



Project Identification Form (PIF) entry – Full Sized Project – GEF - 7

## Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer

### Part I: Project Information

**GEF ID**

10520

**Project Type**

FSP

**Type of Trust Fund**

GET

**CBIT/NGI**☐ CBIT☐ NGI**Project Title**

Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer

**Countries**

Regional, Cambodia, Viet Nam

**Agency(ies)**

FAO

**Other Executing Partner(s)**

MoNRE Viet Nam (Lead), MoE Cambodia (Lead), regional/transboundary partner to be identified during PPG

**Executing Partner Type**

Government

**GEF Focal Area**

International Waters

**Taxonomy**

Focal Areas, International Waters, Freshwater, Aquifer, Transboundary Diagnostic Analysis, Influencing models, Transform policy and regulatory environments, Strengthen institutional capacity and decision-making, Stakeholders, Beneficiaries, Local Communities, Type of Engagement, Partnership, Participation, Civil Society, Community Based Organization, Non-Governmental Organization, Academia, Private Sector, Large corporations, Individuals/Entrepreneurs, SMEs, Communications, Awareness Raising, Behavior change, Gender Equality, Gender Mainstreaming, Women groups, Gender-sensitive indicators, Capacity, Knowledge and Research, Learning, Adaptive management, Knowledge Generation

**Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 0

**Climate Change Adaptation**

Climate Change Adaptation 1

**Duration**

60 In Months

**Agency Fee(\$)**

1,350,000

**Submission Date**

3/20/2020

## A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
IW-3-5	GET	4,500,000	25,000,000
IW-3-6	GET	5,950,000	9,000,000
IW-3-7	GET	4,550,000	32,000,000
Total Project Cost (\$)		15,000,000	66,000,000

**B. Indicative Project description summary****Project Objective**

To strengthen environmental sustainability and water security in the Lower Mekong Basin by focusing, for the first time, on improved governance and sustainable utilization of the Cambodia-Mekong River Delta Transboundary Aquifer.

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
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Component 1 Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods	Technical Assistance	<p>Outcome 1</p> <p>Consensus among countries on key transboundary and national concerns affecting the aquifer, reached through joint fact finding, opening pathways to concerted remedial actions.</p> <p>Outcome Indicator (OI): TDA signed by Cambodia and Viet Nam</p>	<p>Output 1.1</p> <p>Assessment of current state of groundwater resources, recharge and extraction dynamics</p> <p>Output 1.2 Analysis of groundwater related dependencies of related ecosystems</p> <p>Output 1.3</p> <p>Agreed upon Transboundary Diagnostic Analysis (TDA), including assessment of related governance, socio-economic, legal and gender aspects.</p> <p>Output 1.4</p> <p>Agreement reached on Environmental Status Indicators.</p>	GET	4,500,000	25,000,000
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Component 2 Piloting solutions for improved transboundary groundwater management	Investment	<p>Outcome 2</p> <p>Tested strategies for improved groundwater recharge, reduced extraction and mitigated ecosystem/ livelihoods trade-offs</p> <p>OI: Pilot study designs, implementation reports, and upscaling-focused assessments for three pilots for improved groundwater management (extraction and recharge) in each country</p>	<p>Output 2.1</p> <p>Pilot demonstrations of innovative groundwater management and utilization</p>	GET	4,550,000	32,000,000
Component 3 Transboundary cooperation mechanisms	Technical Assistance	<p>Outcome 3.</p> <p>Agreed upon arrangements for transboundary cooperation improve aquifer transboundary governance</p> <p>OI: Interim bilateral coordination agreement signed by two countries</p>	<p>Output 3.1</p> <p>Harmonized design of groundwater monitoring networks and protocols</p> <p>Output 3.2</p> <p>Agreement on groundwater data exchange mechanisms and procedures.</p> <p>Output 3.3</p> <p>Design of permanent transboundary consultation and coordination body (TCCB).</p>	GET	2,500,000	7,000,000

Component 4 Joint strategies and action programs	Technical Assistance	<p>Outcome 4</p> <p>Commitment reached among countries on implementing priority legal, institutional and policy reforms and investments for the protection and equitable utilization of the shared aquifer and its' dependent ecosystems</p> <p>OI: Two SAPs approved/signed by the relevant Ministry in each country</p>	<p>Output 4.1</p> <p>Countries establish ad hoc inter-ministerial committees.</p> <p>Output 4.2</p> <p>A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets.</p> <p>Output 4.3</p> <p>Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision.</p>	GET	1,000,000	500,000
Component 5 Reinforced institutional capacity, improved participation, gender mainstreaming, monitoring and coordination	Technical Assistance	<p>Outcome 5.</p> <p>Implementation of project mechanisms for monitoring, improved stakeholder consultation, gender mainstreaming, dissemination, coordination and monitoring progress enhance long-term sustainability of achievements.</p> <p>OI: 100 national staff skills and knowledge of transboundary issues increases by 50% over baseline levels</p>	<p>Output 5.1</p> <p>Structured capacity building in groundwater governance for decision makers and other stakeholders.</p> <p>Output 5.2</p> <p>Annual stocktaking and awareness raising meetings with relevant stakeholders (e.g. local, national and regional meetings)</p>	GET	1,735,714	500,000

## Output 5.3

Water and Gender  
Action Plans and  
indicators, based  
on results of  
Component 1,  
adopted by relevant  
authorities in both  
countries

## Output 5.4

Periodic events for  
the coordination  
with other ongoing  
initiatives organized  
by the PCU/TCCB

## Output 5.5

Full participation to  
GEF IW LEARN  
activities, creation  
of a project  
website, and  
preparation of  
experience notes.

Sub Total (\$)	14,285,714	65,000,000
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## Project Management Cost (PMC)

GET	714,286	1,000,000
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Sub Total(\$)	714,286	1,000,000
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Total Project Cost(\$)	15,000,000	66,000,000
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## C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Government	Cambodia Climate-Friendly Agribusiness Value Chains Sector Project (ADB)	Public Investment	Investment mobilized	12,000,000
Government	Cambodia - Irrigated Agriculture Improvement project ADB	Public Investment	Investment mobilized	5,000,000
Government	Cambodia - Irrigated Agriculture Improvement project ADB	Public Investment	Investment mobilized	4,500,000
Government	Vietnam - MARD	In-kind	Recurrent expenditures	4,000,000
Government	Vietnam - MonRE	In-kind	Recurrent expenditures	1,000,000
Government	Cambodia Tonle Sap Poverty Reduction and Smallholder Development project (IFAD)	Public Investment	Investment mobilized	3,000,000
Government	Viet Nam Irrigation System planning	In-kind	Recurrent expenditures	1,000,000
Government	Viet Nam Irrigation investments and economic restructuring	Public Investment	Recurrent expenditures	20,500,000
Government	Viet Nam Irrigation investments and economic restructuring	Public Investment	Investment mobilized	15,000,000
<b>Total Project Cost(\$)</b>				<b>66,000,000</b>

**Describe how any "Investment Mobilized" was identified**

The three ADB loans identified as co-finance in Cambodia are loans that have already been taken by the government. The letter of co-finance will come from the respective ministries that are managing the loans. Identification of recurrent expenditure mobilized. (Listed values do not include structural investments but only the planning and assessment steps and non-structural solutions) Cambodia: The dollar amount shown represents the approximate value of the components

relevant for the project of the following ongoing investments (total value \$21.5m): • \$12 m Climate-friendly agri-business value chains Sector Project (part of \$90m ADB loan) • \$5 m Irrigated Agriculture Improvement Project (collaboration with ADB) funding the National Water Resource Data Centre • \$4.5 m Tonle Sap Poverty Reduction and Smallholder Development project (MAFF) Viet Nam: The dollar amount shown represents the approximate value of the components relevant for the project of the following ongoing and planned investments (total value \$36.5m): • \$1 m Irrigation planning (MARD) • \$35.5 m Irrigation investments and economic restructuring (MARD)

## D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
FAO	GET	Regional	International Waters	International Waters	15,000,000	1,350,000	16,350,000
Total GEF Resources(\$)					15,000,000	1,350,000	16,350,000

E. Project Preparation Grant (PPG)  
PPG Required



PPG Amount (\$)  
300,000

PPG Agency Fee (\$)  
27,000

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
FAO	GET	Regional	International Waters	International Waters	300,000	27,000	327,000
Total Project Costs(\$)					300,000	27,000	327,000

## Core Indicators

Indicator 7 Number of shared water ecosystems (fresh or marine) under new or improved cooperative management

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
<b>Shared water Ecosystem</b>	Cambodia Mekong River Delta Aquifer			
<b>Count</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>

Indicator 7.1 Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
Cambodia Mekong River Delta Aquifer	1			

Indicator 7.2 Level of Regional Legal Agreements and Regional management institution(s) (RMI) to support its implementation (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
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Cambodia Mekong River Delta Aquifer	1	
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**Indicator 7.3 Level of National/Local reforms and active participation of Inter-Ministeral Committees (IMC; scale 1 to 4; See Guidance)**

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
Cambodia Mekong River Delta Aquifer	1			

**Indicator 7.4 Level of engagement in IWLEARN through participation and delivery of key products(scale 1 to 4; see Guidance)**

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
Cambodia Mekong River Delta Aquifer	1			

**Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment**

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	1,250,000			

Male	1,250,000			
Total	2500000	0	0	0

## Part II. Project Justification

### 1a. Project Description

1a. *Project Description*. Briefly describe:

1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description); 2) the baseline scenario and any associated baseline projects, 3) the proposed alternative scenario with a brief description of expected outcomes and components of the project; 4) alignment with GEF focal area and/or Impact Program strategies; 5) incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing; 6) global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF); and 7) innovation, sustainability and potential for scaling up.

#### The global environmental and/or adaptation problems, root causes and barriers that need to be addressed

The lower section of the Mekong River Basin is underlain by a major transboundary aquifer system shared by Cambodia and Viet Nam: *The Cambodia – Mekong River Delta Aquifer*[1]. This transboundary aquifer system (TBA) connects two ecosystems of global environmental significance and socio-economic importance: the i) Tonle Sap area and the ii) Mekong Delta (see Figure 1), and includes some major urban areas, including Phnom Penh and Ho Chi Minh. The whole area is approximately 200,000 km<sup>2</sup> with about 63% lying within Cambodian territory. Tonle Sap, the largest lake in the Peninsular Indochina, is hydraulically connected to the Mekong River and serves as a natural regulating reservoir ensuring adequate groundwater recharge to the aquifer. One key hydrogeological characteristic of the aquifer system is that the upstream section in Cambodia has one single alluvial aquifer overlying older 'hard rock' formations, while in the delta region, in Viet Nam, at least eight alluvial aquifers can be distinguished on the basis of depositional sequences ranging in age from Holocene to Middle Miocene (approx. 15 million years), and up to 800m thick.

The groundwater resources in this TBA have a considerable impact on human livelihoods and socio-economic development. Groundwater is critical for rice production and makes a substantial contribution to the national GDP of Viet Nam, and; supports the agricultural sector in Cambodia, accounting for half of the country's GDP and employing 80–85% of its' labor force. For these reasons, the aquifer is heavily exploited for irrigation and water supply. The annual groundwater extraction rate throughout the TBA is estimated to be about 800–900 million m<sup>3</sup>/year.

The diverse ecosystems of the region are exceptionally productive, as are the benefits derived from them by its' inhabitants. The integrity of ecosystem services is critical both in terms of biodiversity and of the sustainability of a range of natural resources and products available to both urban and rural populations. The effects of surface and groundwater interactions nourish large tracts of forests and wetlands, which produce building materials, medicines and food, and provide habitats to thousands of species of plants and animals. Groundwater naturally interacts with areas of low-lying land where permanent wetlands tend to develop. These wetlands provide habitat for fish breeding, buffer flood events by absorbing huge quantities of excess water, and offer natural water cleansing functions. In addition, groundwater sustains wetlands during the dry season: when groundwater levels drop below the historic norms, wetlands can dry out.



The sustainability of water resources and the health of the delta and Tonle Sap ecosystems cannot be achieved without a proper and shared understanding of the regional groundwater flow regimes, especially with regard to the up-gradient recharge zones within the Cambodian territory.

The establishment of cooperative management frameworks for this major transboundary aquifer embracing the whole Mekong delta and extending upstream in Cambodia, is of critical importance because of the region's high dependence on water resources, and vulnerability to climate-related hazards (floods and droughts, sea level rise).

So far, two major barriers have hindered the implementation of cooperative groundwater resources management strategies and plans: i) the different levels of understanding that the two countries have of the TBA system, and; ii) the differences in groundwater management policies in Cambodia and Viet Nam that increase the difficulty of reaching a bilateral agreement for sustainable TBA development.

### *Groundwater related issues of concern*

#### Salinization and lowering of the water table

Due to the rapidly increasing population and rapid economic development, the demand for water resources has continued to escalate, and is driving the over-exploitation of groundwater. The resulting reduction in groundwater levels and deterioration in quality are among the main problems threatening future water security in both countries. Groundwater levels have declined significantly, particularly in the delta area. Monitored groundwater levels indicate a drop of water levels of over 20m since the 1990s in many parts of the delta. The observed decreasing levels of groundwater range from 10 to 80 cm/yr. Increased groundwater salinity has also significantly affected freshwater supply capacity. The distribution of saline groundwater in the aquifers, which covers 62–84% of total area, is posing an immediate threat to the water supply. Due to the low geographical topography, sea level rise and growing groundwater consumption, the aquifers in the delta are increasingly vulnerable to seawater intrusion. Besides seawater intrusion, the spread of salinity in the groundwater in the delta is likely to be influenced by multiple causes, including infiltration of seawater trapped during the deposition of sediments, leaching of aquifer host rocks, and re-circulation of irrigation water. The continuation of current pumping rates would most likely cause land subsidence of 0.35 to 1.4 meters by 2050. Adding projected sea-level rise results in a substantial inundation risk for large parts of the delta considering that most areas lie less than two meters above sea level. [2]

#### Pollution and arsenic contamination

Anthropogenic groundwater pollution by agricultural practices and households, causing the deterioration of shallow unconfined groundwater has been identified as the major source of groundwater quality degradation. Another quality concern for TBA is the occurrence of arsenic contaminated groundwater. High arsenic concentrations ( $> 10 \mu\text{g}\cdot\text{L}^{-1}$ ) have been found in the floodplain areas located along the Mekong River. In Cambodia, around 20% of aquifers are not suitable for human consumption: mainly associated with elevated levels of arsenic. The source of elevated arsenic concentrations in groundwater is thought to be the release of arsenic from river sediments under highly reducing conditions.

#### Land and forest degradation

The extent and health of the region's forests continues to decline, with increasing demand for timber and land driving deforestation and soil degradation. Deforestation impacts on hydrology and related processes, such as flooding, soil erosion and mass soil movement, and poses a major threat to aquifer recharge. Progressive disappearance of the flooded forest in the downstream Tonle Sap area is a serious threat to fish reproduction and refuges. The agricultural encroachment that follows deforestation often causes the loss of traditional land-use rights and traditional conservation mechanisms.

#### Fisheries and habitats at risk

The region has one of the most productive inland fisheries in the world. It provides a wide variety of breeding habitats for over 1,300 species of fish and the annual rise and fall of the river ensures a nutrient-rich environment for fish. The fishery provides a livelihood not just for fishers and their families but for thousands more who are employed full or part time making and selling food products and fishing gear, repairing boats and providing hundreds of related services. Fishery resources management is a prime example of a transboundary issue that challenges the two riparian countries and must be dealt with cooperatively. Any change in the ecosystem occurring in the upstream region will affect and impact on the livelihoods of millions of people whose food supply and economic activities rely heavily on fishery resources in the downstream areas. *Groundwater quality and availability, and the preservation of the groundwater dependent flooded forest are key conditions for the survival and sustainability of fishery resources in the region.* In the delta, groundwater is also critical for rice production and shrimp farming. Rice grown in the delta now accounts for about half the total national production in Viet Nam, and the country stands as the third biggest rice exporter globally. Shrimp farming is also an increasingly important source of foreign-exchange for Viet Nam. These economic gains have only been achieved at great environmental cost. Few areas of natural or semi-natural habitat remain in the delta that are not subject to ever increasing levels of human exploitation, many of which are unsustainable.

#### Climate change

Considering the worst-case scenario for the project region, by 2050, average temperatures will rise of 0.9 – 1.4 degrees C, rainfall will decrease in the dry season and increase in the wet season, and sea levels will rise between 26 to 32cm. Sea level rise is a major threat to the social-ecological system of the Mekong Delta as salinity creeps up the rivers and causes the decline of soil productivity. This process is accelerated by excessive groundwater pumping in most areas of the Mekong Delta. Increased salinity reduces the productivity of rice and many other crops, which affect food security, household income, and levels of poverty.

#### Upstream hydropower development

Changes in groundwater levels are mainly driven by surface water flows, which are currently altered by the development of hydropower reservoirs upstream. The operation of existing and planned dams affects aquifer recharge dynamics and the flood cycles. Hydropower development in the Mekong River basin defines a major focus for ongoing negotiations and research concerning transboundary water management.

## **2) Baseline scenario and any associated baseline projects**

### Government action

Viet Nam's Government is well aware of the various facets of groundwater related problems and have invested in improving the management of groundwater in the Mekong Delta. Currently, the main focus is on adjusting development plans to mitigate emerging risks related to land subsidence and the design of more effective regulatory mechanisms to curb groundwater extraction.

Cambodia, most recent efforts focused on collecting data and improving monitoring to reach a better hydrogeological understanding of the Cambodia-Mekong River Delta TBA. The Mekong River Commission has recently started a new project on eliciting agricultural groundwater extraction rates in Cambodia to support the development of a database for improved groundwater management.

### Overview

#### Associated Baseline Projects

The project region is the target of numerous investments as evidence continues to emphasize the vulnerability of the Delta due to its exposure to sea level rise, consequences of upstream hydropower development, and land subsidence. *The following analysis of past, present and planned investments relevant to the proposed project, highlights that transboundary aquifer management – crucial to effectively address a range of sustainability challenges facing the region – is a glaring gap.*

Table 1 provides an overview of past, current and planned investments related to the Cambodia - Mekong River Delta aquifer. The majority of existing initiatives excludes groundwater and focus instead on the combined impact of upstream hydropower and sea-level rise. In Viet Nam two major development frameworks have been developed, the Mekong Delta Plan (2013) and the Prime Minister Resolution 120 (2017), which receive substantial financial support by various donors.

One of the largest investments is the World Bank funded Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods (ICRSL) project. Since 2016 around \$310 million have been invested through the ICRSL program. Ten of its components are infrastructure-focused and are being delivered through the Ministry of Agriculture and Rural Development (MARD) and focus on flood drainage, livelihood adaptation, prevention of coastal erosion, and aquaculture improvements. The ICRSL project also includes components implemented by MoNRE, which focus on improving the monitoring of surface and groundwater, the monitoring of riverbank and coastal erosion, and the establishment of a Mekong Delta Data Center. The World Bank's ICRSL investments focus solely on Viet Nam and does not include Cambodia. The establishment of a solid groundwater data base for the Mekong Delta is an important contribution to the improvement of groundwater governance in the Delta.

Table 1: List of ongoing, past and planned projects relevant to the Cambodia - Mekong River Delta aquifer (*Those including consideration of groundwater in highlight*)

Past Projects	<i>Investment &amp; period</i>	<i>Area</i>	<i>Objective</i>
MRC Council Study	\$5.6m 2010-2017	Lower Mekong Basin, incl Mekong Delta	Assessment of impacts of hydropower on surface water flow, sediment loads, and fisheries
Mekong Delta Study	TBC 2012-2015	Lower Mekong Basin with focus on Viet Nam's Mekong Delta	Assessment of impacts of hydropower on surface water flow, salinity intrusion, sediment loads, and fisheries
KIGAM funded project on the Mekong Delta aquifer	Until 2015	Entire Mekong Delta aquifer	Collaboration with UNESCO. Collate existing data on groundwater aquifer and make data policy relevant.
WISDOM project	until 2013	Viet Nam's Mekong Delta	Flood and drought management
IUCN's Integrated Planning Project Viet Nam project	until 2018	Viet Nam's Mekong Delta	Also focusing on flood mitigation but with a strong biodiversity and land use planning component was
Australian Aid funded Mekong Delta Futures project	Until 2014	Viet Nam's Mekong Delta (and basin wide)	Improved land use planning based on the impact assessment of upstream hydropower development, sea-level rise, and climate change.
USAID funded Mekong ARCC project	Until 2016	Kien Giang Province in Viet Nam's Mekong Delta	Improved management practice of rice-shrimp rotation farming.
ACIAR-funded rice-shrimp farming project	Until 2015	Viet Nam's Mekong Delta	Improved management practice of rice-shrimp rotation farming.
Current Projects	<i>Investment &amp; period</i>	<i>Area</i>	<i>Objective</i>
World Bank's Integrated Climate Resilience and Sustainable Livelihoods (I-CRSL)	Since 2016	Viet Nam's Mekong Delta	Flood drainage, livelihood adaptation, coastal erosion prevention, aquaculture improvements, monitoring of surface and groundwater, monitoring

Sustainable Livelihoods (ICRSL) project	\$310	Cambodia	ing of riverbank and coastal erosion, and the establishment of a Mekong Delta Data Center.
GEF/WB ICRSL (building on the phase 2 2016-2022, see above)	Start 2020	An Giang, Dong Thap (upper delta); Ben Tre, Tra Vinh, Vinh Long, Soc Trang (delta estuary); Ca Mau, Bac Lieu, Kien Giang (coastal peninsula)	Enhance tools for climate-smart planning and improve climate resilience of land and water management practices GEF objective: strengthen research capacity, and encourage innovation relating to land and water management practices, and coastal forest rehabilitation to build climate resilience of agriculture and aquaculture livelihoods, and reduce greenhouse gas emissions
World Bank's Integrated Water Resource Management (IWRM) project	Third phase until 2021 \$16.5m	Mekong Delta, Cambodia & Viet Nam	Collaboration with the MRC.  Riverbank erosion, salinity intrusion, flooding (major focus), and sluice gate management. Data sharing is a core goal of this transboundary initiative and a Joint Committee has been formed
Mekong Delta Region Urban Upgrading Project	\$329 m	Viet Nam's Mekong Delta	Upgrading drains, canals and roads in response to climate change (e.g. sea-level rise, flood & drought management)
World Bank's Landscape Project		Viet Nam's Mekong Delta	Improved utilization of remote sensing technology to inform eco-tourism and improved road access.
IDA project	\$91.7 million	Cambodia	Improved agricultural value chains and improved irrigation, involving surface and groundwater.
JICA's Water management project	\$266.9m	Ben Tre Province, Viet Nam	To prevent salinity intrusion and ensure water distribution with adequate salinity level by constructing water sluices and related facilities
MARD, Viet Nam	\$221.3m	Coastal provinces in Viet Nam's Mekong Delta	Improved water infrastructure, including sluice gates, pumping stations, and irrigation schemes.
ADB's Climate Resilience in Viet Nam's Mekong	\$100m	Binh Thuan, Dak Lak, Dak Nong, Khanh Hoa, and Ninh Thuan Provi	Upgrading irrigation systems, involving the upgrade of pressurized pipe systems, the development of improved groundwater and water produc

Delta project		nces in Viet Nam's Mekong Delta	tivity assessments, and micro-irrigation systems.
ADB's Climate Resilience Cambodia project		Cambodia	Increased utilization of groundwater resources.
NWO funded "Rise and Fall" project		Viet Nam's Mekong Delta	Development of strategies for a subsiding and urbanizing Mekong Delta (Viet Nam) through improved modelling of groundwater and salinity intrusion.
BMBF funded ViWAT project		Ca Mau peninsula in Viet Nam's Mekong Delta	The design and implementation of water management and land use change strategies, erosion control, land reclamation, and improved (ground)water and land subsidence monitoring.
BMBF funded Catch Mekong project		Viet Nam's Mekong Delta	Assessment of salinity intrusion and sediment deposition in Viet Nam's Mekong Delta to fill data gaps regarding water availability, saltwater intrusion, land use, river morphology, and coastal erosion.
DWRM study of coastal aquifers		Viet Nam's Mekong Delta	Assess coastal aquifers in Viet Nam's Mekong Delta and summarizes data and key trends.
IUCN project "Groundwater in the Mekong Delta"		Viet Nam's Mekong Delta	Build's on DWRM's study and adds other international research results for groundwater in Viet Nam's Mekong Delta.
<b>Planned Projects</b>	<b><i>Investment &amp; period</i></b>	<b><i>Area</i></b>	<b><u><i>Objective</i></u></b>
World Bank/GCF: Transforming the Mekong Delta		Kien Giang, An Giang, Dong Thap (upper delta)	Scale up the transition of small-holder farmers to climate resilient livelihoods and strengthen their participation in flood-based value chains
FAO FOLUR		An Giang, Dong Thap (upper delta); Tra Vinh, Vinh Long, Soc Trang (delta estuary)	To incentivize scaling up of proven best practices and innovations for sustainable and inclusive rice-based production landscapes to generate a range of global environmental and livelihood benefits

The World Bank's Integrated Water Resource Management (IWRM) project invests in Cambodia and Viet Nam and covers a wide range of urban and rural topics. Its third phase is set to invest \$16.5 million until 2021 on water management (quantity and quality), fisheries and agriculture. It includes investments in partnership with the MRC in five transboundary dialogue projects in the lower Mekong basin, which include one between Viet Nam and Cambodia focusing on river bank erosion, salinity intrusion, flooding (major focus), and sluice gate management. Groundwater is not included. Data sharing is a core goal of this transboundary initiative and a Joint Committee has been formed. *This initiative establishes a key foundation for the proposed aquifer-focused transboundary project.*

Table 1 lists two additional relevant World Bank projects in the Mekong Delta area, a new IDA project granted to the Cambodian Government (\$91.7 million) to improve agricultural value chains, JICA's \$266.9 million investment in improved water management in Ben Tre Province, and ADB's \$100 million loan to improve climate resilience of farmers in the Mekong Delta by upgrading irrigation systems, which complements ADB's ongoing irrigations investment in Cambodia.

The Vietnamese Government (via MARD) is also investing in a number of water management infrastructure projects, including Trà Sư sluice (\$10 million), Ninh Quới shiplock combined sluice (\$17.2 million), Xuân Hòa pumping station and sluice (\$10.8 million), and the dredging of the Mây Phốp - Ngã Hậu canals (\$19.7 million). Additional investments aim to improve irrigation schemes in Nam Bến Tre (\$9.3 million), Cà Mau (\$21.6 million), and Cái Lớn – Cái Bé (\$142.7 million).

Few investments focus on land subsidence in Viet Nam's Mekong Delta. Ongoing investments in this field include the NWO funded project "Rise and Fall: Strategies for a subsiding and urbanizing Mekong Delta (Viet Nam)", which has a strong focus on improved groundwater modelling and salinity intrusion. The project's main goal is the development of a new Integrated Delta Model (IDM). The project aims to link surface water, groundwater and geo-mechanical models to analyse the interrelated character of groundwater extraction, subsidence levels and salt water intrusion (<https://www.nwo.nl/en/research-and-results/research-projects/i/67/10967.html>).

The BMBF funded project ViWAT is also triangulating groundwater extraction, land subsidence, and salinity intrusion in Viet Nam's Camau Peninsula, which involves the development of modelling capacity to predict surface and groundwater dynamics and effects on land subsidence in Camau (<https://www.vd-office.org/en/viwat-mekong-go-2/>). Related is BMBF's Catch Mekong project on salinity intrusion and sediment deposition in Viet Nam's Mekong Delta, which aims to fill data gaps regarding water availability, saltwater intrusion, land use, river morphology, and coastal erosion (<https://catchmekong.eoc.dlr.de>).

Table 1 also lists a range of relevant past initiatives. A major effort in regards to improving groundwater related data was the project "Solutions for Groundwater problems in the CCOP Region", which was a cooperation between CCOP, KIGAM and UNESCO in Bangkok. This project conducted a stock-taking exercise of all data available on all groundwater in the entire Mekong Basin, including the entire Cambodia-Mekong River Delta aquifer. The project involved a series of expert workshops to identify data availability and to synthesis the groundwater situation across the various aquifers in the Mekong basin. *The study revealed that the largest data gaps remain in Cambodia.*

Table 1 finally provides an overview of the major investments planned or being planned that are relevant for the proposed project. Aforementioned ICRSL aims to continue developing tools for effective climate adaptation in nine Provinces in Viet Nam's Mekong Delta. This program has no specific focus on groundwater management and does not include Cambodia.

The World Bank project "Transforming the Mekong Delta" continues the Bank's aim to improve the resilience of livelihoods to floods and focuses on three provinces in Viet Nam's Mekong Delta. This initiative does not focus on groundwater and does not include Cambodia.

FAO's Sustainable Rive Landscapes projects in Viet Nam (GEF-7 FOLUR Impact Program) and Cambodia (LDCF) aim to scale-up best practices in rice farming. These projects do not focus on groundwater management. The proposed IW project will fill this gap and help make links between the three projects where relevant. The proposed IW project will draw on the biodiversity, ecosystem services, water quality and other assessments being undertaken for the other FAO projects as relevant.

#### **The proposed alternative scenario with a brief description of expected outcomes and components of the project**

The overview of associated baseline projects emphasizes that while substantial investments have targeted specific water related challenges in the Mekong Delta (floods, subsidence, salinization), only minor portions of current and proposed funding focuses on groundwater. These few initiatives are limited to the Mekong Delta and aim to establish a solid data base on groundwater and inform a few emerging modelling initiatives. No previous, existing or planned initiative is explicitly focused on the entire Cambodia - Mekong River Delta aquifer or aims to establish transboundary cooperative frameworks for aquifer management between Cambodia and Viet Nam. However, transboundry cooperation is essential for effectively addressing groundwater related concerns, including water security and land subsidence. The objective of the proposed project is fill this gap and strengthen environmental sustainability and water security in the Lower Mekong Basin by focusing on improved governance and sustainable utilization of the Cambodia-Mekong River Delta Transboundary Aquifer.

Table 2: Main challenges and responding programs for sustainable development and resilience in the Cambodia - Mekong River Delta Aquifer region



Challenge	Key drivers	Investment focus		
		Research/Data/ Monitoring/Modelling	Implementation (Livelihoods or in frastructure)	Transboundary c ooperative frame works for ground water manageme nt
Land subsidenc e  Lowering of the water table  Salinity intrusion	Groundwater ove r-extraction; Sea-level rise; Land use chang e; Infrastructure de velopment; Upstr eam hydropower development	KIGAM (CA&VN); BMB F (VN); IUCN (VN); MARD (VN); MoNRE (VN); many independe nt studies (mostly, V N; e.g. Mekong Delta Futures)	VN Gov (limited)  JICA (VN); MARD (VN); MoNRE (V N)	
Floods	Climate change; Upstream hydrop ower developme nt	MRC (VN&CA); MARD (VN); MoNRE (VN); WI SDOM (VN); many ind ependent studies (mo stly VN)	WB ICRSL (VN) & RUUP (VN); ADB (CA); MARD (VN); MoNRE (VN)	
Sustainable land use & land resto ration	Salinity intrusion; floods; climate c hange	FAO (VN); IRRI (VN); MARD (VN); MoNRE (VN)	FAO FOLUR (VN)	
Groundwater qu ality degradatio n	Pollution from an thropogenic sour ces			
Loss of ground water dependen t ecosystem ser vices	Reduced aquifer recharge and gro undwater quality			

Figure 2 maps current and planned investments against the sustainability challenges facing the region. It clearly highlights the critical lack of comprehensive action to address groundwater related challenges and opportunities. Activities to develop a transboundary framework to address these challenges do not yet exist. The project proposed here aims to fill this critical gap.

While on the one hand, the proposed initiative benefits from past and ongoing studies as data is increasingly available for the evidence-based decision making which underpins understanding of transboundary dynamics between both countries, on the other hand establishing an aquifer-focused transboundary cooperative process between Cambodia and Viet Nam is likely to generate substantial benefits for both ongoing and planned initiatives. Generating cross-project synergies will be a major objective of this proposed IW project.

Within this context, the proposed foundational IW project will seek to strengthen environmental sustainability and water security in the Lower Mekong Basin by focusing, for the first time in the region, on the totality of the Cambodia-Mekong River Delta transboundary aquifer present in the subsurface of the entire region, on the understanding of its functioning and interactions with surface waters and ecosystems, and on its national and transboundary governance. The project will place emphasis on the enhancement of aquifer recharge, pollution reduction, and optimization of groundwater withdrawals. This is expected to be achieved by:

- Strengthening transboundary cooperation through joint fact finding and information exchange;
- Harmonizing technical capacities and the level of understanding of the aquifer's functioning across the two countries;
- Enhancing groundwater recharge through the introduction of sound groundwater governance frameworks and practices (e.g.: protection of recharge areas), building on the results of the FAO/GEF Global Groundwater Governance project;
- Promoting the application of innovative solutions to optimize groundwater use, reverse salinization trends and increase resilience to climate change (e.g.: Aquifer Storage Recovery and Reuse – ASR/MAR; demand management);
- Reducing agri-pollutants contamination of ground and surface waters (aquifer vulnerability mapping)
- Protecting freshwater dependent ecosystems by unraveling the role of groundwater in sustaining their functioning;
- Facilitating policy coordination with relevant sectors especially at national level, in particular with policies for surface water management, land-use planning, agriculture and energy.

The proposed project - targeting the main aquifer of the Lower Mekong Basin shared by Viet Nam and Cambodia - will complement the recently approved GEF-World Bank project: *Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods*, and its related IDA loan, and other ongoing initiatives, by:

Addressing for the first time the groundwater component of the hydrologic system of the Lower Mekong in its entirety, including the critical upstream Cambodian section with its groundwater related freshwater ecosystems and recharge areas controlling subsurface water flow to the delta;

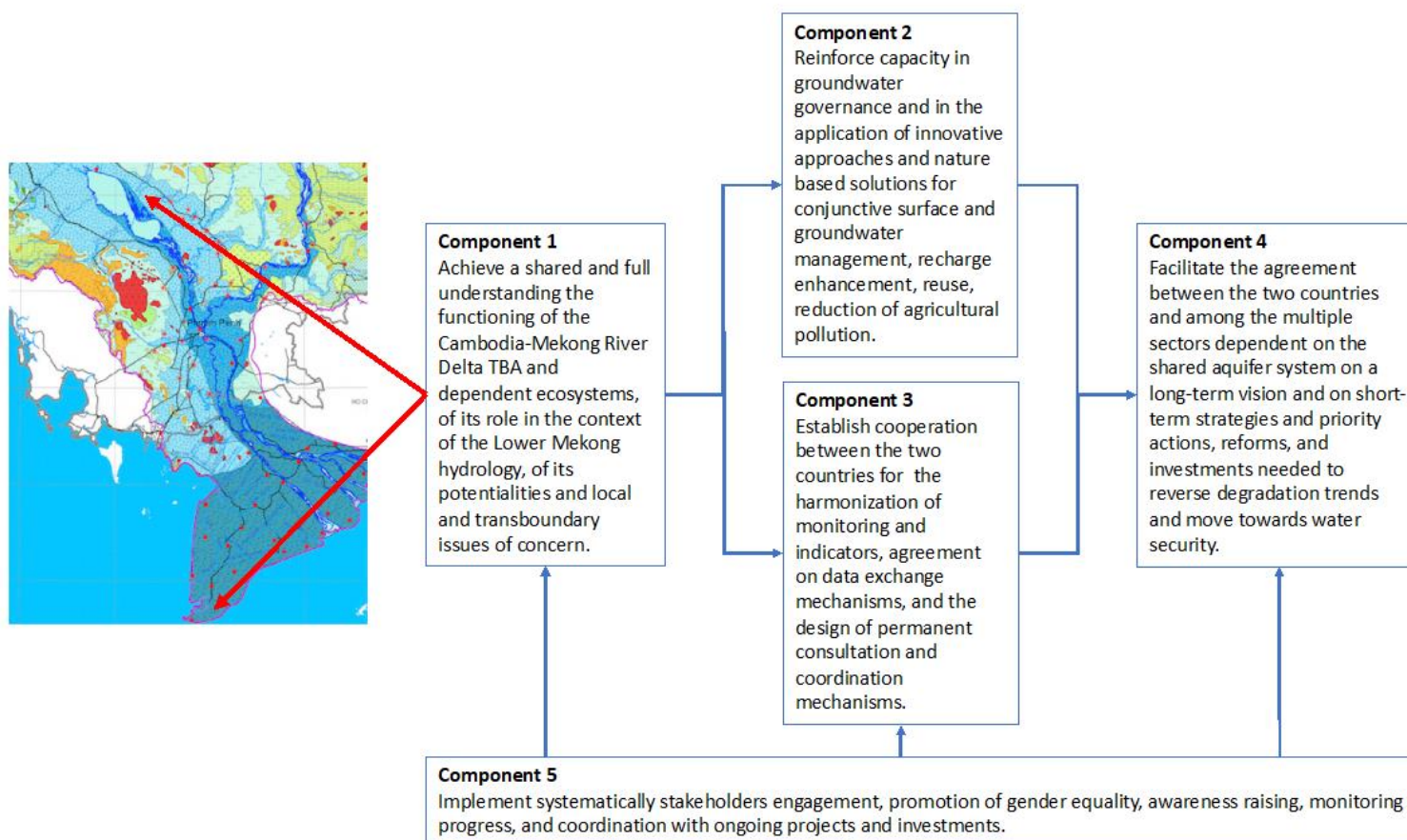
Reinforcing the countries' institutional capacity in groundwater governance;

Creating the enabling environment and policy frameworks for transboundary cooperation in the management of the shared aquifer resources and dependent ecosystems.

The project will support countries as they go through the Transboundary Diagnostic Analysis – Strategic Action Program (TDA-SAP) methodology recommended by the GEF IW Focal Area for “foundational” projects, aimed at creating mutual trust among riparians by joint fact finding, facilitating the consensus on overall long-term visions, and assist governments and stakeholders as they agree on the strategies and actions needed to reverse degradation trends and move towards water

security. The project will fulfil its purpose through the systematic implementation of structured participatory processes for institutional strengthening, awareness raising, promotion of broader adoption, and gender mainstreaming designed to identify the procedures, agreements, responsibilities and monitoring strategies for successful cooperation between the two countries and the multiple sectors dependent on the shared aquifer system. This will strengthen transboundary aquifer management capacity and lead towards the institutionalization of transboundary cooperation. The intervention logic is outlined in Figure 1.

Figure 1: Intervention logic



## COMPONENT 1:

## JOINT SCIENCE-BASED DIAGNOSTIC FOR GROUNDWATER DYNAMICS (RECHARGE AND EXTRACTION) AND EFFECTS ON ECOSYSTEMS (E.G. FISH, WETLANDS) AND LIVELIHOODS

The Outcome expected to be achieved by this Component is the consensus among countries on key transboundary and national concerns affecting the aquifer, reached through joint fact finding, as prerequisite for the development and implementation of concerted remedial actions aiming at improving water security in the Lower Mekong Basin. The outcome will be obtained through four main outputs:

The jointly conducted assessment of groundwater resources, including (i) current water-table levels and of groundwater quality, exploitation and recharge dynamics, and (ii) the identification of trends for main drivers for groundwater exploitation and recharge (e.g. land use change, wetland management, agricultural water use).

The jointly conducted analysis of groundwater dependent ecosystems (GDE), including (iii) the evaluation of ecosystems state (e.g. wetlands) and ecosystem services (groundwater recharge, flood retention, nutrient reduction) at selected sites; and (iv) the assessment of the impacts of projected trends (including hydrometeorological trends and climate trends using downscaled climate information) and development scenarios on groundwater resources, ecosystems (e.g.: wetlands), land subsidence, and livelihoods.

-

A Transboundary Diagnostic Analysis (TDA) of the aquifer, based upon jointly conducted science-based assessments of the current state of groundwater resources (i-ii) and related ecosystems (iii-iv) in the two national segments of the aquifer, considering also governance, socio-economic, legal and gender aspects. This will also include, but not be limited to: (v) the review of existing legislative and policy frameworks related to groundwater and freshwater ecosystems; (vi) an analysis of socio-economic considerations, with focus on poverty, ethnic minorities, and gender inequalities; (vii) the evaluation of existing and potential conflicts at the water nexus.

The TDA will consolidate the agreement between the two countries on the main issues of transboundary concern requiring joint remedial actions, and on those under national responsibility only. The diagnostic will include the description of the immediate and root causes of the degradation of the aquifer and of its related ecosystems.

Environmental Status Indicators: a limited number of simple and feasible indicators agreed upon by the two countries to describe the state of the aquifer (baseline), to be applied periodically to monitor long-term trends, and the impacts of remedial measures.

## COMPONENT 2:

## PILOTING SOLUTIONS FOR IMPROVED TRANSBOUNDARY GROUNDWATER MANAGEMENT.

This key component aims gaining experience of the feasibility and effectiveness of groundwater related innovative solutions and practices. Solutions will focus on a range of entry points ranging from the loss of groundwater recharge areas, groundwater extraction (extraction technology, regulation and other incentives, monitoring), and impacts of groundwater table changes on ecosystems (wetlands, fisheries) and livelihoods. Critical contextual learning will be facilitated by pilot demonstrations of innovative groundwater management and utilization practices and solutions. The pilots, to be identified during the project preparation phase, will likely deal with: (i) Improving the productivity of groundwater use and reversing salinization trends through the pilot application of Aquifer Storage Recovery and Reuse (ASR/MAR); (ii) Reducing agricultural pollutants infiltration into groundwater, by building capacity to produce aquifer vulnerability maps and translate them into land use capability indications, and (iii) by enhancing the filtration role of natural and engineered wetlands. Pilots will be limited in number (approx. 2-3 per country) and size according to budget availability and country needs. The identification and design of pilot solutions will consider short and long-term changes related to climate change.

### COMPONENT 3: TRANSBOUNDARY COOPERATION MECHANISMS

The Component will focus on the design and establishment of arrangements for transboundary cooperation mechanisms between Viet Nam and Cambodia, aimed at improving the transboundary governance of the aquifer (outcome). These mechanisms/outputs will consist of:

- Harmonized design of groundwater monitoring networks and protocols. An essential tool for groundwater management, the networks will be harmonized across the two country segments of the aquifer in terms of positioning, analytical methodologies, instrumentation, data transmission, collection and custodian protocols. The networks will be multi-purpose and monitor groundwater extraction rates and quality, meteorological data and agrometeorological data, aquifer recharge, and wetland condition.
- Agreement on data exchange mechanisms and procedures. This agreement will be negotiated between the two countries, and will regulate the sharing of monitoring data and early alert information.
- Design of a transboundary consultation and coordination mechanism (TCCM). Under this Component, the project will strive to design and facilitate the establishment of a permanent mechanism for: (i) ensure systematic bilateral consultations on common issues related to the sustainable management of the aquifer, (ii) conflicts resolution, (iii) coordination of ongoing and planned TA and investment projects impacting on groundwater resources and related ecosystems.

### COMPONENT 4: JOINT STRATEGIES AND ACTION PROGRAMS

The Component will aim at obtaining the political commitment of the countries to implement the priority legal, institutional and policy reforms and investments necessary for the protection and equitable utilization of the shared aquifer and its dependent ecosystems (outcome). This will be done through three sequential steps (outputs):

- Countries establish ad hoc inter-ministerial committees (ICs). These committees, or equivalent bodies, will facilitate policy coordination with relevant sectors especially at national level, in particular with policies for surface water management, land-use planning, agriculture, and energy.
- A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets. The Vision, based on the results of the previous Components, will be elaborated by the TCCM with the support of project experts, and will be translated into few common long-term environmental quality targets (e.g. groundwater level, land subsidence rate, groundwater recharge target, groundwater extraction quota).
- A Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision and the recommendations of the TDA, will be prepared with broad participation of stakeholders and of the ICs; it will identify the key actions (policy, legal and institutional reforms, investments) that will be deemed necessary to reverse the degradation trends of the transboundary aquifer and its related ecosystems, and improve overall sustainability in the Lower Mekong basin and delta. The SAP will be submitted for countries' endorsement and is to be endorsed by a Minister from each country.

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#### COMPONENT 5:

#### REINFORCED INSTITUTIONAL CAPACITY, IMPROVED PARTICIPATION, GENDER MAINSTREAMING, MONITORING AND COORDINATION

The Component will put in place mechanisms for systematic stakeholder's participation, gender mainstreaming, dissemination, coordination and monitoring progress with the aim of supporting the overall process for enhancing long-term sustainability of project achievements (outcome). For doing so, four main outputs/processes will be produced:

- Structured capacity building in groundwater governance for decision makers and other stakeholders at national and regional (Cambodia-Viet Nam) levels, designed closely following the guiding principles and recommendations of the Groundwater Governance GEF/FAO project, and including study visits to international exemplary cases of successful transboundary aquifer management efforts (e.g.: Guarani Aquifer, shared by Argentina, Brazil, Paraguay and Uruguay).
- Annual stocktaking and awareness raising meetings with the participation of all relevant stakeholders, including the private sector, held at local, national and regional levels.
- Preparation of Water and Gender Action Plans and indicators, based on results of Component 1, for adoption by relevant authorities in both countries.
- Periodic events for the coordination with other ongoing initiatives organized by the PCU/TCCB.
- Full participation to GEF IW LEARN activities, creation of a project website, and preparation of experience notes.

#### 4) Alignment with GEF focal area and/or Impact Program strategies

The project is fully consistent with GEF-7 programming directions, in particular with objective 3 of International Waters Focal Area: Enhancing water security in freshwater ecosystems and its three strategic actions: 1) advance information exchange and early warning; 2) enhance regional and national cooperation on shared freshwater surface and groundwater basins; and 3) investments in water, food, energy and environmental security.

## 5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF and co-financing

The incremental reasoning at the basis of the proposed project is simple. The current baseline conditions for groundwater resources management, in the Cambodia- Mekong Delta Aquifer region, fundamentally consist of either:

- Individual national economic development programs, which are the responsibilities of various levels of government and primarily focus on individual country needs.
- Other environmental management activities including ongoing environmental monitoring programs, informational programs, and related activities at the national and local levels.
- Fragmented monitoring efforts at the national levels.

Current planning processes are driven by sector interests within each country, which causes highly unsustainable developments for the shared aquifer (the impacts of which are not well understood or quantified). Sustainability advancements depend on effective transboundary management strategies. The regional increment (e.g. transboundary aquifer management plan) will lead to much larger benefits than isolated national development strategies as actions can be coordinated based on a shared and jointly accepted evidence base. The present project seeks to overcome the barriers hindering regional coordination in the management of the aquifer - such as lack of knowledge of the aquifer characteristics and functioning, and of coordination management tools, frameworks and capacity - by developing a number of incremental regional actions focusing on building a shared science based knowledge of the aquifer, on the facilitation of regional technical cooperation frameworks and monitoring capacity, fostering stakeholders' participation, women empowerment, thus advancing coordination among the aquifer's countries and their ability to enhance synergies among the many ongoing fragmented sectoral actions (baseline contributions).

## 6) Global Environmental Benefits

In the area of water resources management, this project will promote a coordinated and integrated approach to prevent environmental degradation from overexploitation of groundwater resources. The Transboundary Consultation and Coordination Body (TCCB) will promote jointly agreed allocations among competing uses, equitable distribution of benefits and burdens, adequate involvement of both women and men and community participation in addressing sustainability in water resources management. The project will additionally promote gender equality in the areas of management, governance, and policy development. The project will emphasize cross-sectoral, inter-ministerial, integrated ecosystem and landscape scale approaches that rely on consultative processes and provide a basis for setting up regional conjunctive surface and groundwater management agreements and processes. Ultimately, GEB outcomes include

- improved water security of around four million households depending directly or indirectly on groundwater;

- improved resilience of groundwater dependent ecosystems (e.g. wetlands, fish abundance and diversity); and
- sustainable food production systems (e.g. irrigated agriculture, aquaculture).

## 7) Innovation, sustainability and potential for scaling up

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### Innovation

The project addresses, amongst others, a challenge faced by many large transboundary aquifers globally, as demonstrated by the findings of the TWAP project: how to implement an aquifer wide harmonized monitoring system covering both short-term and long-term trends in the quality and the quantity of the water resources of the aquifer. It does so by fostering the design and pilot testing of an innovative multi-purpose network based on scientifically selected deep wells, and the definition of sampling/monitoring protocols harmonized across the two project countries. Realising such a transboundary aquifer cooperation mechanism is innovative considering that only a handful of these exist worldwide. Furthermore, the comprehensive understanding of groundwater dependent systems (e.g. food production, wetlands, fish production) is still innovative for southeast Asia and also globally.

### Sustainability

The project will build multi-country cooperation frameworks, as well as institutional capacity and expertise in groundwater governance. The institutional and financial sustainability of the project outcomes will be ensured through commitment of the two countries to implement the strategic and priority actions enshrined in the SAP.

### Potential for Scaling Up

Component 2 of the project is dedicated to the testing on the ground of nature based solutions and practices aimed at reversing water table lowering trends, and groundwater contamination. The dissemination of the results of these experiences and of the progress towards achieving the desired impacts, will foster the scaling up and broader adoption of the successful practices promoted by the project to the level of the whole aquifer, and beyond, to other regions and major transboundary aquifers globally.

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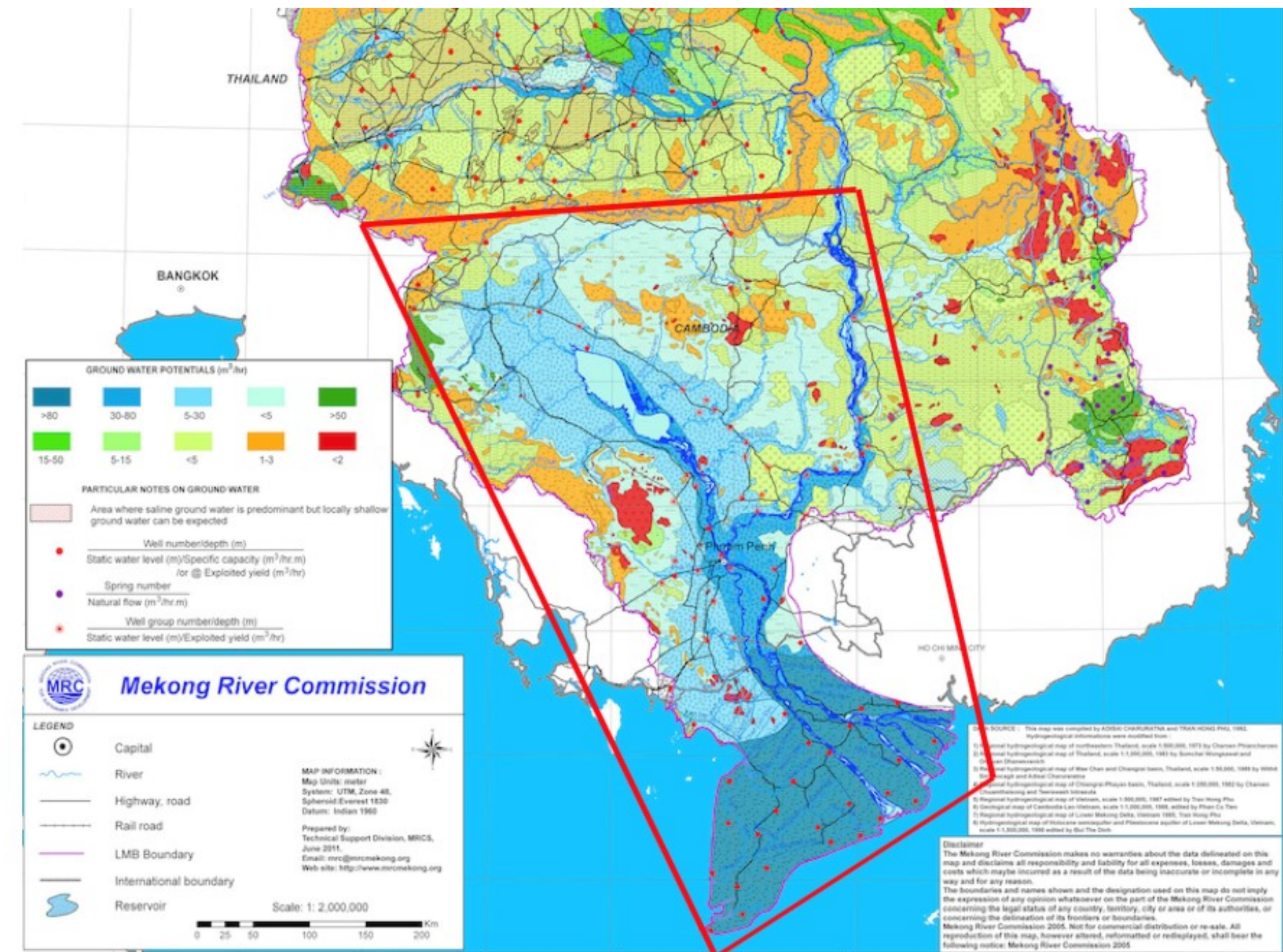
[1] AS89 of the Transboundary Waters Assessment Program Inventory, 2016 (GEF/UNEP)



[2] Land subsidence processes due to groundwater extraction are compounded by two drivers responsible for reducing sediment depositions in the Mekong Delta. Geologically, the Mekong Delta is relatively 'young' and has received substantial amounts of sediment from areas further upstream the Mekong. It is estimated that the Mekong Delta received an average of 200 million tons of sediment annually, which naturally fertilized the Delta and turned it into one of the world's most productive agricultural area. Recently completed dams in China and Lao PDR have started trapping most of these sediments, especially in the tributaries where most sediment originated from, but also along the mainstream. In a recent study, the Mekong River Commission estimated that the Mekong Delta will lose more than 95% of previously received sediments due to upstream hydropower. In parallel, sand mining continues to increase in Viet Nam and Cambodia to provide material for national construction industries and to support sand exports which are driven by Singapore's land reclamation needs. This reduces deposited sediments in the nine branches of the Mekong. Both processes combined cause substantial erosion, which further exacerbate land subsidence.

### 1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.



## 2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

As part of the PIF formulation, country consultations took place in each country with key staff of the MoE and MoWRAM in Cambodia and MoNRE and MARD in Viet Nam. The countries and dates of consultation were:

- Phnom Penh, Cambodia, 06-07 June 2019,
- Hanoi, Viet Nam, 17-18 June 2019,
- Phnom Penh, Cambodia, 19-20 February 2020

These consultations provided the main inputs for developing this PIF and identifying the main political concerns as well as identifying the political scope for transboundary processes towards improved (transboundary) management of the Mekong Delta aquifer. Consultations with private sector entities are planned for the PPG phase.

Institution/Organization	Description	Engagement
Ministry of Water Resources and Meteorology, Cambodia	Government agency with the main mandate for water management in Cambodia	Primary stakeholders and project executing agencies.
Ministry of Natural Resources and Environment, Viet Nam	Government agency with the main mandate for water management and environmental protection in Viet Nam	
Tonle Sap Authority, Cambodia	Government agency responsible for cross-sector or planning of Tonle Sap area, incl. management of lake and wetlands.	
Ministry of Environment.	Government agency responsible for environment	

Cambodia	ental policy and conservation.	Will provide technical expertis e to the project final design an d during project implementati on taking the lead on particula r project activities.
Ministry of Agriculture, Forestry and Fisheries, Cambodia	Government agency with the mandate to develop policies and plans for agriculture, livestock, fisheries and forests.	
Ministry of Rural Development, Cambodia	Government agency with the mandate to improve living standards and reduce poverty of households in rural areas, which includes the availability of drinking water.	
Ministry of Women's Affair, Cambodia	Government agency to advocate gender equality.	
Ministry of Agriculture and Rural Development, Viet Nam	Government agency responsible for providing the technical support for water resource planning and agricultural policies.	Will provide technical expertis e to the project final design an d during project implementati on, taking the lead on particul ar project activities.
Institute of Meteorology, Hydrology, and Climate Change, Viet Nam	Government agency responsible for providing climate change projections.	
Department of Southeast Asian - South Asian - South Pacific Affairs, Ministry of Foreign Affairs, Viet Nam	Government agency with the mandate to guide transboundary negotiations.	
National CSOs (e.g. Action Aid Cambodia; Gender and Development; Cambodian National Council for Women; Cooperation Committee for Cambodia; Viet Nam Red Cross Society; Viet Nam's Women Union; Viet Nam's Center for Nature Conservation and Development)	Various CSOs that focus on sustainable development in the two target basins.	
International CSOs		Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. at

		Order engagement plan (e.g. stocktaking meetings).
Donor organizations (e.g. World Bank, ADB, BMBF, NWO)		Will be invited to annual Stocktaking Meetings.

During the PPG phase, additional consultations will take place with national and regional level stakeholders, from the government but also from the private sector, the academia, CSOs and NGOs, etc. The project will ensure gender balanced participation in all the consultations.

### 3. Gender Equality and Women's Empowerment

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

The project will be aligned with the GEFs and FAOs Policies on Gender Equality, the FAO Regional Gender Strategy and Action Plan 2017-2019 for Asia and the Pacific, and the GEF Gender Implementation Strategy. The project is also in line with SDG 5 on Gender Equality, and the empowerment of women and girls, and it will therefore put efforts to improve the participation of women in decision-making, particularly in groundwater management and irrigation, and in the design and implementation of effective transboundary institutions.

The project will develop a Gender Action Plan (GAP) during the PPG phase to ensure that gender considerations are being taken into account during project formulation through a gender-responsive approach, and through specific activities directed to strengthen women's participation in decision-making.

During early project implementation, gender actions will be consolidated into a Mekong Delta aquifer focused Gender Strategy, that will include, among others, the following interventions:

- Capacity development to national stakeholders on groundwater management and aquifer recharge.
- Creation of a system with Gender Focal points at national and regional levels to share information related to gender issues in groundwater management and groundwater dependent livelihoods.
- Conduct gender analysis in both project countries to have an overall assessment of women's roles.
- Design specific activities targeted to women to ensure they benefit from the project and to improve their participation in decision-making.
- Setting up a gender responsive M&E system, with gender sensitive indicators.

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes**

**closing gender gaps in access to and control over natural resources; Yes**

**improving women's participation and decision-making; and/or Yes**

**generating socio-economic benefits or services for women. Yes**

**Will the project's results framework or logical framework include gender-sensitive indicators?**

Yes



#### 4. Private sector engagement

Will there be private sector engagement in the project?

Yes

**Please briefly explain the rationale behind your answer.**

The agricultural Sector in Cambodia and Viet Nam are at the beginning of a rapid mechanization trend, in which public-private partnerships play an important role. This involves also the surge in irrigation expansion, in particular in Cambodia. These development plans involve the increased utilization of groundwater. In Viet Nam, private sector investments are not just critical for the rice sector but also for the rapidly expanding aquaculture sector. The latter is perceived as a major driver for recent increases in groundwater utilization.

Against this backdrop it is paramount to engage with the private sector investing in agriculture in Cambodia and Viet Nam. This is likely to include the Hong Kong based Green Leader Holdings Group with its cassava focused investments in Cambodia, Golden Rice (Cambodia), Gentraco (Viet Nam), and Southern Seed Corporation (Viet Nam). Under Component 5, output 5.2 will focus amongst others on providing opportunities for exchanges with and engagement of the private sector.

## 5. Risks

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Risks	Assessment with out mitigation	Management plan or measures	Assessment with mitigation
Ensuring effective multi-stakeholder involvement from both countries can be time and resource consuming – especially to ensure that people and institutions involved effectively represent their sector or stakeholders	High	The project will facilitate roundtables and task forces to ensure that knowledge is being shared among different stakeholders, and that the views of different groups are being taken into consideration.	Medium
Climate risks including incorrect assumptions regarding future climate change trajectories.	Medium	Historical, current and future projected changes in climate will be incorporated as an integral part of the planned assessments and management plans in the project. The differing adaptive capacities between the two countries will be taken into account when devising strategies to manage climate risks.	Low
Pilot projects are successfully designed for current climate conditions but fail for future climate conditions (e.g. increasing variability).	High	The pilots will be assessed against the backdrop of a wide range of climate change scenarios and safeguards will be applied.	Medium
Lack of sustained political support to establishing transboundary cooperation frameworks.	Medium	The project will adopt a step by step progressive approach to building mutual trust based on joint fact finding and consultative processes. It will build upon, and support compliance to the MoU recently signed between the two beneficiary countries.	Low
Limited interest or involvement by target stakeholders, local communities and the inhabitants of the two basins.	Medium	The risk will be addressed throughout project implementation through systematic communication with local communities and other stakeholders, and through their involvement in the Annual Stocktaking Meetings.	Low
National processes – particularly approvals for plans and legal mechanisms – may be complex and lead to uneven progress between	High	The project will facilitate knowledge sharing and provide guidance based on lessons learned and other similar experiences – but this will not conditionate the normal processes in each country, and it is expected that countries will move at different paces. When necessary, i	Medium

en countries that may undermine different countries interest/ engagement		informal discussion forums (e.g. regional workshops) at the same time formal processes (e.g. setting up an advisory group) are being set up, to avoid time lags.	
Weak participatory processes, with no meaningful integration of the often under represented (marginalized) households depending on irrigated agriculture and aquaculture.	High	The project has gone through an extensive consultation process but has been limited to the national and regional levels – the project needs to be brought to the local level to assess that it will have a positive impact on households and responsive to their needs. During the PPG phase or early implementation, once pilot locations have been decided, the project will follow the Free Prior and Informed consent methodology to inform coastal fishing communities about the aims of the project and obtain their approval to participate.	Medium

In line with FAO's Environmental and Social Safeguards, the Project has been screened against Environmental and Social risks and rated as **low risk** (see certification and checklist in annex) . No FAO safeguards were triggered. To ensure compliance and to make sure that all mitigation measures vis a vis any potential adverse impact is included in the CEO-endorsement package, the risk level will be further re-confirmed at PPG phase.

## 6. Coordination

**Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.**

The project, based on the more comprehensive and shared understanding of the freshwater resources of the whole aquifer region, will jump start the introduction of sound groundwater governance and management tools at the domestic level, and harmonized regionally. This in turn is expected to link with, and enhance the effectiveness of a number of complementary ongoing and planned initiatives by providing the so far lacking overall policy and governance frameworks and tools for conjunctive surface and groundwater management. Component 5 includes the implementation of a mechanism for structured exchanges with ongoing relevant projects and initiatives (see Baseline section above).

A strong link will be developed with FAO's proposed FOLUR project, which is focused on An Giang, Dong Thap (upper delta); Tra Vinh, Vinh Long, Soc Trang (delta estuary) in Vietnam to incentivize scaling up of proven best practices and innovations for sustainable and inclusive rice-based production landscapes to generate a range of global environmental and livelihood benefits. The FOLUR project will benefit from the transboundary water management dialogue and the groundwater specific insights developed in this project while providing important data and on-the-ground experiences, which will support the TDA and the design and implementation of demonstration projects of this project.

The project will also be implemented in close coordination with the GEF 6 Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods project (GEF ID 9265).

## 7. Consistency with National Priorities

### Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions

Yes

**If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc**

More specifically, Viet Nam's Governments identified the Mekong Delta as the country's top priority as the challenges imposed by sea-level rise, land subsidence and salinity intrusion threaten the livelihoods of nearly 18 million people and the food security of the entire country. Two major development frameworks have been developed, the *Mekong Delta Plan* (2013) and the *Prime Minister Resolution 120* (2017). Both request government agencies (in particular MoNRE and MARD) to take immediate action to respond to aforementioned challenges. Since, the efforts of government agencies have found substantial support by international agencies.

The agricultural sector started undergoing a major restructuring in 2008 based on Resolution 26, which targeted increasing farm income, enhanced international competitiveness, and improved sustainability. The restructuring gave room for more diversity to adapt to the changing climatic and economic conditions, which involved a bigger variety in crops as well as sourcing farm income from aquaculture, in particular in coastal communities. The project will contribute to the resilience of the restructuring of rural livelihoods by providing robust evidence for groundwater dependencies and by designing management plans for sustainable groundwater use.

Cambodia's Government defined water management, deforestation and fish stock management as three key priorities. Consequently, Government officials have requested this project to safeguard water availability for rural and urban communities, in particular against the backdrop of predicted climate change. The Ministry of Environment defines climate change and adaptation as the most critical issue (see "*Cambodia Climate Change Strategic Plan 2014-2023*") and expanding dry seasons are expected to introduce increasing concerns as upstream hydropower development continues to change hydraulic dynamics. From a food security perspective, Cambodia aims for substantial expansion of irrigated agricultural production (see MAFF's "*Agricultural Expansion Policy*", 2015), for which groundwater is considered a primary target due to the lack of water storage capacity and the perception that groundwater is entirely underutilized. However, groundwater levels have been dropping substantially, which has become a major concern for rural drinking water supply, which is highly dependent in groundwater (see MRD's "*National Strategy for Rural Water Supply*" 2011-2025). The project will coordinate between the sector specific groundwater demands and provide decision makers and planners with the necessary evidence to design sustainable food production systems in Cambodia without compromising essential needs of other groundwater users.

The project will moreover support countries in their efforts to meet the following SDG targets, including:

*Target 6.4:* by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity

*Target 6.5:* by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

*Target 6.6:* by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

*Target 6.a:* by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

*Target 12.2:* by 2030 achieve sustainable management and efficient use of natural resources

*Target 13.1:* strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries

*Target 13.2:* integrate climate change measures into national policies, strategies, and planning

*Target 13.3:* improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning; and

*Target 15.1:* by 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wet- lands, mountains and drylands, in line with obligations under international agreements

Furthermore, the project will consider where possible during conducting the TDA relevant indicators to inform and support the National Bio Strategy Action Plans (NBSAP), the CBD National Reports, the Cartagena Protocol National Reports, the Nagoya Protocol National Reports, the UNFCCC National Communications (NC), UNFCCC Biennial Update Reports (BUR), the UNFCCC National Determined Contributions, the UNFCCC Technology Needs Assessment, the UNCCD Reporting, the Stockholm National Implementation Plans (NIP) and NIP Updates, and the National Adaptation Programme of Action Updates. Several of these climate change adaptation and biodiversity focused initiatives will also be considered during the SAP and when designing demonstration projects to maximise synergies created by the proposed projects.

## 8. Knowledge Management

**Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

The project is intended to jump start the application of IWRM principles and Groundwater Governance frameworks in the large transboundary Cambodia – Mekong Delta Aquifer System. Integrated aquifer management to be efficiently applied in practice needs both knowledge and practical tools, which the project will strive to enhance. Well-planned structured stakeholder consultation processes in order to facilitate aquifer monitoring, governance and management, will be part of the knowledge management effort together with the participatory design of the monitoring protocols and data processing. The project will facilitate direct exchanges on best practices and enhance capacity and expertise among relevant national entities through collecting and disseminating the shared knowledge for the common benefit of all, enhancing national and local capacity in groundwater knowledge management, and applying lessons learned throughout the region and beyond, via IW LEARN services.

**Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).**

<b>Name</b>	<b>Position</b>	<b>Ministry</b>	<b>Date</b>
Nguyen Duc Thuan	Director, Viet Nam Environmental Protection Fund	Ministry of Natural Resources and Environment	3/3/2020
Tin Ponlock	Secretary General	Ministry of Environment	2/28/2020



**ANNEX A: Project Map and Geographic Coordinates**

Please provide geo-referenced information and map where the project intervention takes place



