,702.0	148,494.0	137,485.0	439,681.0				
		1,371,732.0	29,369.0	193,649.0	192,934.0	185,899.0	572,482.0	Total	193,649.0	192,934.0	185,899.0	572,482.0	0.0	0.0	0.0	0.0
B: Free-standing technical assistance																
1. Attach Mekong River to Tonle Sab River Mangement and Water Resources Development	374	555.0	0.0	300.0	200.0	0.0	500.0						0.0	0.0	0.0	.0
								Republic of Korea	300.0	200.0	0.0	500.0				
								Total	300.0	200.0	0.0	500.0				
2. Gender Mainstreaming of Water Resources	247	1,000.0	0.0	30.0	30.0	30.0	90.0	RGC	30.0	30.0	30.0	90.0	0.0	0.0	0.0	.0
								Total	30.0	30.0	30.0	90.0				
3. Increase and Strengthen Farmer Water User Community (FWUC)	243	14,563.0	0.0	2,850.0	3,780.0	4,600.0	11,230.0	RGC	2,850.0	3,780.0	4,600.0	11,230.0	0.0	0.0	0.0	.0
								Total	2,850.0	3,780.0	4,600.0	11,230.0				
4. Manage and Control the Undergrown Water Resources	295	1,857.0	0.0	725.0	506.0	509.0	1,740.0	RGC	725.0	506.0	509.0	1,740.0	0.0	0.0	0.0	.0
								Total	725.0	506.0	509.0	1,740.0				

5. River Basin Water Resources Utilization	265	5,000.0	0.0	1,000.0	1,000.0	0.0	2,000.0						0.0	0.0	0.0	.0
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Japan	1,000.0	1,000.0	0.0	2,000.0
Total	1,000.0	1,000.0	0.0	2,000.0

Sub-Total B: Free-standing technical assistance								RGC	3,605.0	4,316.0	5,139.0	13,060.0				
								DPs	1,300.0	1,200.0	0.0	2,500.0				
	22,975.0	0.0	4,905.0	5,516.0	5,139.0	15,560.0	Total	4,905.0	5,516.0	5,139.0	15,560.0	0.0	0.0	0.0	0.0	

Sub-Total On Going								RGC	43,552.0	48,756.0	53,553.0	145,861.0				
								DPs	155,002.0	149,694.0	137,485.0	442,181.0				
	1,394,707.0	29,369.0	198,554.0	198,450.0	191,038.0	588,042.0	Total	198,554.0	198,450.0	191,038.0	588,042.0	0.0	0.0	0.0	0.0	

PIP MAFF

No	Project Title	PIP N°	Total Project Budget	Actual Disbursements in 2017	Total Planned Expenditure				Committed Funds				Additional Funds Required			
					2019	2020	2021	Total 2019-2021	Source of Funds	2019	2020	2021	Total 2019-2021	2019	2020	2021

4. Ministry of Agriculture, Forestry and Fisheries

On Going

A: Investment project

1.	Agriculture Service Program for Innovation, Resilience and Extension (ASPIRE)	114	52,400.0	6,097.0	8,220.0	9,028.0	6,947.0	24,195.0	ORGC	1,663.0	1,792.0	1,530.0	4,985.0	0.0	0.0	0.0	.0
									IFAD	6,557.0	7,236.0	5,417.0	19,210.0				

								Total	8,220.0	9,028.0	6,947.0	24,195.0				
2.	Building of 1500 Rural Household Biogas	630	1,500.0	0.0	500.0	450.0	250.0	1,200.0					0.0	0.0	0.0	.0
								China	500.0	450.0	250.0	1,200.0				
								Total	500.0	450.0	250.0	1,200.0				
3.	Climate Resilient Rice Commercialization Sector Development Program (Rice-SDP)	473	87,310.1	0.0	623.0	0.0	0.0	623.0					0.0	0.0	0.0	.0
								ADB	623.0	0.0	0.0	623.0				
								Total	623.0	0.0	0.0	623.0				
Sub-Total A: Investment project									RGC	1,663.0	1,792.0	1,530.0	4,985.0			
								DPs	7,680.0	7,686.0	5,667.0	21,033.0				
		141,210.1	6,097.0	9,343.0	9,478.0	7,197.0	26,018.0	Total	9,343.0	9,478.0	7,197.0	26,018.0	0.0	0.0	0.0	0.0
B: Free-standing technical assistance																
1.	Establishment of Forest Genetics Research Center for Restoration of Major Timber Species in Cambodia	625	1,500.0	245.4	111.7	111.5	91.5	314.7					0.0	0.0	0.0	.0
								Republic of Korea	111.7	111.5	91.5	314.7				
								Total	111.7	111.5	91.5	314.7				
2.	GMS Biodiversity Corridor Conservation Project	618	13,693.5	1,443.9	1,580.0	0.0	0.0	1,580.0					0.0	0.0	0.0	.0
								ADB	1,580.0	0.0	0.0	1,580.0				
								Total	1,580.0	0.0	0.0	1,580.0				
3.	Integrated Forest Ecosystem Management Planning and Demonstration Project in Greater Mekong Sub-region (Cambodia)	749	1,115.5	0.0	76.6	97.9	0.0	174.5					0.0	0.0	0.0	.0
								China	76.6	97.9	0.0	174.5				

								Total	76.6	97.9	0.0	174.5				
4.	Landscape approach to Sustainable Management of Forests in Prek Thnot Watersheds	624	499.2	72.7	53.8	0.0	0.0	53.8					0.0	0.0	0.0	.0
								China	53.8	0.0	0.0	53.8				
								Total	53.8	0.0	0.0	53.8				
5.	Promotion of Forest Rehabilitation in Cambodia and Viet Nam through Demonstration Models and Improvement of seed supply system	627	500.0	124.2	78.6	0.0	0.0	78.6					0.0	0.0	0.0	.0
								Republic of Korea	78.6	0.0	0.0	78.6				
								Total	78.6	0.0	0.0	78.6				
6.	R & D of Cambodia Natural Fiber Composite for Industrial Application	619	51.0	10.6	17.0	0.0	0.0	17.0					0.0	0.0	0.0	.0
								Republic of Korea	17.0	0.0	0.0	17.0				
								Total	17.0	0.0	0.0	17.0				
7.	Sustainable Forest Management through REDD+ Mechanisms in Kampong Thom Province	623	414.4	22.6	99.9	0.0	0.0	99.9					0.0	0.0	0.0	.0
								Japan	99.9	0.0	0.0	99.9				
								Total	99.9	0.0	0.0	99.9				
8.	The Establishment of Korea-Cambodia Natural Recreation Forest Model (Prey Chamka Kranhoung), Siem Reap Province, Cambodia	750	100.0	0.0	27.6	0.0	0.0	27.6					0.0	0.0	0.0	.0
								Korea	27.6	0.0	0.0	27.6				
								Total	27.6	0.0	0.0	27.6				

								RGC	0.0	0.0	0.0	0.0				
Sub-Total B: Free-standing technical assistance								DPs	2,045.2	209.4	91.5	2,346.1				
	17,873.5	1,919.4	2,045.2	209.4	91.5	2,346.1	Total		2,045.2	209.4	91.5	2,346.1	0.0	0.0	0.0	0.0

								RGC	1,663.0	1,792.0	1,530.0	4,985.0				
Sub-Total On Going								DPs	9,725.2	7,895.4	5,758.5	23,379.1				
	159,083.6	8,016.4	11,388.2	9,687.4	7,288.5	28,364.1	Total		11,388.2	9,687.4	7,288.5	28,364.1	0.0	0.0	0.0	0.0

PIP MRD

No	Project Title	PIP No	Total Project Budget	Actual Disbursements in 2017	Total Planned Expenditure				Committed Funds				Additional Funds Required			
					2019	2020	2021	Total 2019-2021	Source of Funds	2019	2020	2021	Total 2019-2021	2019	2020	2021

26. Ministry of Rural Development

On Going

A: Investment project

1.	Second Rural Water Supply and Sanitation (Additional Financing)	819	16,500.0	0.0	1,200.0	200.0	0.0	1,400.0											
									ADB	1,200.0	200.0	0.0	1,400.0						
									Total	1,200.0	200.0	0.0	1,400.0						
2.	Labor Cash Project to Improve Rural Infrastructure and Support Farmers	700	24,712.0	0.0	8,237.4	0.0	0.0	8,237.4	RGC	8,237.4	0.0	0.0	8,237.4	0.0	0.0	0.0			
									Total	8,237.4	0.0	0.0	8,237.4						
3.	Rural Development Project with Saemaul Undong Approach	557	8,000.0	0.0	2,666.0	2,666.0	2,668.0	8,000.0						0.0	0.0	0.0			

									Republic of Korea	2,666.0	2,666.0	2,668.0	8,000.0				
									Total	2,666.0	2,666.0	2,668.0	8,000.0				
4. Rural Infrastructure Programme Phase IV (RIP-IV)	604	22,605.0	9,305.0	3,300.0	3,300.0	0.0	6,600.0	RGC	3,300.0	3,300.0	0.0	6,600.0	0.0	0.0	0.0	.0	
									Total	3,300.0	3,300.0	0.0	6,600.0				
5. Rural Roads Improvement Project II	226	192,710.0	22,737.0	67,210.0	38,090.0	0.0	105,300.0	RGC	130.0	130.0	0.0	260.0	0.0	17,200.0	0.0	17,200.0	
									Republic of Korea	14,000.0	3,000.0	0.0	17,000.0				
									Other	37,920.0	7,430.0	0.0	45,350.0				
									ADB	15,160.0	10,330.0	0.0	25,490.0				
									Total	67,210.0	20,890.0	0.0	88,100.0				
6. Rural Water Supply	189	10,410.0	2,828.2	1,740.3	2,013.3	0.0	3,753.6						0.0	0.0	0.0	.0	
									India	1,740.3	2,013.3	0.0	3,753.6				
									Total	1,740.3	2,013.3	0.0	3,753.6				
Sub-Total A: Investment project									RGC	11,667.4	3,430.0	0.0	15,097.4				
									DPs	72,686.3	25,639.3	2,668.0	100,993.6				
		274,937.0	34,870.2	84,353.7	46,269.3	2,668.0	133,291.0	Total	84,353.7	29,069.3	2,668.0	116,091.0	0.0	17,200.0	0.0	17,200.0	
B: Free-standing technical assistance																	
1. Provide Basic Skill and Job Creation	239	300.0	0.0	100.0	100.0	100.0	300.0	RGC	100.0	100.0	100.0	300.0	0.0	0.0	0.0	.0	
									Total	100.0	100.0	100.0	300.0				
2. Provide Basic Skill on Biogas Construction and New Stove Building	211	2,150.0	0.0	795.0	685.0	670.0	2,150.0	RGC	795.0	685.0	670.0	2,150.0	0.0	0.0	0.0	.0	
									Total	795.0	685.0	670.0	2,150.0				
Sub-Total B: Free-standing technical assistance									RGC	895.0	785.0	770.0	2,450.0				
									DPs	0.0	0.0	0.0	0.0				
		2,450.0	0.0	895.0	785.0	770.0	2,450.0	Total	895.0	785.0	770.0	2,450.0	0.0	0.0	0.0	0.0	

Sub-Total On Going								RGC	12,562.4	4,215.0	770.0	17,547.4				
								DPs	72,686.3	25,639.3	2,668.0	100,993.6				
	277,387.0	34,870.2	85,248.7	47,054.3	3,438.0	135,741.0	Total	85,248.7	29,854.3	3,438.0	118,541.0	0.0	17,200.0	0.0	17,200.0	

PIP MPWT

No	Project Title	PIP N°	Total Project Budget	Actual Disbursements in 2017	Total Planned Expenditure				Committed Funds				Additional Funds Required			
					2019	2020	2021	Total 2019-2021	Source of Funds	2019	2020	2021	Total 2019-2021	2019	2020	2021

25. Ministry of Public Works & Transport

On Going

A: Investment project

1.	Construction of National Border (Stung Bot-Nong Ean) and Road Connection (checkpoint border to NR.5-Banteay Meanchey Province)	742	29,766.3	0.0	5,953.3	14,883.1	8,929.9	29,766.3					0.0	0.0	0.0	.0
									Thailand	5,953.3	14,883.1	8,929.9	29,766.3			
									Total	5,953.3	14,883.1	8,929.9	29,766.3			
2.	Construction of National Road No.3 from Chom Chao (Phnom Penh) to Veal Renh (Kampot)	33	215,388.0	0.0	1,000.0	1,000.0	3,000.0	5,000.0					0.0	0.0	0.0	.0
									China	1,000.0	1,000.0	3,000.0	5,000.0			
									Total	1,000.0	1,000.0	3,000.0	5,000.0			
3.	Construction of NR 11 [Neakloeung-Thnal	25	98,388.0	0.0	45,000.0	25,847.7	20,000.0	90,847.7					0.0	0.0	0.0	.0

Totoeung(NR7)] Length 96.48km.																
									China	45,000.0	25,847.7	20,000.0	90,847.7			
								Total	45,000.0	25,847.7	20,000.0	90,847.7				
4.	Construction of NR2 and NR22	32	56,100.0	0.0	1,000.0	1,000.0	3,000.0	5,000.0					0.0	0.0	0.0	.0
									Republic of Korea	1,000.0	1,000.0	3,000.0	5,000.0			
								Total	1,000.0	1,000.0	3,000.0	5,000.0				
5.	Construction of Provincial Road No.55-1 (Samlot-Veal Veng-Koh Kong) 197.363 Km	68	173,880.0	0.0	1,000.0	1,000.0	3,000.0	5,000.0					0.0	0.0	0.0	.0
									China	1,000.0	1,000.0	3,000.0	5,000.0			
								Total	1,000.0	1,000.0	3,000.0	5,000.0				
6.	Construction of Stung Bot-Nong Ean Bridge	740	21,488.2	0.0	7,162.6	7,162.6	7,162.6	21,487.8					0.0	0.0	0.0	.0
									Thailand	7,162.6	7,162.6	7,162.6	21,487.8			
								Total	7,162.6	7,162.6	7,162.6	21,487.8				
7.	Construction Project of Phnom Penh-Sihanoukville Expressway	834	1,782,000.0	0.0	1,000.0	2,000.0	5,000.0	8,000.0					0.0	0.0	0.0	.0
									China	1,000.0	2,000.0	5,000.0	8,000.0			
								Total	1,000.0	2,000.0	5,000.0	8,000.0				
8.	Flood Damaging Road Rehabilitation Project of NR7 from Kla Stus to O Chalang (South Section) Length 93.565 km	99	36,593.8	29,309.0	1,821.2	0.0	0.0	1,821.2					0.0	0.0	0.0	.0
									China	1,821.2	0.0	0.0	1,821.2			

								Total	1,821.2	0.0	0.0	1,821.2					
9.	GMS Corridor Towns Development Project	9	92,800.0	42,010.9	7,277.0	0.0	0.0	7,277.0	RGC	97.1	0.0	0.0	97.1	0.0	0.0	0.0	.0
								ADB	7,179.9	0.0	0.0	7,179.9					
								Total	7,277.0	0.0	0.0	7,277.0					
10.	Improvement of Siem Reap River Phase II	705	13,300.0	0.0	5,020.3	5,021.3	4,492.5	14,534.1	RGC	586.0	587.0	146.0	1,319.0	0.0	0.0	0.0	.0
								Republic of Korea	4,434.3	4,434.3	4,346.5	13,215.1					
								Total	5,020.3	5,021.3	4,492.5	14,534.1					
11.	Integrated Urban Environmental Management in the Tonle Sap Basin	382	52,600.0	658.5	10,904.6	10,839.7	10,839.7	32,584.0						0.0	0.0	0.0	.0
								ADB	10,904.6	10,839.7	10,839.7	32,584.0					
								Total	10,904.6	10,839.7	10,839.7	32,584.0					
12.	National Road No.5 Improvement Project (Battambang-Sri Sophorn Section) I+II	12	215,000.0	883.2	50,984.9	50,915.7	46,186.4	148,087.0						0.0	0.0	0.0	.0
								Japan	50,984.9	50,915.7	46,186.4	148,087.0					
								Total	50,984.9	50,915.7	46,186.4	148,087.0					
13.	National Road No.5 Improvement Project (Prek Kdam- Thlea Ma'am Section)	7	265,157.0	736.5	55,429.0	55,429.0	55,429.0	166,287.0						0.0	0.0	0.0	.0
								Japan	55,429.0	55,429.0	55,429.0	166,287.0					
								Total	55,429.0	55,429.0	55,429.0	166,287.0					
14.	National Road No.5 Improvement Project (Thlea	13	186,000.0	2,496.0	10,744.7	12,200.5	11,526.8	34,472.0						0.0	0.0	0.0	.0

								Total	4,000.0	5,000.0	0.0	9,000.0					
20.	Road Asset Management Project (RAMP2)	20	64,000.0	25,982.9	325.0	14,612.9	23,059.2	37,997.1					0.0	0.0	0.0	.0	
								World Bank	325.0	14,612.9	23,059.2	37,997.1					
								Total	325.0	14,612.9	23,059.2	37,997.1					
21.	Road Asset Management Project (RAMP2) Additional Financing	890	110,000.0	0.0	31,880.0	42,710.0	19,070.0	93,660.0					0.0	0.0	0.0	.0	
								World Bank	31,880.0	42,710.0	19,070.0	93,660.0					
								Total	31,880.0	42,710.0	19,070.0	93,660.0					
22.	Road Network Improvement Project (RNIP)	716	70,000.0	6,000.0	18,000.0	18,000.0	18,000.0	54,000.0					0.0	0.0	0.0	.0	
								ADB	18,000.0	18,000.0	18,000.0	54,000.0					
								Total	18,000.0	18,000.0	18,000.0	54,000.0					
23.	Second Greater Mekong Sub-region Corridor Towns Development (Kampot-Preah Sihanouk)	50	38,000.0	1,570.4	12,908.8	11,871.1	11,871.1	36,651.0	ORGC	37.7	0.0	0.0	37.7	0.0	0.0	0.0	.0
								ADB	12,871.1	11,871.1	11,871.1	36,613.3					
								Total	12,908.8	11,871.1	11,871.1	36,651.0					
24.	Sihanoukville New Port Container Development Project	377	203,000.0	1,500.0	2,080.0	37,910.0	60,480.0	100,470.0					0.0	0.0	0.0	.0	
								JICA	2,080.0	37,910.0	60,480.0	100,470.0					
								Total	2,080.0	37,910.0	60,480.0	100,470.0					
25.	The Project of Stueng Trang - Krauch Chhmar	43	56,998.0	11,399.6	14,249.5	11,399.6	2,849.9	28,499.0					0.0	0.0	0.0	.0	

Bridge over Mekong River in Cambodia (Phase I of National Road No. 71c) Bridge Length 1131m.

China	14,249.5	11,399.6	2,849.9	28,499.0
Total	14,249.5	11,399.6	2,849.9	28,499.0

26. The Sewerage System Development in Ta Khmau Town Project	833	63,886.0	5,250.0	15,638.0	15,892.0	7,143.0	38,673.0	RG	2,272.0	2,309.0	1,038.0	5,619.0	0.0	0.0	0.0	.0
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Republic of Korea	13,366.0	13,583.0	6,105.0	33,054.0
Total	15,638.0	15,892.0	7,143.0	38,673.0

27. West Section of the Second Ring Road of Phnom Penh, Road Length 16.563 km, Fly-over Bridge 610 m	19	61,903.0	43,332.2	3,095.2	0.0	0.0	3,095.2						0.0	0.0	0.0	.0
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China	3,095.2	0.0	0.0	3,095.2
Total	3,095.2	0.0	0.0	3,095.2

Sub-Total A: Investment project								RG	2,992.8	2,896.0	1,184.0	7,072.8				
								DPs	402,911.3	416,716.7	383,390.1	1,203,018.1				
	4,271,384.3	201,762.3	405,904.1	419,612.7	384,574.1	1,210,090.9	Total	405,904.1	419,612.7	384,574.1	1,210,090.9	0.0	0.0	0.0	0.0	

Sub-Total On Going								RG	2,992.8	2,896.0	1,184.0	7,072.8				
								DPs	402,911.3	416,716.7	383,390.1	1,203,018.1				
	4,271,384.3	201,762.3	405,904.1	419,612.7	384,574.1	1,210,090.9	Total	405,904.1	419,612.7	384,574.1	1,210,090.9	0.0	0.0	0.0	0.0	