



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 **No**

NGI **No**

Project Title

Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer

Countries

Regional, Cambodia, Viet Nam

Agency(ies)

FAO

Other Executing Partner(s)

IUCN, UNESCO, Cambodia Ministry of Environment (MOE), Viet Nam Ministry of Natural Resources and Environment (MONRE).

Executing Partner Type

Others

GEF Focal Area

International Waters

Taxonomy

Focal Areas, International Waters, Freshwater, Aquifer, Transboundary Diagnostic Analysis and Strategic Action Plan Preparation, Influencing models, Transform policy and regulatory environments, Stakeholders, Type of Engagement, Partnership, Gender Equality, Gender Mainstreaming, Capacity, Knowledge and Research, Knowledge Generation, Knowledge Exchange

Sector

Mixed & Others

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 0

Climate Change Adaptation

Climate Change Adaptation 1

Submission Date

3/20/2020

Expected Implementation Start

6/15/2022

Expected Completion Date

6/14/2027

Duration

60In Months

Agency Fee(\$)

1,350,000.00

A. FOCAL/NON-FOCAL AREA ELEMENTS

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
IW-3-5	Enhance water security in freshwater ecosystems through advance information exchange and early warning	GET	4,500,000.00	43,371,668.00
IW-3-6	Enhance water security in freshwater ecosystems through enhanced regional and national cooperation on shared freshwater surface and groundwater basins	GET	5,950,000.00	15,635,218.00
IW-3-7	Enhance water security in freshwater ecosystems through investments in water, food, energy and environment security	GET	4,550,000.00	55,579,989.00
Total Project Cost(\$)			15,000,000.00	114,586,875.00

B. Project description summary

Project Objective

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

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
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Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
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><u>Outcome 1:</u> 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><u>Outcome Indicator (OI):</u> TDA and the Environmental Status Indicators (ESI) endorsed by the country representatives in the Steering Committee.</p>	<p><u>Output 1.1:</u> Assessment of current state of groundwater resources, recharge and extraction dynamics.</p> <p><u>Output 1.2:</u> Analysis of groundwater related dependencies of related ecosystems.</p> <p><u>Output 1.3:</u> Agreed upon Transboundary Diagnostic Analysis (TDA), including assessment of related governance, socio-economic, legal and gender aspects.</p> <p><u>Output 1.4:</u> Agreement reached on Environmental Status Indicators.</p>	GET	4,388,523.00	26,000,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 2: Piloting solutions for improved transboundary groundwater management.	Investment	<p><u>Outcome 2:</u> Tested strategies for improved groundwater recharge, reduced extraction and mitigated ecosystem/livelihoods trade-offs.</p> <p>OI: Demonstration project designs, implementation reports, and upscaling-focused assessments for three demonstration projects for improved groundwater management (extraction and recharge) in each country.</p>	<p><u>Output 2.1:</u> Pilot demonstrations of innovative groundwater management and utilization, after adequate feasibility studies</p>	GET	4,550,000.00	76,000,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 3 Transboundary cooperation mechanisms	Technical Assistance	<p><u>Outcome 3:</u> Agreed improvements of transboundary cooperation improve aquifer transboundary governance</p> <p>OI: Agreement on the creation of a Bilateral coordination and consultation body (TCCB) signed by two countries.</p>	<p><u>Output 3.1:</u> Harmonized design of groundwater monitoring networks and protocols.</p> <p><u>Output 3.2:</u> Agreement on groundwater data exchange mechanisms and procedures.</p> <p><u>Output 3.3:</u> Design of permanent transboundary consultation and coordination body (TCCB).</p>	GET	2,192,709.00	5,000,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 4: Joint strategies and action programs.	Technical Assistance	<p><u>Outcome 4:</u> 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: SAP approved/signed by the relevant Minister(s) in each country.</p>	<p><u>Output 4.1:</u> Countries establish Joint Technical Committees (JTCs) and ad hoc inter-ministerial committees.</p> <p><u>Output 4.2:</u> A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets.</p> <p><u>Output 4.3:</u> Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision.</p>	GET	980,960.00	1,056,500.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 5: Reinforced institutional capacity, improved participation, gender mainstreaming, monitoring and coordination.	Technical Assistance	<p>Outcome 5: 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: Skills and knowledge on transboundary issues of 100 gender-balanced national staff increased by 50% over baseline levels.</p>	<p><u>Output 5.1:</u> Structured capacity building in groundwater governance for decision makers and other stakeholders.</p> <p><u>Output 5.2:</u> Annual stocktaking and awareness raising meetings with relevant stakeholders (e.g. local, national and regional meetings).</p> <p><u>Output 5.3:</u> Water and Gender Action Plans and indicators, based on results of Component 1, adopted by relevant authorities in both countries.</p> <p><u>Output 5.4:</u> Periodic events for the coordination with other ongoing initiatives organized by the PMU/TCCB.</p> <p><u>Output 5.5:</u> Full participation to GEF IW LEARN</p>	GET	2,173,522.00	801,031.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Sub Total (\$)					14,285,714.00	108,857,531.00
Project Management Cost (PMC)						
GET			714,286.00		5,729,344.00	
Sub Total(\$)			714,286.00		5,729,344.00	
Total Project Cost(\$)			15,000,000.00		114,586,875.00	

Please provide justification

C. 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(\$)
Recipient Country Government	Cambodia - Ministry of Agriculture, Forestry and Fisheries (MAFF).	Public Investment	Investment mobilized	32,000,000.00
Recipient Country Government	Cambodia - Ministry of Environment (MoE).	Public Investment	Investment mobilized	2,000,000.00
Recipient Country Government	Cambodia - Ministry of Rural Development (MRD).	Public Investment	Investment mobilized	11,000,000.00
Recipient Country Government	Cambodia - Ministry of Water Resources and Meteorology (MoWRAM).	Public Investment	Investment mobilized	20,500,000.00
Recipient Country Government	Viet Nam - Ministry of Natural Resources and Environment (MoNRE).	Public Investment	Investment mobilized	43,500,000.00
GEF Agency	Food and Agriculture Organization (FAO).	In-kind	Recurrent expenditures	1,020,875.00
Other	International Union for Conservation of Nature (IUCN) Viet Nam.	In-kind	Recurrent expenditures	2,000,000.00
Other	United Nations Educational, Scientific and Cultural Organization (UNESCO).	In-kind	Recurrent expenditures	1,200,000.00
Other	United Nations Educational, Scientific and Cultural Organization World Water Assessment Programme (UNESCO WWAP)	In-kind	Recurrent expenditures	896,000.00
Other	Mekong Region Futures Institute (MERFI)	In-kind	Recurrent expenditures	470,000.00

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
Total Co-Financing(\$)				114,586,875.00

Describe how any "Investment Mobilized" was identified

The public investments reported as Co-Financing from Cambodia and Viet Nam were identified in a series of discussions with four central Government Ministries, namely: - The Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Environment (MoE), Ministry of Rural Development (MRD), and Ministry of Water Resources and Meteorology (MoWRAM) in Cambodia; and - The Ministry of Natural Resources and Environment (MoNRE) in Viet Nam. All the Co-Financing from the two recipient countries was reported as "Investment Mobilized" because it excludes recurrent expenditures. All the investments contribute directly or indirectly to the achievement of the objectives of the project. However, strictly speaking, none of these public investments are directly mobilized by the GEF grants allocated to the project. Without the GEF Project Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer though, these public investments in Cambodia and Viet Nam will happen in isolation without any coordination and synergies within and between the countries. The GEF investment in this region, allows for the full coordination and for the financing of the additional costs associated with transforming the public investments listed in Table C, from national benefits into global environmental benefits impacting positively the Mekong River Delta Aquifer and its related ecosystems. The related letters of co-financing (attached to the submission), were all agreed upon by the respective manager of the initiatives/projects listed here under. The "Public investments" - "Investments mobilized" in the two countries consist of: Cambodia*: ? \$18m Climate-friendly agri-business value chains Sector Project (part of \$130m, ADB) ? \$8m Agricultural Diversification (part of a \$101.67m, World Bank) ? \$6m Agricultural Services Programme Innovation, Resilience, and Extension (ASPIRE) (part of \$52.5m, IFAD) ? \$2m Sustainable Landscape and Ecotourism Project (CSLEP) (part of \$54m, World Bank) ? \$9m Rural water supply and sanitation project (ADB) ? \$1m Installation of hand pumps for rural water supply (Gov of India) ? \$1m Improving Rural water supply (China Aid) ? \$9 m Irrigated Agriculture Improvement Project (collaboration with ADB) funding the National Water Resource Data Centre ? \$8 m Uplands irrigation and water resource management sector project (ADB) ? \$0.5 m Integrated Water Resource Management project (World Bank) ? \$3 m Water resource management and agro-ecological transition (WAT4CAM) (AFD) *: The dollar amount shown represents the approximate value of the components relevant for this GEF project of the investments listed above. For this reason, only a fraction of these investments listed in the ministerial Co-Financing letters have been listed according to how much falls within the project's target area and into the relevant time frame. Viet Nam*: ? The project "Enhancing the resilience inclusive and sustainable eco-human settlement development through small scale infrastructure interventions in the coastal regions of the Mekong Delta in Viet Nam" (2020-2023); ? The project "Identification of scientific solutions, technologies and policies to manage and protect groundwater and to treat and supply clean water to high mountainous and water scarcity areas" (2015-2023); ? The project "Carrying out investigation and preliminary assessment of groundwater resources at scale of 1:50,000 in the North of Tien River" (2021-

2025); ? The project ?Protection of groundwater in urban - Phase II, including Ca Mau, Bac Lieu, Rach Gia and Long Xuyen cities? (2020-2022); ? The project ?Investigation and detection of groundwater in high mountainous and water scarcity areas? (2015-2023); ? The project ?Improvement of Groundwater Protection in Vietnam (IGPVN)? (IGPVN) (2022-2025). * The dollar amount shown represents the approximate value of the components relevant for this GEF project of the investments listed above. For this reason, only a fraction of these investments listed in the ministerial Co-Financing letters have been listed according to how much falls within the project?s target area and into the relevant time frame.

D. 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	GE T	Regional	International Waters	International Waters	15,000,000	1,350,000	16,350,000.00
Total Grant Resources(\$)					15,000,000.00	1,350,000.00	16,350,000.00

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)
PPG Required **true**

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	327,000.00
Total Project Costs(\$)					300,000.00	27,000.00	327,000.00

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)
Shared water Ecosystem	Cambodia Mekong River Delta Aquifer	Cambodia Mekong River Delta Aquifer		
Count	1	1	0	0

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	1		<input type="checkbox"/>
Select SWE				

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)
Cambodia Mekong River Delta Aquifer	1	1		<input type="checkbox"/>
Select SWE				

Indicator 7.3 Level of National/Local reforms and active participation of Inter-Ministerial 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	1		<input type="checkbox"/>
Select SWE				

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	1		
Select SWE				

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	60,000		
Male	1,250,000	60,000		
Total	2500000	120000	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Part II. Project Justification

1a. Project Description

a. The global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description).

The lower section of the Mekong River Basin is underlain by a major transboundary aquifer system shared by Cambodia and VietNam: The Cambodia ? Mekong River Delta Aquifer (CMDA) [AS89 of the Transboundary Waters Assessment Program Inventory, 2016 (GEF/UNEP)]. This transboundary aquifer (TBA) system (Figure 1) connects two ecosystems of global environmental significance and socio-economic importance, namely: the i) Tonle Sap area and the ii) Mekong Delta, and includes some major urban areas, including Phnom Penh and Ho Chi Minh. The lower part of the area is dominated by the largely flat lands of the Mekong river delta, which lies mostly within Viet Nam. The whole CMDA area is approximately 200,000 km² with about 63% lying within Cambodian territory. Around 35 million people live in the CMDA recharge zone and the vast majority of households depend on groundwater for drinking or for irrigation. However, groundwater management faces severe challenges, including over-extraction, loss of recharge zones, climate change, arsenic pollution, salinity intrusion, and land subsidence. Transboundary solutions are paramount to address the mounting challenges.

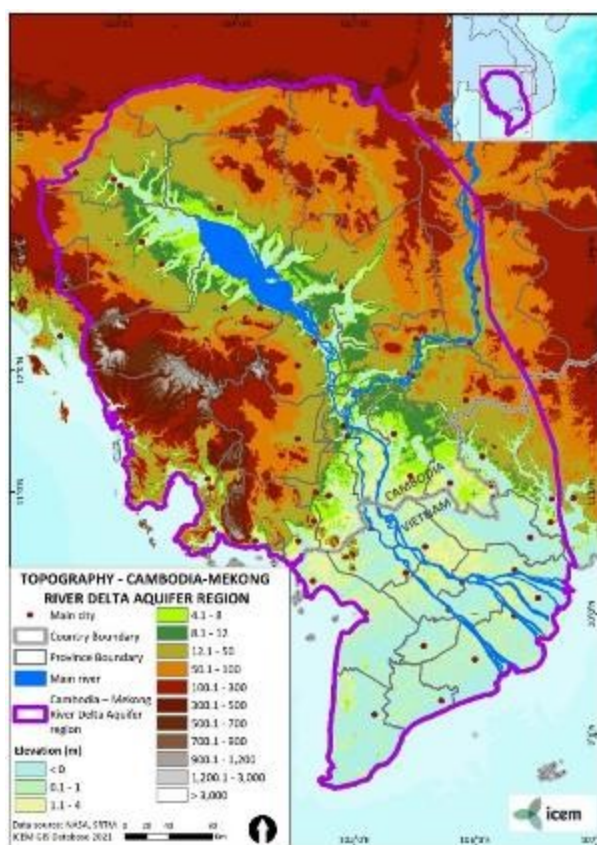


Figure 1: Topography (left) and land cover (right) of the CMDA area

Annex M1 provides data and research details on the various aquifer segments, the underlying geology, climate conditions, and the relevant aspects of surface water hydrology (ICEM. 2021. Deploying nature-based solutions (NBS) as specific measures to address agroecosystem degradation and associated drivers and generate environmental benefits at multiple scales Final NBS Report. Prepared for FAO).

Land cover in the CMDA area has been substantially modified by human activity (see Figure 1). The most significant blocks of remaining forest are located on the Cardamom mountain range in Cambodia. Most of the middle and lower lying area is dominated by crop land and plantations: the Mekong Delta portion is dominated by intensive rice cropping featuring seasonal flooding, and closer to the coast, shrimp aquaculture.

The CMDA area contains large areas of wetlands (Figure 2), many of which are of major importance for biodiversity and/or for livelihoods, especially for rice-farming and fisheries; conditions in these wetlands are in most cases strongly related to those of the CMDA, especially groundwater levels. Vice versa, wetlands sustain groundwater levels, emphasising the symbiotic relationships between wetlands and groundwater aquifers. Major wetland types include the Tonle Sap lake; the marshes and seasonally-flooded forest surrounding it (which also occur in other parts of the region); the seasonally flooded rice landscapes of the Mekong Delta; and the coastal mangroves of the lower Mekong Delta.

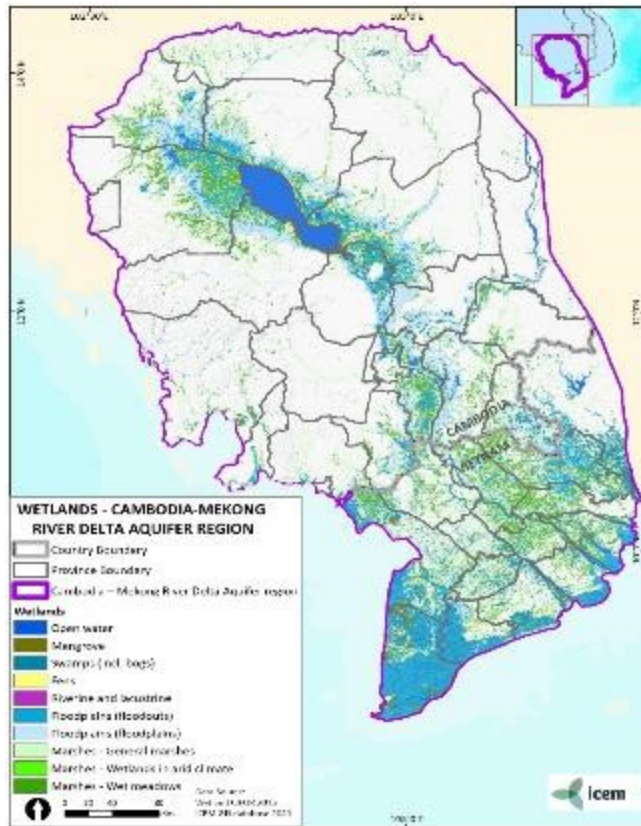


Figure 2: Wetlands of the CMDA area (ICEM 2021)

On the Cambodian side of the TBA three main zones can be distinguished, (i) the Cambodian Mekong Delta Zone, (ii) Tonle Sap Lake Zone, and (iii) Coastal Plain Zone of Southwestern Cambodia. Tonle Sap, the largest lake in the Indochina Peninsular, is hydraulically connected to the Mekong River and serves as a natural regulating reservoir.

On the Viet Nam side, the CMDA connects the Mekong Delta and Ho Chi Minh City. Viet Nam's Mekong Delta covers 39,734 km² and locates at the southern part of Viet Nam, limited by the Gulf of Thailand to the southwest, East Sea to the south and southeast, Ho Chi Minh City to the east, Cambodia boundary to the north. The Mekong Delta includes the whole areas of Long An, Dong Thap, An Giang, Tien Giang, Ben Tre, Vinh Long, Tra Vinh, Hau Giang, Soc Trang, Bac Lieu, Kien Giang, Ca Mau provinces and Can Tho city.

Current uses of groundwater resources

Cambodia is considered one of the most water-abundant countries in the region. Rivers, streams, lakes, aquifers and marine water are important sources for national economic development in many sectors, such as agriculture, manufacturing and small-scale industries, hydropower, navigation, tourism, and key for environmental protection and daily life of the population. The maximum quantity of annual water consumption is estimated to be 750 million m³ (10% of the country's total available water), of

which 95% (710 million m3) is used for irrigated agriculture. Groundwater is mostly used for agricultural activities, which account for more than 80% of the total groundwater usage in Cambodia. Groundwater is available almost everywhere in the plains area, except for the dry zone in the central and north-western regions.

The exploitation and utilization of deep/shallow confined groundwater from the Cambodia Mekong Delta aquifer can be approximated based on the water balance method considering irrigation water requirements and evapotranspiration. Table 1 summarizes the irrigation requirements for the Cambodian side of the CMDA and estimate the total groundwater use for irrigation purposes at 614.9 Million m3/year. The estimated groundwater use for domestic purposes in the Cambodian side of the CMDA (Table 1) is approximately 201.7 Million m3/year. Unfortunately, no data is available for industrial use of groundwater despite the fact that the industrial sector has become a major user and is mainly located on the outskirts of the capital and provinces.

Table 1: Estimated groundwater exploitation in Cambodia Mekong Delta

Zone	Estimated groundwater use for irrigation (Million m3/year)	Total Domestic water use (Million m3/year)	Total abstraction (Million m3/year)
Tonle Sap Lake zone	390.0	77.4	467.3
Delta zone in Cambodia	225.0	124.3	349.3
Cambodia Mekong Delta Aquifer	614.9	201.7	816.6

Groundwater recharge rate and rainfall data have been estimated in a recent study (including ADB, 2014) to range from 14.9% to 22.1% of total annual rainfall. These estimates are rather high if compared to FAO's estimate that in average, only 5% of the country's annual rainfall recharge aquifers.

On Viet Nam's side, a study by the Division for Water Resources Planning and Investigation for the South of Viet Nam in 2014 shows that there are 553,135 abstraction wells and the amount of groundwater abstraction is 1,798,256 m3/day. Annex M1 explains how seven layered aquifer segments can be distinguished, and Table 2 provides extraction data for each of these segments. Annex M2 provides the provincial breakdown.

Table 2: Layered aquifers in Viet Nam's Mekong Delta

Data for	Holocone aquifer qh	Upper Pleistocene aquifer, qp3	Upper- Middle Pleistocene aquifer, qp2-3	Lower Pleistocene aquifer, qp1	Middle Pliocene aquifer, n22	Lower Pliocene aquifer, n21	Upper Miocene aquifer, n13
Abstraction m3/day	17,851	114,945	997,514	130,077	477,395	87,652	87,652

Vuong B.T and et al (2014) assessed groundwater recharge for the whole delta, see Figure 3. The quantity of groundwater recharge in the rainy season is 2 to 7 times greater than that in the dry season. The quantity of annual groundwater recharge varies from about 2.5 to 4.6 Mm³/day (Figure 3) during the wet season and seems not to follow any trend but is highly variable. Cao Xuan Viet et al. (2019) estimated groundwater recharge in the Ho Chi Minh City area to be 1,552,043 m³/day.

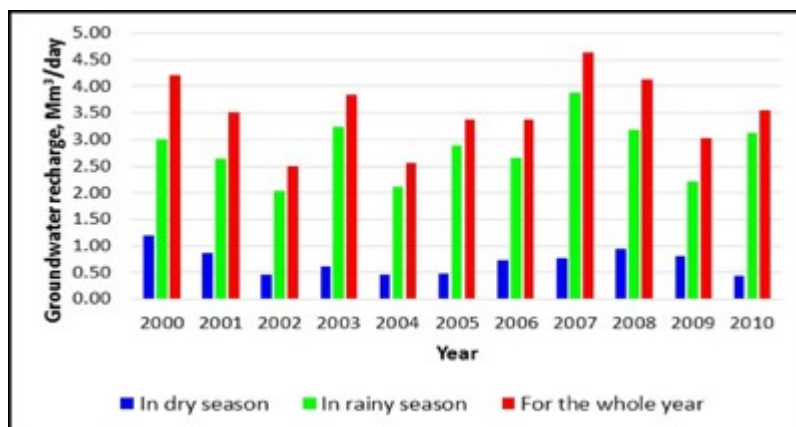


Figure 3. Annual groundwater recharge in period 2000 to 2010 (Vuong B.T. and et al., 2014(1). Báo cáo về tình hình chất lượng nước ngầm ở đồng bằng sông Cửu Long (The report on assessment of groundwater quality). Archived at the Division for Water Resource Planning and Investigation, Hochiminh city)

Annex M2 provides an overview for exploitable groundwater reserves.

Land cover related recharge reductions

The major drivers for aquifer recharge are land cover change and change in surface water flows. While the latter is driven by climate change and surface water management ? including hydropower and flow diversion ? land development is driven by a complex array of socio-economic factors (e.g.

urbanization, timber demand, mining). The evaluation of groundwater resources in inundated areas of the Mekong River basin in Cambodia by Kazama et al. (2007) showed that land use change leading to a reduction of inundation areas, which leads to a severe reduction of groundwater recharge. In 1993, a 19% reduction in inundation areas resulted in a 31% reduction in groundwater storage and in 1998, a 44% reduction in inundation areas led to a 42% reduction in groundwater storage (Kazama et al., 2007). It concludes that even though flood control activities are important to reduce negative flood impacts in the Mekong River basin, they also negatively impact groundwater resources in the area (Kazama et al., 2007).

Viet Nam experienced in recent decades, substantial land use and land cover (LULC) change in the Mekong Delta. Residential land surged and reached 3,251,348 ha in 2015. Aquaculture had the largest growth rate and covered in 2015 approximately 720,913 ha (Figure 4), accounting for 19% of the study area. The area of mangrove forest gradually decreased from 1979 to 1995, and then stabilized. Compared to 1979, the area of mangrove forests decreased by 27,899 ha in 2015. Forests experienced a similar trend (Figure 4).

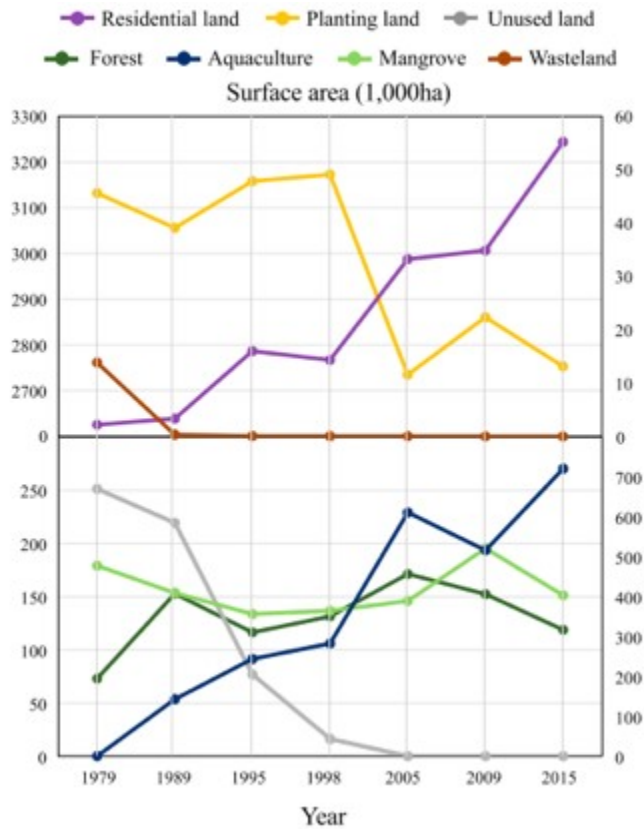


Figure 4. The surface area of LULC types in the Mekong Delta from 1979 to 2015 (Created by authors)

Ho Chi Minh City area experienced an increase of *non-agricultural area* from 251km² in 2002 to 285 km² in 2010 and an increase of *urban area* from 371km² to 424km² (Nguyen Thanh Son et al., 2012). These data indicate recharge areas could have decreased adversely affecting groundwater recharge. In addition, conversion of rural into urban land has led to increased pumping in many areas, and more

importantly, extensive pollution of both surface streams and shallow aquifer due to direct disposal of municipal solid waste and wastewater in rivers and their flood plains.

Land use change affects groundwater recharge rates drastically. This is particularly relevant for delta area as slopes are small: land use changes reduce the rainfall partitioning to groundwater recharge more than in mountainous areas. Forest and grass generate the most groundwater recharge. Paddy field has a small groundwater recharge rate. Recharge in residential and urban areas is even lower. ***These trends highlight that integrated land use planning is needed*** across the CMDA so groundwater recharge is considered in land use change decisions.

Challenges affecting the CMDA

Rapid groundwater level decline due to over-extraction and reduced recharge

Understanding recharge rates and processes is critical to determining the sustainability of the resource. If surface and groundwater are highly connected, with groundwater replenishment happening through yearly flooding, the system may be sustainable over the long term, even if groundwater is continuously pumped. However, seasonal drawdown jeopardizes water supply for crops; in Prey Veng, farmers experience that wells dry out at the end of the dry season. Drawdown can compromise village water supplies, particularly if water levels drop more than 6m below ground surface level (the depth at which hand pumps are no longer useful). If annual extraction exceeds annual recharge, then long-term water level decline, with gradual increase in pumping costs and eventual system failure.

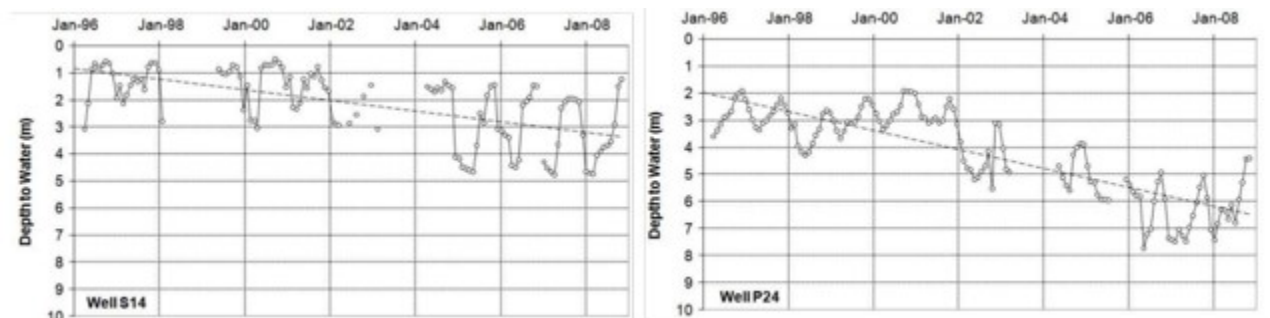


Figure 5. Groundwater levels in Prey Veng & Svay Rieng, 1996-2008 (Johnston, R., M. Roberts, T. Try, and Sanjiv de Silva. 2013. *Groundwater for Irrigation in Cambodia*. Colombo, Sri Lanka: IWMI.).

iDE (2009) observed average water level declines of 14cm/year based on monthly water-level measurement in 49 wells in Prey Veng and Svay Rieng during 1996-2008 (Figure 5), suggesting that over pumping may already be a problem (Figure 6 and Figure 7). Figure 6 also explains that the main flow direction of groundwater is to the direction of Viet Nam, which is important for understanding aquifer recharge and for water quality concerns as discussed later. Declining groundwater levels have also been reported in Siem Reap, see Annex M3 for further details.

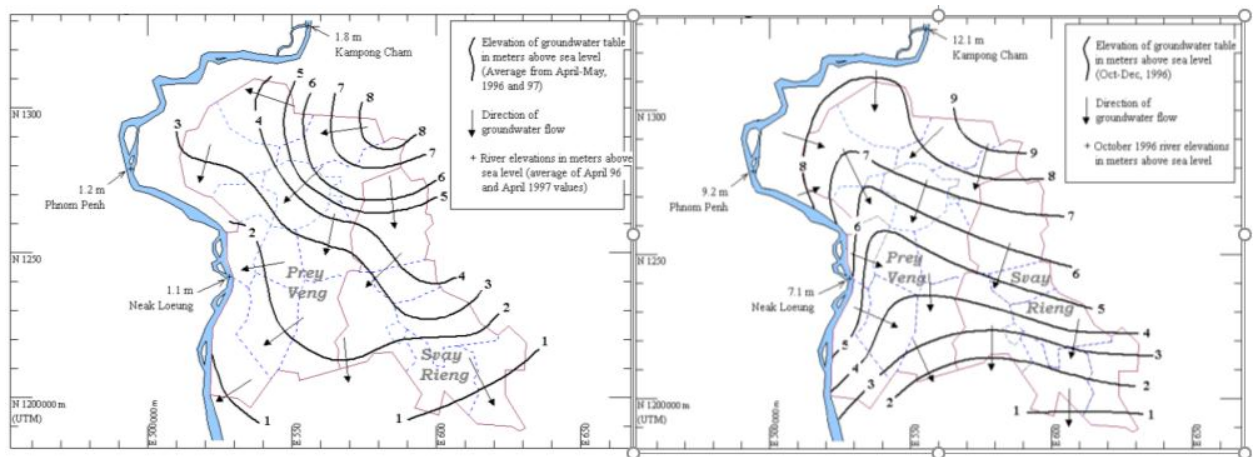


Figure 6. Elevation of groundwater level in the Dry (left) and Wet season (right) (IDE Cambodia 2009. Strategic Study of Groundwater Resources in Prey Veng and Svay Rieng (Phase 1) Final Report. Rural Poverty Reduction Project, Seila Task Force Secretariat, IFAD Loan No: 623- KH, Phnom Penh.)

Figure 6: Average Rate of Groundwater Decline from Apr 96 to Dec 08

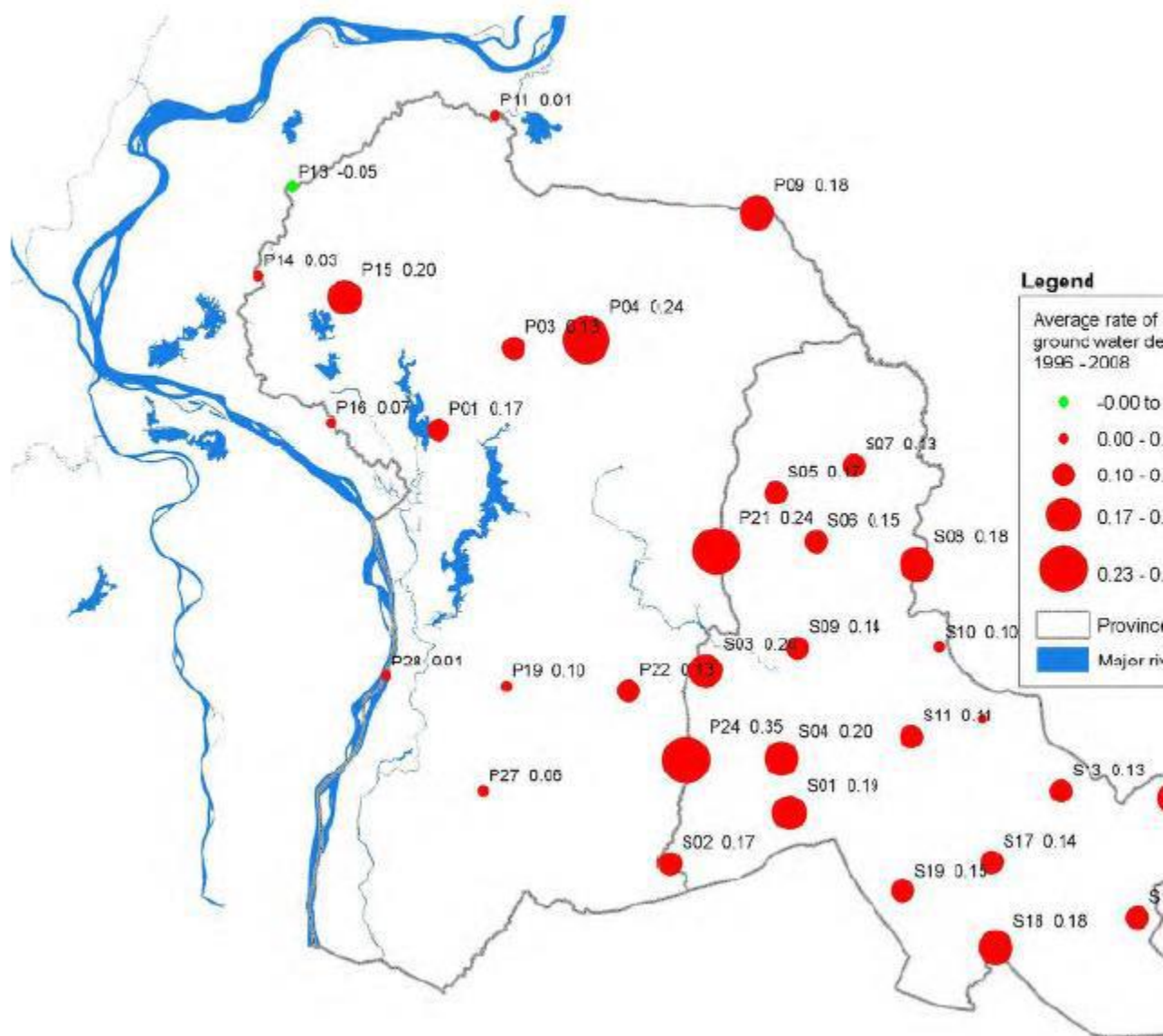


Figure 7. Average rate of groundwater decline from April 1996 to December 2008 in Svay Rieng province. (IDE Cambodia 2009)

Monitoring data for Viet Nam's side of the aquifers indicate a clear trend of decline in groundwater levels. Annex M2 provides a detailed overview for monitoring data for the Mekong Delta.

Table 3: Groundwater decline in Viet Nam's Mekong Delta

Data for 2010	Holocene aquifer qh	Upper Pleistocene aquifer, qp3	Upper-Middle Pleistocene aquifer, qp2-3	Lower Pleistocene aquifer, qp1	Middle Pliocene aquifer, n22	Lower Pliocene aquifer, n21	Upper Miocene aquifer, n13
Average decline	0.064 m/a	0.15 m/a	0.30m/a	0.285m/a	0.434m/a	0.365m/a	0.266m/a
Extremes	HCMC: 0.34m/a	Can Tho & Tra Vinh: 0.27-0.39 m/a	Kien Giang, Tra Vinh, Ca Mau HCMC: 0.37-0.44 m/a	Ca Mau: 0.93m/a	Ca Mau: 0.89 m/a; HCMC: 0.78 m/year	Long An & Ca Mau: 0.81m/a	HCMC (Binh Chanh): 1.11m/a

Table 3 lists the average decline for each of the aquifer segments in Viet Nam's Mekong Delta. The sharpest average decline is 0,434 m/year for aquifer n22. However, several areas experience much more rapid groundwater decline, particularly in parts of Ho Chi Minh City and Ca Mau. These observations suggest that extraction levels from this aquifer (see Table 2) are highly unsustainable.

As aforementioned, climate change is an important driver that will continue to affect groundwater resources in the CDMA into the future. Overwhelmingly, research suggests that seasonal distribution of rainfall will change causing drier and longer dry seasons and shorter more intense wet seasons. Eastham et al., (2008) estimated the impact of climate change and hydropower dams on water resources in the Mekong River Basin and predicted that by 2030, the mean annual runoff of the basin within the Cambodia territory would increase by 50-150 mm during the wet season. However, the percentage increase in annual runoff compared with the current condition is estimated to range between 10% (Tonle Sap) and 65% (Phnom Penh). Substantial increases in surface runoff during the wet season indicate that despite an increase of annual precipitation, groundwater recharge would not increase (or even decrease) because the large portion of rainfall would be lost via runoff, while further degrading soils. The impacts on runoff and groundwater recharge of climate change might be exacerbated without suitable management of current watersheds, catchments and flood plains.

Modelling for the Mekong Delta shows the likely future impact of climate change on groundwater recharge across three climate change scenarios, see Figure 8. This indicates that climate change is likely to start having larger impacts from 2040 on, which is a baseline scenario that is likely to unfold into a detrimental decline of aquifer recharge of 50-65% depending on the scenario.

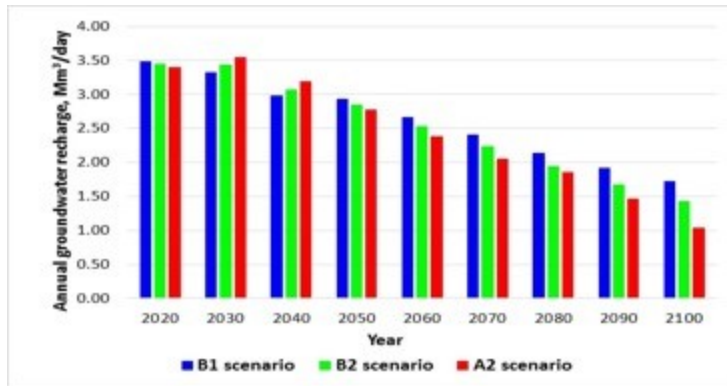


Figure 8. Annual groundwater recharge in period 2020 to 2100 under the three different climate scenarios (Vuong B.T, 2014a)

Table 4. Decrease in groundwater level under different climate scenarios (Vuong B.T, 2014a)

Aquifer	Difference between GW levels in the year of 2010 and 2100, m		
	Climate scenarios		
	B1	B2	A2
qp3	8.1	8.5	10.3
qp2-3	14.5	15.0	17.4
qp1	4.9	5.5	4.8
n22	37.3	39.1	44.5
n21	1.6	1.5	1.5
n13	20.5	20.7	22.4

As a consequence, groundwater levels are likely to drop dramatically, as shown in Table 4. Under even highly optimistic assumptions (B1) critical aquifers will decline by 2010 by up to 37.3m (aquifer n22), 14.5m (qp2-3), and 8 m (qp3). These values increase to 44.5m (aquifer n22), 17.4m (qp2-3), and 10.3 m (qp3) if more realistic change scenarios are assumed.

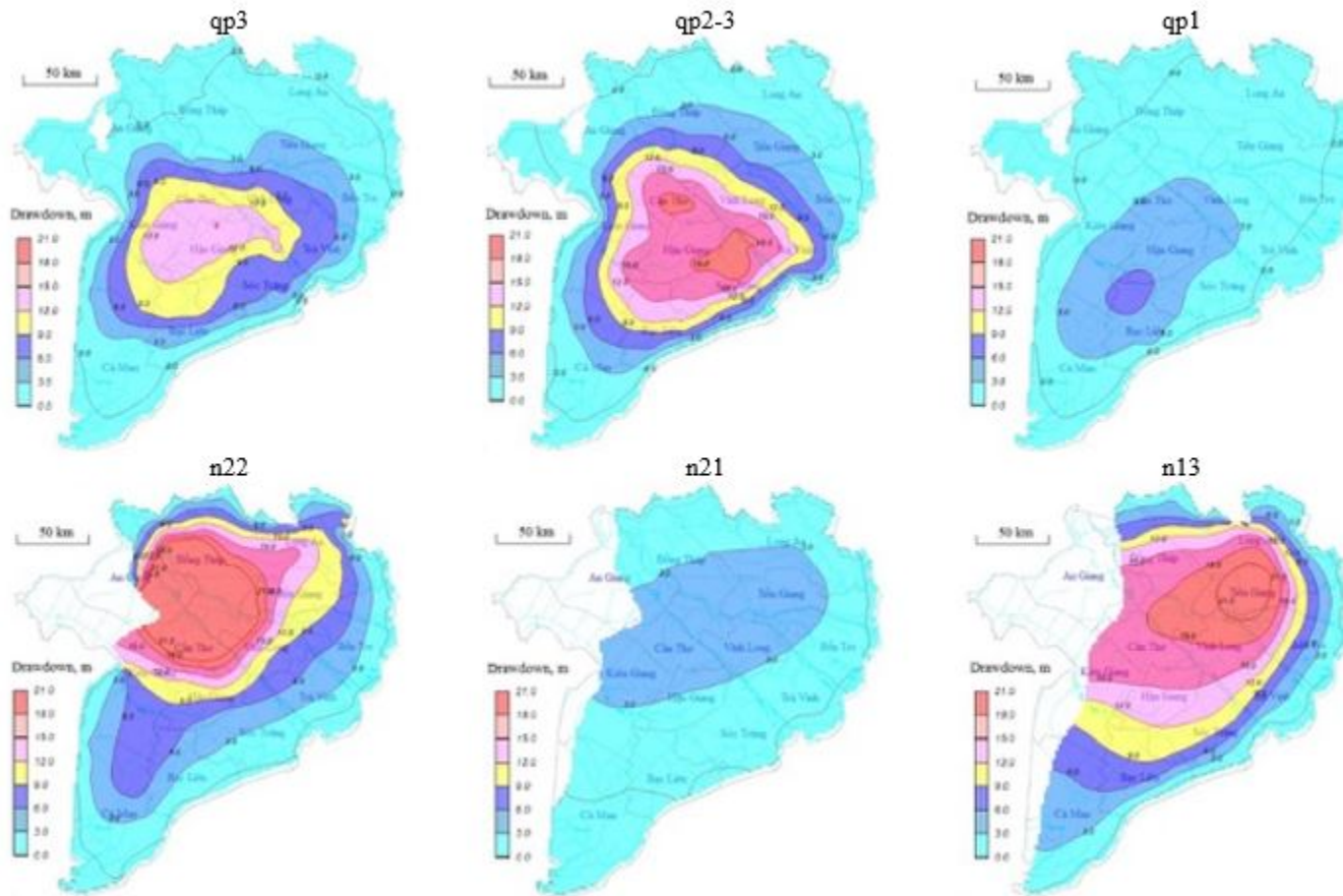


Figure 9. Maps of the differences of groundwater levels in 2010 and in 2100 aquifers of the CMDA (Created by authors)

Figure 9 shows that the average decline estimations will not occur uniformly but will have distinct geographic differences. Urban centers such as Can Th? are likely to experience the largest decline. Most important for the transboundary context is that the largest drops in groundwater levels are likely to be seen in aquifers n22 and n13, which both lie across the border.

Land surface subsidence accelerated due to groundwater decline

Land subsidence is one of the major problems related to the over-extraction of groundwater. Land subsidence is especially of concern for aquifers of unconsolidated sediments, as a decrease in groundwater level reduces pore water pressure and in turn induces the compaction of unconsolidated sediment layers. The most imminent threat from land subsidence in Cambodia has been recorded for Siem Reap.

Siem Reap town is one of the fastest growing cities in Cambodia particularly fuelled by the tourism industry. At the moment, 16,000 m³/day are pumped from wells south of West Baray while 18,000 m³/day are pumped by hotels and water production companies (see Annex M6) in Siem Reap city. All temples are built on sand layers. Their stability depends on the degree of water saturation. If these layers are not saturated, their stability decreases. The high level of water abstraction represents a great threat to Angkor's world heritage listed temples. Consequently, large areas in Siem Reap region experience moderate to rapid land subsidence, ranging from 5 to 12 mm per year.

Another Cambodian area facing the challenge of land subsidence is the Cambodian Mekong Delta. However, so far land subsidence has been minimal if compared to Viet Nam's parts of the Mekong Delta.

In Viet Nam's Mekong Delta, several studies have highlighted the threats posed by land subsidence due to groundwater over-extraction. Annex M3 provides a detailed overview. Erban et al. (2014) explains that the over-extraction causes an average decline of the hydraulic head of 26 cm/yr causing compaction-based subsidence rates average 1.6 cm per year (range: 0.28-3.1 cm/yr). InSAR-based estimates are very similar with a range of 1-4 cm/yr. Karlsrud and Vangalsten (2017) estimated the subsidence rate in Ca Mau at 2-4 cm/yr. Minderhoud et al. (2017) found subsidence rates of 6-20 mm yr⁻¹ and determined based on long term monitoring (1991-2015) that the delta sank during this 25-year period on average ~170 mm due to groundwater extraction.

A study by the Ministry of Natural Resources and Environment involving 339 landmarks reaching from Ho Chi Minh City across the Mekong Delta (2014, 2015 and 2017) found subsidence rate ranging from 0.01 to 6.8cm/year, and an average of 1.07cm/year. Area with subsidence rates greater than 10cm covers an area of about 3,390km², including Ho Chi Minh City, Vinh Long, Can Tho, Hau Giang, Soc Trang, Dong Thap, An Giang, Bac Lieu, and Ca Mau.

Recent research tested widely used elevation data and found that the average elevation of the delta plain (excluding areas with bedrock outcrops) is only 0.82m instead of the assumed 2.6m (according to the SRTM DEM). Hence, the Mekong delta plain might well be the lowest elevated of all mega deltas in the world and even more vulnerable to sea-level rise than previously understood. Even a moderate sea-level rise (~40 cm by 2100 (Church et al., 2013)) would result a quarter of the delta falling below sea level by the end of the century.

Groundwater quality ? Arsenic threatens water security

Arsenic is the most concerning water quality issue for Cambodia and to some extent also in Viet Nam. WHO recommends a limit of 10 ppb and Cambodian drinking water quality standards define a maximum of 50 ppb. However, RDI monitoring reports arsenic concentrations of up to 3,000 ppb for Cambodia. Annex M4 provides results from a range of research studies for arsenic, manganese, iron, nitrate, and fluoride.

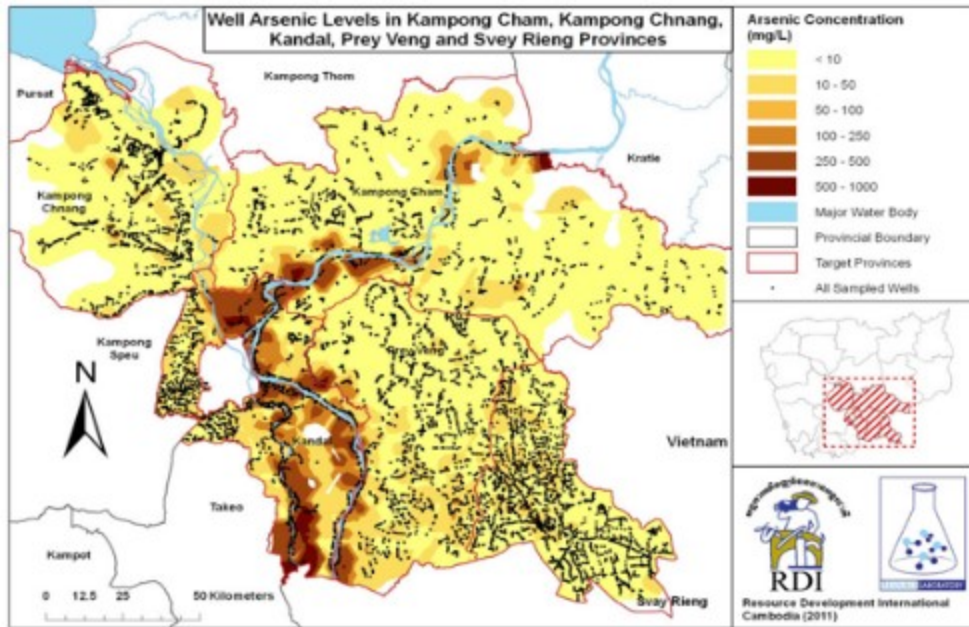


Figure 10. Well Arsenic levels in Kampong Cham, Kampong Chhnang, Kandal, Prey Veng and Svay Rieng (WHO limit: 10mg/l) (Resource and Development International, Cambodia, Summary of Groundwater Quality in Cambodia, Data, Maps, and Priority Parameters. 2011)

Groundwater arsenic pollution in the Mekong Delta is caused by reductive dissolution of arsenic-bearing iron phases buried in aquifers (Berg, et al, 2007). In Viet Nam's Mekong Delta various studies measured arsenic concentrations and peak values have been reported to reach 845 $\mu\text{g/L}$, 321 $\mu\text{g/L}$, 1,470 $\mu\text{g/L}$, or even 1,523 $\mu\text{g/L}$, depending on the location and the study. All studies confirmed that arsenic concentrations are only high within 100 m to both sides of rivers (see Figure 11) and that they can vary with seasons. Arsenic concentrations in January exceeded those in May and August.

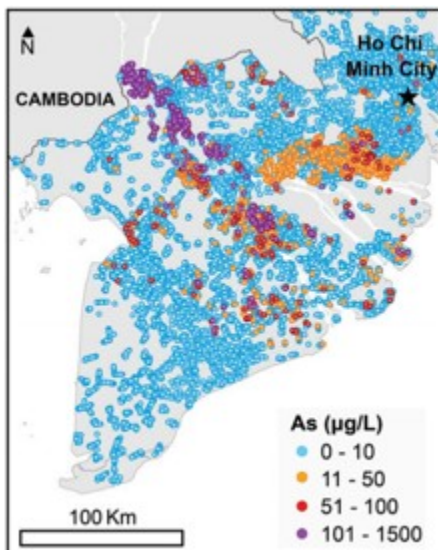


Figure 11. Groundwater arsenic concentrations in the Mekong Delta, Viet Nam (source: Erban, L.E., 2013. Groundwater exploitation and Arsenic occurrence in the Mekong Delta aquifer system)

Most of the highest arsenic concentrations have been measured along the Cambodian border (see Figure 11) and considering the transboundary connection between the affected aquifers (Figure 6) it is likely that arsenic levels move across the border. Furthermore, groundwater extraction has been found to potentially unsettle arsenic concentrations, which is outlined in Annex M4, further aggravating the spread of arsenic.

Groundwater saline intrusion

Salinity intrusion is arguably the biggest water quality threat in Viet Nam's Mekong Delta (see Table 5 and Figure 12) and to some extent also in Cambodia's coastal communities. show. In Viet Nam's Mekong Delta 52% (for aquifer, n21) and 88% (aquifer qh) of the aquifer area are saline.

Table 5. Areas of fresh and saline groundwater in aquifers

Parameters	Aquifer						
	qh	qp3	qp2-3	qp1	n22	n21	n13

Saline groundwater area, km ²	33,502	28,964	24,303	25,670	21,455	18,123	17,628
Fresh groundwater area, km ²	4,398	9,418	14,466	13,443	12,948	16,269	10,232

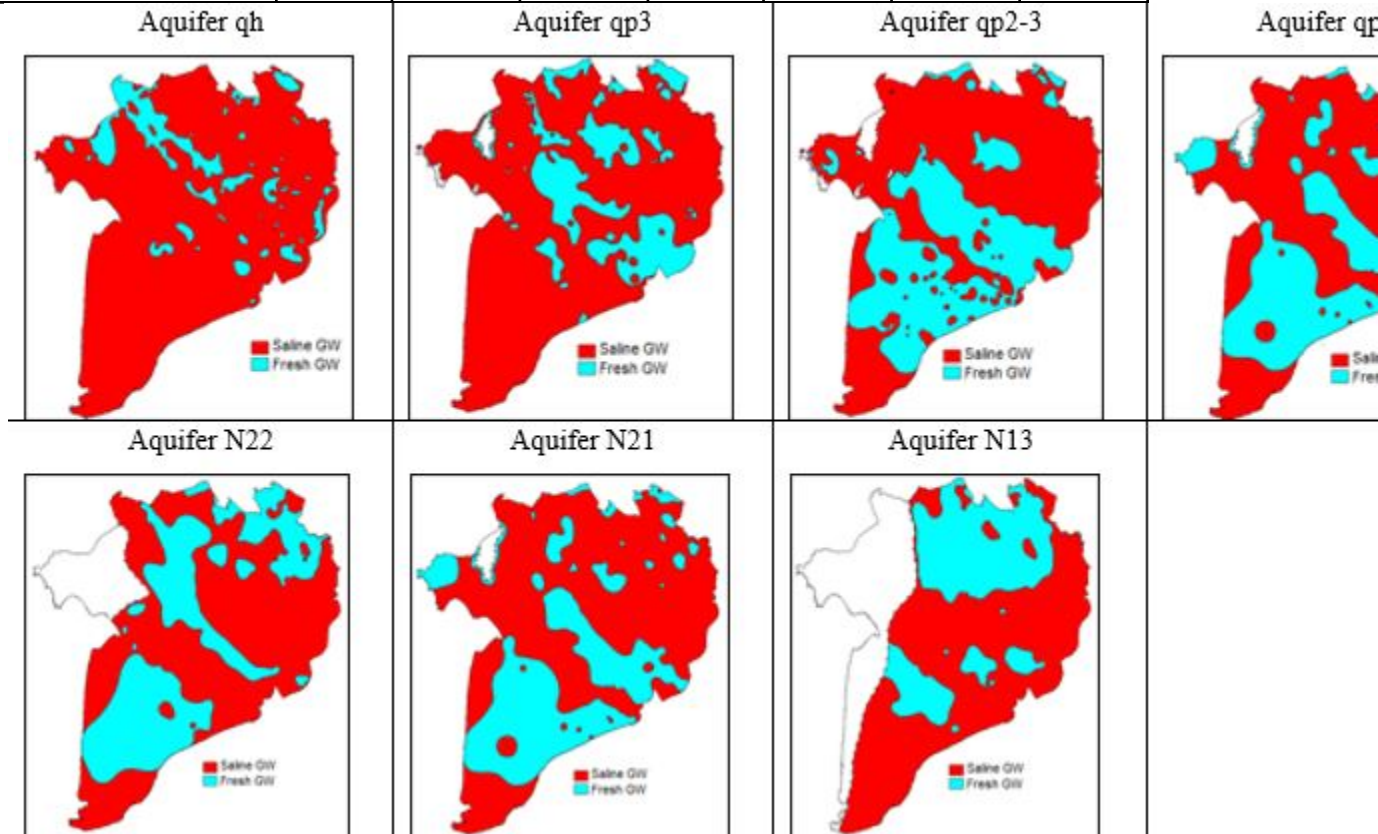


Figure 12. Distribution of fresh and saline groundwater (Created by Authors)

In Ben Tre province groundwater salinity is increasing due to shrimp farming, especially in communes of Binh Dai district. In Kien Giang province groundwater abstraction is very high while groundwater recharged is nearly absent, which causes salinity levels in groundwater to increase rapidly, like in Ha Tien, Rach Gia, An Ninh districts. In Soc Trang Province several abstraction wells are contaminated with salinity due to the phenomenon of leakage of salty groundwater or over-exploitation. The saline groundwater intrusion at the centralized water supply stations increased (at Dai Ngai town, Tran De district). In Tien Giang province most of the groundwater extraction wells at the depths from 20-100m are salty and the chloride content is many times above the allowable standards. In Hau Giang province the value of chloride content in groundwater increased sharply and exceeded Viet Nam's standard many times based on monitoring data for 2004 to 2010.

Saline groundwater is also widely observed in the Cambodian Mekong Delta, particularly in the coastal area, which is threatened by impacts of climate change (Smajgl et al., 2015), including seawater intrusion due to sea level rise. During the dry season, especially from November to February, seawater intrusion and high tides pose serious threats to land and freshwater sources in the coastal zone. Salinization of surface and groundwater has detrimental effects for local communities along the coast and can result in severe fresh water shortage (UNDP, 2009). Soil salinity of the coastal lands increases due to salt accumulation, which also has a severe impact on the fertility of the areas used for farming. A study indicated that in case of one-meter rise in seawater would result in inundation of 56% of Koh Kong city and an area of over 4,400 ha of natural habitat would submerge (MoE, 2005). Low-lying agriculture and urban lands have been affected by salinization, which would be further amplified by climate change. In addition, even a minor rise in sea-level will increase coastal erosion and may eventually lead to the inundation of economically important coastal infrastructure such as ports and coastal resorts. Even a moderate sea-level rise will increase flooding from storms and storm surges.

Salinity levels are also a problem in the south-eastern provinces of Prey Veng, Takeo and Kampot due to saline groundwater at the depth range of 40-50 m. Also, deeper groundwater abstraction for irrigation in Takeo Province has failed due to intrusion of saline groundwater (ADB, 2013). Extraction limits could prevent salinization of groundwater and soil. Figure 13 shows salinity changes for the qp2-3 aquifer, which is currently one of the most relevant aquifers for drinking water. While the most dramatic changes have to be expected for the southern provinces, effects are likely to impact also areas along and across the Cambodian border.

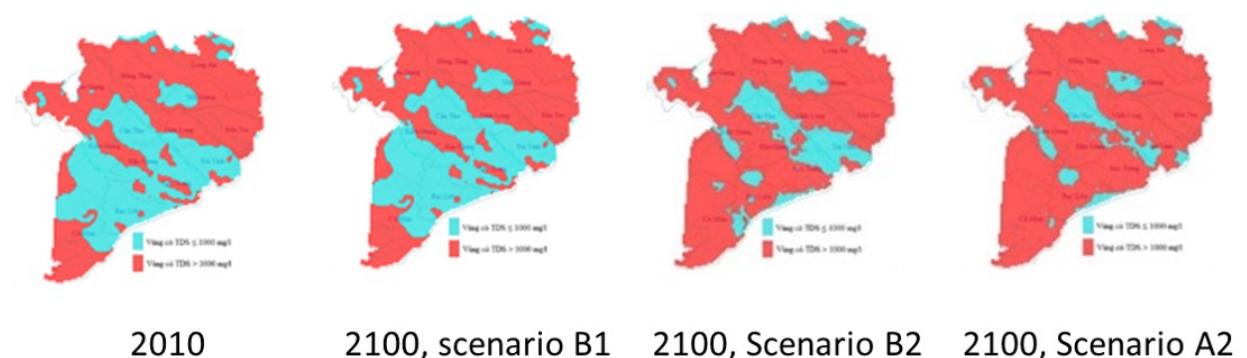


Figure 13. Area of saline groundwater in aquifer qp2-3 in 2010 and 2100 under different climate change scenarios (Created by Authors)

Degradation of groundwater dependent ecosystems (e.g. wetlands)

A major environmental challenge in the context of declining groundwater levels is the sustainability of wetlands. Wetlands provide a multitude of ecosystem services, including flood risk mitigation and the provision of habitat for fish. Surface aquifers store water during the wet season and release it during the dry season to provide base flow for rivers, streams, and wetlands, thus providing an essential component of environmental flows. Floodplains are hydrologically complex, with a high degree of connectivity between surface and groundwater systems. Over-extraction of groundwater can reduce dry

season discharge and, if water levels drop significantly, surface water bodies may lose water to the aquifer system rather than gaining from it. This can cause groundwater dependent wetlands to dry up, either seasonally or permanently. The implications for a wide variety of fish species and other aquatic species that depend on wetlands as nurseries and habitat can be severe and cause a further decline of fish population and diversity in the CMDA area. The ecological connectivity can cause losses across the wider lower Mekong basin. These consequences for fisheries will impact on the food security of millions of households.

Annex M5 provides an overview for groundwater dependent wetlands across the CMDA. On the Cambodian side more than 1.3m ha of wetlands depend on groundwater, many of international significance, including RAMSAR listed wetlands, e.g. Boeung Chhmar. Wetlands in Viet Nam's Mekong Delta cover 4,939,684 ha and are among the richest ecosystems of the basin, which provide important breeding sites for many aquatic species migrating to and from upper reaches of the Mekong River.

Particularly relevant for the groundwater context are riverine wetlands and lacustrine wetlands. Four sites within the Mekong Delta are Ramsar-listed wetlands, namely the Tram Chi National Park (listed in 2012), Ca Mau National Park (listed in 2013), Lang Sen Wetland Reserve (listed in 2015), and the U Minh Thuong National Park (listed in 2016).

The implications of groundwater decline on wetlands compound the other forms of degradation to which wetlands have been subject over many decades, including those resulting from drainage and canal construction, and conversion for housing and farms. Now, only 1? 1.5 % of the wetlands remain in the Mekong Delta.

Transboundary dimensions

Figure 14 below portrays the transboundary dimensions of the threats described above, underlining the need for an integrated, harmonized and coordinated transboundary approach. Red arrows depict negative causality, and blue positive causality. In summary, the main transboundary phenomena are as follows:

- Loss of forests and wetlands, and overall watershed degradation is reducing the recharge of the shared CMDA, with implications for groundwater availability in both countries;
- Modifications to surface hydrology (canals, sluices and reduced emphasis on flood-based farming) is reducing groundwater recharge in the shared aquifer;
- Over-extraction of groundwater for large-scale agricultural, domestic and industrial purposes in both countries is leading to depletion and reduced availability of the shared resource;
- Viet Nam in particular is affected by subsidence as a result of over-extraction of groundwater in both countries;
- Wetlands, especially those in Cambodia, are affected by groundwater decline, affecting the viability of transboundary fisheries resources of importance to both countries.
- Transboundary migration of (human) population is placing additional pressures on groundwater resources.

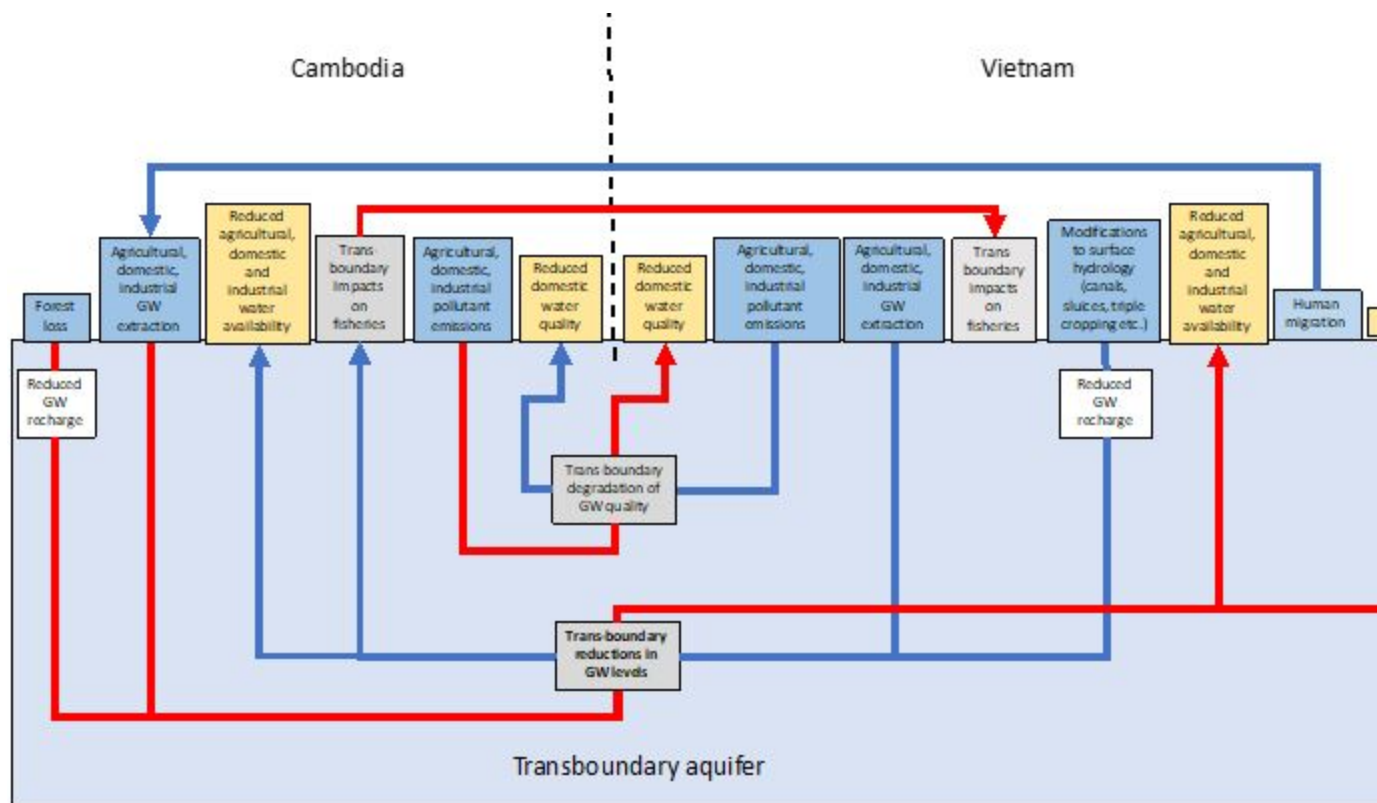


Figure 14: Transboundary dimension of threats to CMDA (Created by authors)

Socio-economic conditions and implications

The variety of interlinked bio-physical changes shift conditions for communities and affect a wide range of socio-economic indicators, including poverty and livelihoods. Annex M6 provides a detail overview for Cambodia while Annex M7 is focused on Viet Nam. Understanding the socio-economic dimensions reveals the actual exposure, vulnerability and risks for the dependent population to the biophysical developments, and reveals some of the major drivers for groundwater over-extraction and wetland loss. Ensuring sustainable dynamics between wetlands and the CDMA is critical for the survival of more than 16 million people as agricultural production systems of small-scale farmers, groundwater for domestic use, fish as main protein intake depend on this link.

In Cambodia 22 provinces and the capital city of Cambodia depend on the CDMA. Around 16 million people of which 51% are women live across the six different geographical regions with an average household size of 4.52, which converts to almost 3.5 million households including an average of 18% of female headed families (FHF).

The upper Mekong area is the least populated region but has the highest density of Indigenous Peoples (IP), which account for 10.25% of households. The main ethnicities are Kouy, Punong, Steang, Souy

and Tompoun and follows by other Charay, Kanchork, Por, Merl, Krerl, Thmorn, Khernh, Chorong, Kreung, Sa Och, Kavet, Lun, and Rodai.

Poverty in Cambodia has been dropping due to rapid economic growth but it still ranks 146 of 189 countries on the UNDP Human Development Index (UNDP 2019). According to ID Poor (Ministry of Planning, MOP), an average of 14% of households (or 541,945 households) across all six regions of the groundwater aquifers of Cambodia are considered poor and highly depend on ecosystem services provided by wetlands. The COVID-19 pandemic already eliminated an estimated 390,000 jobs and is expected to push an additional 1.3 million people into poverty. As shown in the Mekong Sub-Regional Report on the Rapid Gender Analysis conducted in 2020, women and children are disproportionately impacted, in particular related to financial impacts due to job and other economic losses, and an increase in their work-burden, as women might take on unpaid care responsibilities and domestic chores, including fetching water and collecting firewood. Furthermore, the under-representation of female share in decision-making and women's and children's needs in high level taskforces and committees might further exacerbate underlying gender inequalities.

Agricultural production in Cambodia involves 64% of the workforce or 5 million people, of which almost 4 million people cultivate rice. Rice production (3,871,689 ha) relies heavily on water and depends increasingly on irrigation. Subsistence agriculture is paramount for food provision of small-scale agriculture and for food security of the majority of households in the CMDA area.

The socioeconomic report from 2019 indicates that the currently 512,841 hectares of rice are irrigated, of which 47.10% locate in the Lower Mekong region, specifically dry season land in Prey Veng, Takeo and Kandal. The Southern Tonle Sap region accounts for 43.03% of irrigated rice land but mainly for the rainy season, specifically for Battambang and Banteay Meanchey (Figure 15).

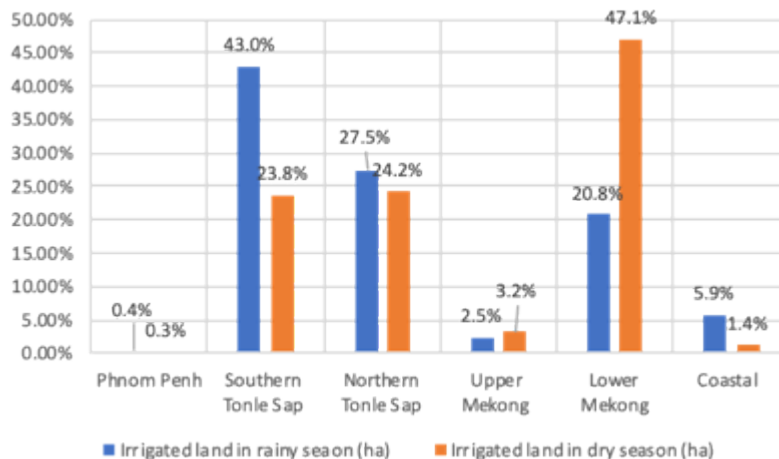


Figure 15: Comparison of irrigated rice land in rainy and dry season from the six regions (Created by authors)

However, irrigation expansion plans aim to reduce community vulnerability to droughts. Establishing irrigation across the entire existing rice production across the CMDA (3,871,689 hectares) would

require an additional 2,942,048 hectares of irrigation, especially in the Southern Tonle Sap (979,576 hectares), the Lower Mekong (902,660 hectares) and the Northern Tonle Sap (733,079 hectares), see Figure 16.

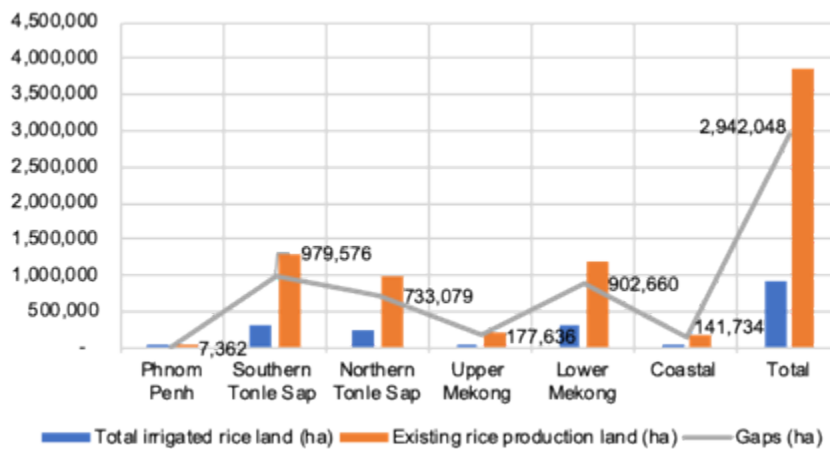


Figure 16: Comparison between existing rice land and irrigated land from the six regions

The increasing number of non-agricultural water users further exacerbates water needs, in particular for pure water stations, hotels, and guesthouses. Figure 17 shows that rural groundwater dependency seems highest in the Lower Mekong region with a large number of wells. Southern Tonle Sap uses substantially more rainwater than the other five regions.

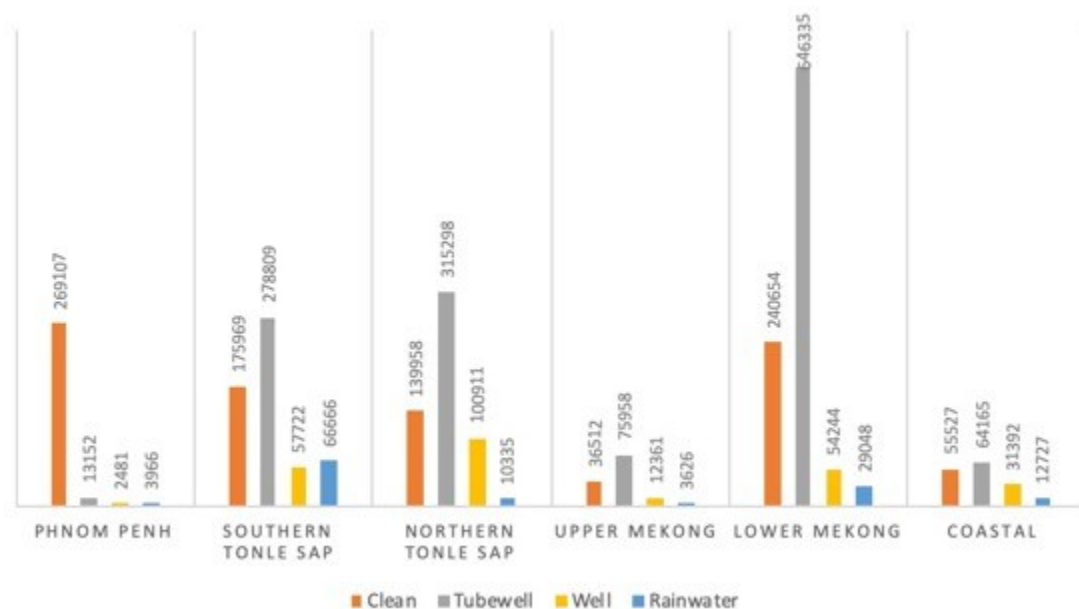


Figure 17: Comparison household's access to water sources from the six regions (Created by authors)

The emerging socio-economic picture highlights high groundwater dependency of households. Considering declining groundwater levels and the subsequent increase of pumping costs, it seems likely that particularly poorer population segments will become increasingly vulnerable.

On the Viet Nam side of the CMDA area, the mostly rural Mekong Delta needs to be distinguished from the largely urban Ho Chi Minh City area. It is estimated that around 21 million people live in the Mekong Delta while around 9 million people live in Ho Chi Minh City.

Livelihoods in the Mekong Delta depend widely on agricultural production, particularly rice and also increasingly shrimp farming. Rice income contributes 50-70% to the total income of richer farmers, compared to about 10-25% for poorer farmers. Poorer farmers typically supplement their income with fishing and off-farm wage labor, securing 45-55% of their total household income (Nhan et al., 2018).

In the coastal provinces, shrimp production has emerged as a major livelihood. However, saline shrimp production has economic and social trade-offs. Compared to rice and other crop production, saline shrimp production has higher income but bears high income loss risks due to shrimp diseases, less opportunities for off-farm employment and reduced food security of poor households (Smajgl et al., 2015). Shrimp culture requires relatively low labor inputs but reduces bio-diversity of aquatic resources, on which livelihoods of the poor highly depend.

Groundwater is a key input for many agricultural livelihoods, including aquaculture. However, groundwater related restrictions and poor water quality pose limits for agricultural as well as domestic users. Adoption of adaptive farming practices by farmers in response to these changes is still limited. A case study in the lower provinces by Hamer et al. (2019) reports that 84% of the farmers did not use improved water-saving techniques even though they believed a causal relation between groundwater extraction and the drop of groundwater levels. Main constraints are high material investments, poor access to information and education, and economical trade-off (Hoang et al., 2018; Hamer et al. (2019)). Many farmers practicing upland crops (e.g. fruit trees, maize, water melon, groundnut) that rely on groundwater in Tra Vinh and Soc Trang provinces are too poor to change their farming practices, and they pay much more attention to short-term profit.

The use of rain water for domestic and agricultural purposes is still not popular, due to storage capacity and quality problems. A majority of groundwater users for domestic and crop irrigation purposes use privately owned tube-wells, which is constraint on resource management, efficiency and quality monitoring. Improved access to communal groundwater supply stations is therefore necessary to switch from private wells to communal supply systems (Danh and Khai, 2015).

Legal enforcement of small-scale groundwater exploitation by local authorities and inhabitants is weak. Groundwater use for agricultural purposes, with capacity > 10 m³ per day and from the depth below 30 m, requires permission by local authorities (Decree 167/2018/N?-CP). However, drilling and extracting water from aquifers for agricultural uses by small farmers cannot be well controlled.

According to MDP (2013) and Resolution 120/NQ-CP (2017), regional land and water uses for agricultural development will be in the order of importance: aquaculture ? fruit ? rice (instead of rice ? aquaculture ? fruit formerly). Accordingly, flood-based farming production systems (i.e. rice and catfish) will be the main land use in the upper zone; fruits and high-value vegetables are major

commodities in mid-zone; brackish and saline aquaculture production systems are important in the lower zone.

Summary of Barriers

The project will address the following barriers which, without GEF intervention, would prevent the transboundary problems affecting the CMDA from being addressed effectively. In summary, without GEF intervention the two countries would lack the level of shared understanding of the transboundary nature of the problems affecting the CMDA required to allow them fully to appreciate the need for transboundary cooperation; and they would lack the forum and methodological roadmap required for them jointly to develop negotiated and science-based solutions to their shared problems within the framework of a Strategic Action Programme (SAP).

Barrier 1: Lack of a shared, adequate understanding across the region of biophysical and socioeconomic conditions and processes associated with the CMDA

Description: At present, only fragmented and sectoral sets of data exist on the current state of groundwater resources, recharge and extraction dynamics. While monitoring of groundwater in Viet Nam is well developed, Cambodia lacks consistent and long-term national groundwater monitoring. Groundwater monitoring has only been performed by isolated groundwater resource assessment studies in certain regions. Cambodia lacks also data on deep wells (>78m); number of tube (dug) wells with hand pumps; quality of groundwater; and industrial groundwater use. Although aquifers on Viet Nam's side have been mapped, there is limited information on how far these extend into Cambodia, as required to identify transboundary impacts and inform transboundary management decisions. The deeper aquifers (n12-3) have in general been insufficiently studied. Aquifer system dynamics (seasonal and long-termed) is practically unknown. Socio-economic modelling that accounts for interactions between livelihoods of men and women, ecosystem services, environment, water resources, land use change, and migration remains absent, but need to be included for sustainable governance and management. Consequently, assessments of planning strategies, investments, or policies against a broader set of SDG indicators, and impacts of groundwater resource depletion on rural poor, are unavailable.

Impact: Without adequate data and modelling tool of the CMDA, groundwater management and underpinning policy and planning cannot lead to sustainable outcomes.

Project contribution: This project will address this barrier by among others, upscaling an existing (under Output 1.1 and Output 1.2) model of the CMDA (addressing piezometric and land subsidence evolution), updating and optimizing the monitoring network (under Output 3.1) and consolidating (under Output 1.3) a consistent TDA for the transboundary context of the CDMA.

Barrier 2: Limited knowledge across the region of proven strategies and practices for aquifer management and recharge

Description: Practical experiences of options for aquifer management and recharge are lacking, specifically in relation to practices for groundwater extraction, recharge and management. This is compounded by the lack of effective mechanisms for collecting, managing and channeling the learnings from experiences generated to date, into guiding decision-makers and practitioners.

Impact: Without the knowledge of proven strategies and practices investments face high risk and the design of actions remains paralyzed.

Project contribution: The project will present proven strategies including managed aquifer recharge (MAR) and test solutions as part of the demonstration project component, under Output 2.1.

Barrier 3: Inadequate cooperation on transboundary issues

At present, decisions and plans on groundwater/aquifer management are formulated on a country-specific basis: neither country has transboundary aquifer management obligations at present. Monitoring lacks transboundary harmonization. Moreover, the lack of data sharing agreement for groundwater resources is of particular concern in relation to key issues, such as groundwater levels, groundwater extraction rates, transmissivity, and in some areas salinity and/or arsenic levels. There is also limited coordination within countries on issues related to the management of the CMDA, especially between agricultural and environment sector institutions (such as DARD and DoNRE in Viet Nam), and between different provinces in the Delta.

Furthermore, mechanisms for transboundary resolution of conflicts associated with groundwater/aquifer management are lacking. Such conflicts include, for example, over-extraction of groundwater on one side of the border, affecting well yields on the other side, and potential transboundary movement of arsenic associated with such extraction.

In addition to the limited availability of data per se, there is limited consensus across the region on the nature and implications of the problems affecting the CMDA, particularly on issues of transboundary groundwater management and options of aquifer recharge strategies; nor are their objective, standardized and binationally-agreed measures specified in form of environmental indicators.

Impacts: This situation entails further risks leading to sub-optimal or conflicting decisions being taken in relation to natural resource (including groundwater/aquifer) management.

Project contribution: The project will establish a TCCB for transboundary planning and coordination (under Output 3.3) and will also develop well-specified environmental indicators (under Output 1.4).

Barrier 4: Legal, policy, institutional and incentive frameworks do not specifically facilitate transboundary and inter-sector coordination

Description: The lack of shared vision of groundwater/aquifer management between the two countries, and of transboundary coordination of actions and investments, is further reflected in the status of legal, policy, institutional and incentive frameworks. In addition to lacking transboundary focus, these frameworks generally fail to adequately consider the water-food-energy-ecosystems nexus.

So far, both countries have mainly focused on regulatory instruments instead of economic incentives (e.g. pricing instruments or subsidies) to manage groundwater aquifers. However, the implementation of legal documents related to water resources at bottom levels (i.e. district and commune) are not

effective due to constraints of human capacity, financial budgets and sectoral coordination prevail. Additional barriers prevail between sectors affecting land use change and thereby directly and indirectly affecting groundwater resources.

Impact: Insufficient coordination between levels of governance and between sectors leads to fragmentation of planning affecting groundwater extraction and recharge directly or indirectly, for instance by lack of integrated land use planning.

Project contribution: The project will introduce as a demonstration project integrated land use planning (under Output 1.4) as well as improve capacity for cross-sector coordination for issues relevant for groundwater management (under Output 4.2 and 4.3).

Without overcoming these barriers, the CMDA is very likely to follow a highly unsustainable trajectory, as described in the following baseline scenario section.

b. The baseline scenario and any associated baseline projects.

As detailed above, without concerted transboundary groundwater management action the future trend is most likely to be characterized by

- a) continued over-abstraction of groundwater resources in many parts of the aquifer, resulting in ground water level decline and land subsidence;
- b) groundwater level decline will in turn incur environmental (e.g. loss of wetlands and loss of fish) and energy costs for pumping, which will threaten many livelihoods and increase poverty, disproportionately affecting women and children due to underlying gender inequalities.
- c) Groundwater dependent ecosystems (wetlands) will be threatened, which will amplify water quality problems (e.g. nitrates) and erode livelihood, further adding to the poverty cycle.

The following paragraphs outline the five key threats: Groundwater level decline, land surface subsidence, groundwater saline intrusion, loss of groundwater dependent wetlands, and loss of ecosystem services provided in wetlands to rural livelihoods.

Challenge 1: Groundwater level decline

Large parts of the CMDA experience unsustainable levels of groundwater extraction while land use change and climate change cause aquifer recharge to decline. Consequently, groundwater levels are declining, in some areas rapidly, see Figure 7 and Table 3. Provinces in the Mekong Delta experience the highest decline, particularly Ca Mau Peninsula and Ho Chi Minh City, where groundwater in individual aquifer segments drops by around a meter per year. The future impact of climate change on groundwater recharge suggest a substantial decline of aquifer recharge of 50-65%. Consequently, groundwater levels are predicted to drop by up to 44.5m by 2100, see Table 4.

In Cambodia, groundwater decline is particularly extensive close to the border in Svay Rieng Province. Between 1996 and 2008, groundwater levels have dropped in average around 4.5 meters and while no recent monitoring data was available the discussions during the project preparation phase have

confirmed that this trend has continued and, in many places, even intensified. According to a study by Erban and Gorelick (2016), it was found that within 15 years current groundwater use in Cambodia will cause the groundwater table to drop below the level at which conventional suction pumps can operate. Considering the timing of this study and the accelerating extraction levels it is likely that many conventional suction pumps will run dry before 2030. Current observations flag that many pumps are already now drying up during the dry season. Cost and water security implications and subsequent impacts on the poor are substantial.

Challenge 2: Land subsidence

The lack of sustainable groundwater management has several major consequences of which land subsidence is often perceived as the most devastating. Land subsidence is understood to occur largely due to the decline of groundwater levels and the subsequent compaction of unconsolidated sediment layers. This phenomenon is most evident in Viet Nam's Mekong Delta and in Cambodia's Siem Reap Province. Several studies have focused on the Mekong Delta and observed land subsidence rates of up to 4 cm per year. In average, the delta sank between 1991 and 2015 by around 17 cm.

The BAU projections of future land subsidence have shown that the continuation of current groundwater extraction trends would cause a land subsidence of around 68 (55-70) cm by 2100 (Minderhoud, 2019). If extraction rates increase at a slightly higher rate of 4%, land is likely to subside by 1m or more by 2100. The severity of the situation becomes even more prominent if upstream hydropower development is considered. Minderhoud (2019) estimated that a sediment reduction of 50% over the 21st century results in a loss of elevation amounting to ~1.2 m at the present coastline due to ongoing natural compaction of the Holocene sequence. Recent MRC studies have alerted that sediment delivery might nearly entirely cease, leading to an elevation loss of ~2.0 m by the end of the century.

Challenge 3: Arsenic contamination

Arsenic contamination is a natural phenomenon that originates from alluvial deposits of major rivers which flow south and east from the Himalayas and the Tibetan plateau. The Mekong has received lower arsenic deposits than large parts of south Asia. Arsenic is released into alluvial aquifers when it reacts with organic matter and iron oxide. While the WHO prescribes a limit of 10 ppb some groundwater pockets in the CMDA exceed this limit by factor 300. The highest concentrations can be found in Cambodia in close proximity to the Mekong River. But also, Viet Nam experiences loads of up to 1,523 µg/L in localized pockets. However, while many deposits are currently localized the extraction of groundwater can spread arsenic contamination between affected aquifer segments or unsettle deposits and drive them according to the dominating flow direction towards Viet Nam's Mekong Delta.

Challenge 4: Groundwater salinization

Groundwater extraction and land subsidence will also induce salinity intrusion. This constitutes a mounting threat for crop production and subsequently for food security as yields of rice and other crops decline. Already now large parts of the coastal aquifer segments are considered saline. The portion of

saline groundwater area varies from 52% to 88% depending on the aquifer segment. Unsustainable groundwater extraction and sea-level rise are key drivers for this threat. Some communities exacerbate groundwater salinization by increasing shrimp production and accelerating their groundwater extraction. Groundwater salinization is not only a threat to rice yields but also an emerging threat for freshwater availability for millions of people in the Mekong Delta. These effects are not limited to coastal communities but reach north into Cambodia. Projections suggest that until 2100 the area of the seven aquifer segments that will be saline is likely to increase by up to 111 km² per year.

Challenge 5: Loss of wetlands and loss of fish

The unsustainable extraction of groundwater and its implication for the decline of groundwater tables results in a loss of wetlands that depend on groundwater and a subsequent loss of fish that depend on wetlands as their habitat. Annex M5 provides an overview for groundwater dependent wetlands, which includes Ramsar-listed wetlands. As groundwater levels decline wetlands dry out. Typically, permanent wetlands turn into seasonal wetlands, only effective during the wet season, and with a further decline of groundwater tables wetlands can disappear. While some communities might experience the availability of land as a benefit, the long-term implications are typically substantial, as the frequency and magnitude of floods increase. Equally important, fish habitat disappears reducing the availability of fish nurseries for many fish species. This constitutes a substantial threat for food security of many communities in the CMDA area as fish provides the main basis for people's protein intake. Consequently, the disappearance of groundwater dependent wetlands and subsequent loss in fish and food security while flood risks are increasing constitute a major threat this project will address during the TDA-SAP process.

Socioeconomic implications

The social and economic consequences will result as a threat for the sustainability of the broader social-ecological system and the sustainability of the water-food-energy-ecosystem Nexus. In an early stage, stakeholders are likely to experience increasing pumping costs, as already observed in Cambodia and Viet Nam. Wealthier users will be able to respond with motorized wells, which shifts impacts disproportionately to the poorest users (Sekhri, 2014), disproportionately affecting women's work burden by increasing their water-fetching responsibilities and by consequence restricts women's ability to invest in gaining skills, education, and to engage in entrepreneurial activities. These patterns are likely to affect in rural communities a wide variety of crops as well as livestock production. Increasing salinity levels will exacerbate the situation. Impacts will not be limited to agricultural uses but rather increase water scarcity and costs for all stakeholders, particularly under more realistic climate change scenarios, which involve increasing temperatures and heat waves. From a macroeconomic perspective, resulting public health related costs can be substantial (e.g. work force effects), a factor often neglected in water management.

The combined socio-economic effects of groundwater scarcity, land subsidence, salinity intrusion, and sea-level rise are likely to be catastrophic under the BAU scenario as millions will be forced to vacate inundated or uninhabitable areas. Consequences of the resulting migration are likely to be felt across many borders, first of all the one with Cambodia.

Government action and associated baseline projects

While the aforementioned baseline scenarios are daunting, both Governments have already started investing in a variety of actions, which will be described in the following Section, followed by a list of projects that will be implemented in parallel to this project. Following from there the alternative scenario will be outlined to summarize the contributions this project will be able to make.

Baseline for Component 1 (Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods)

Research, monitoring and knowledge management

In recent efforts the Cambodian government focused on collecting data and improving monitoring to reach a better hydrogeological understanding of the CMDA. The Mekong River Commission aims to support these efforts with a new project that elicits agricultural groundwater extraction rates in Cambodia. Improving the monitoring of hydro-meteorological conditions in the country as well as improving existing water resources systems to cope with rapid climate change especially during dry season are of highest priority. Recently, the National Groundwater Strategy was enforced for Cambodia and will be executed by the Department of Water Supply and Sanitation in the Ministry of Water Resources and Meteorology in partnership with UNDP.

In addition, the Ministry of Rural Development of Cambodia with the support from various development partners such as ADB, World Bank, and UNICEF has started implementing significant actions on groundwater including:

1. A project funded by ADB, which has installed the groundwater monitoring network for regular monitoring of the groundwater dynamic changes throughout times and also increased utilization of groundwater resources for rural poor in Cambodia.
2. Development of groundwater map for some selected provinces.
3. Develop an arsenic database and mapping.
4. Mapping of groundwater aquifer in Svay Raing, Prey Veng, Kampong Cham, Kampong Chhnang, and Takeo provinces.
5. Establishment of local water use communities for all groundwater use-provinces for the long-term sustainability of groundwater utilization and promote equal opportunity and benefit-sharing among all water user and water use communities.
6. Promotion of gender mainstreaming in groundwater user groups and water use communities.
7. Annual expansion of wells for the rural community in the drought-prone areas in Cambodia.

In 2019, the Cambodian National Mekong Committee (CNMC) with the support of the Mekong River Commission has undertaken significant steps on executing the baseline study on groundwater in the Cambodian floodplain. This study supplies many good findings and a better understanding of the groundwater condition in the Mekong Basin and Cambodian floodplain for the preparation of the national strategic and development plan of the Mekong basin in Cambodia as well as the national indicative plan 2021-2025.

The domestic scientific agencies in Viet Nam (under MONRE and MARD) have carried out many series of research programs and projects on the management, exploitation and protection of groundwater resources in the Mekong Delta.

There has been cooperation between the scientific institutions of MONRE and MARD and the many international science organizations from countries such as Norway, France, India, etc., to study water resource management and development in general, which includes groundwater research in the Mekong Delta.

Since 2009 the German Ministry BMZ is funding the groundwater focused project "Improvement of Groundwater Protection in Vietnam" (IGPVN), which is being implemented in a partnership between the German BGR and Viet Nam's NAWAPI/MoNRE. This study aims to improve the protection and sustainable management of groundwater resources in Viet Nam's Mekong Delta assessing recharge, salinization, pollution, and land subsidence. It has been recently extended until 2022 under the title "Climate-resilient management of groundwater and geohazards". The project provides excellent data for two provinces in the Mekong Delta, Soc Trang and Ca Mau. During the PPG phase of this project the team already collaborated with NAWAPI and build on updated data and updated modelling provided by this BMZ project. This partnership will be continued during the TDA phase.

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.

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 analyze 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>).

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.

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 Technical Committee (JTC) has been formed. This initiative provides an important foundation for the CDMA project, which will involve that the TDA will systematically build on and further expand the data sharing experience of the World Bank investment and the SAP will reflect on the experiences made in the IWRM program.

Table 6 features a summary of baseline projects relevant for Component 1. In yellow shading are the projects that include groundwater.

Table 6: Baseline projects relevant for component 1

Current Projects	Investment & period	Area	Objective
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.
EU-PRASAC	1995-2000	All provinces	Monitoring groundwater by well network
BMZ funded "Improvement of Groundwater Protection in Vietnam" (IGPVN)	2209-2014 1	Soc Trang and Ca Mau Provinces in Viet Nam's Mekong Delta	BGR and NAWAPI partnership to improve protection and sustainable management of groundwater resources in Viet Nam's Mekong Delta assessing recharge, salinization, pollution, and land subsidence.
BMZ funded "Climate-resilient management of groundwater and geohazards"	2022-2026	Soc Trang and Ca Mau Provinces in Viet Nam's Mekong Delta	
World Bank's Integrated Climate Resilience and Sustainable Livelihoods (ICRSL) project	Since 2016 \$310m	Viet Nam's Mekong Delta	Monitoring of riverbank and coastal erosion, and the establishment of a Mekong Delta Data Center.
GEF/WB ICRSL (building on the phase 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)	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

Groundwater mapping	Start 2018	Svay Raing, Prey Veng, Kampong Cham, Kampong Chhnang and Takeo	Mapping groundwater aquifer
World Bank's Integrated Water Resource Management (IWRM) project	Third phase until 2021 \$16.5m	Mekong Delta, Cambodia & Viet Nam	Data sharing is a core goal of this transboundary initiative and a Joint Committee has been formed
NWO funded 'Rise and Fall' project	2014-2019	Viet Nam's Mekong Delta	Development of strategies for a subsiding and urbanizing Mekong Delta (Viet Nam) by modelling groundwater and salinity intrusion.
BMBF funded ViWAT project	2018-2021 \$8m	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	2013-2019	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	2005-2008	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'	2011 \$9,000	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.

Baseline for Component 2: Piloting solutions for improved transboundary groundwater management.

Water/wetland management

Apart from the groundwater-related project, the Ministry of Environment in Cambodia, in cooperation with various development partners such as KfW, LMC, World Bank, and other national and local NGOs trying to conserve the wetland sites across the country for maintaining and balancing surface and groundwater recharge, regularly monitoring of surface and groundwater quality, and promote the conservation of environmental assets, improve better management of natural forest, promote reforestation and protect the major wetland sites which have significant ecosystem services and

functions as well as establish almost a thousand of local communities for protection and conservation of natural forest, protected sites and wildlife sanctuary and so on.

There are 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 European Union is supporting in Cambodia the project 'Promoting of inclusive and sustainable growth in the agricultural sector: fisheries and livestock', which has the potential to enhance farmers' access to sustainable options for managing wetland-based livelihoods with positive implications for aquifer status.

Viet Nam's Government (via MARD) is also investing in a number of water management infrastructure projects, including Tr? S? sluice (\$10 million), Ninh Qu?i ship lock combined sluice (\$17.2 million), Xu?n H?a pumping station and sluice (\$10.8 million), and the dredging of the M?y Ph?p - Ng? H?u canals (\$19.7 million). Additional investments aim to improve irrigation schemes in Nam B?n Tre (\$9.3 million), C? Mau (\$21.6 million), and C?i L?n ? C?i B? (\$142.7 million).

FAO's Sustainable Rice 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. Table 7 below summarises the baseline projects relevant for wetland management, highlighting in yellow those with groundwater elements.

Table 7: Baseline projects relevant for wetland management under component 2

Current Projects	Investment & period	Area	Objective
USAID funded Mekong ARCC project	2011-2016 9.4 million USD	Kien Giang Province in Viet Nam's Mekong Delta	Improved management practice of rice-shrimp rotation farming.
ACIAR: Improving the sustainability of rice-shrimp farming systems in the Mekong Delta, Vietnam	2013-2020 2,129,516 AUD	Viet Nam's Mekong Delta	Improved management practice of rice-shrimp rotation farming.
RGC: Commune Investment Programme	2010-2030	25 Provinces	Water supply for community

EU-Capfish Capture (Aquaculture)	2019-2025 124 million USD	25 provinces	Aquaculture productivity and freshwater and marine fisheries
World Bank-Water Supply and Sanitation Improvement Project	2019-2024 57 million USD	Siem Reap	Provincial Water Supply and Provincial Sanitation Improvement
AFD-Project to Build the Bakeng Water Purification Plant and Expand the Drinking Water Network in Phnom Penh	2019-2022 177.33 million Euro	Phnom Penh	Water Purification Plant
ADB-Provincial Water Supply and Sanitation Project	2018-2023 123.74 million USD	Battambang, Kampong Cham, Siem Reap and Preah Sihanouk	Improved Pipe Water Supply and Sanitation
ADB-Urban Water Supply and Sanitation Project	2015-2022 34 million USD	Siem Reap, Stung Treng, Kampong Thom, and Svay Rieng	Improved and Established Water Supply System
ADB-Third Rural Water Supply and Sanitation Services Sector Development Program	2019-2024 47.48 million USD	Banteay Meanchey, Battambang, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Pursat and Siem Reap	Rural Water Supply including Tubewell, Ponds and Water Distribution System Development
ADB- The Agricultural Value Chain Competitiveness and Safety Enhancement Project	2020-2025 70 million USD	Kampong Cham, Kampong Thom, Oddar Meanchey, Preah Vihear, Siem Reap, and Tboung Khmum.	Provide access to high-yield, drought-resilient, disease-resistant crop seeds and other planting materials
World Bank-Cambodia Agricultural Sector Diversification Project	2019-2025 101.67 million USD	Country wide	Enabling agriculture diversification, supporting public infrastructure; Improving agriculture information systems and quality control management.

ADB-Irrigated Agriculture Improvement Project	2019-2025 120.76 million USD	Battambang, Kampong Cham, Kampong Thom and Takeo.	Irrigation System Development
ADB-Uplands Irrigation and Water Resources Management Sector Project	2016-2021 60 million USD	Battambang and Kampong Thom	Climate Resilient Irrigation System
World Bank's Landscape Project	2018-2021 6,090,831 USD	Viet Nam's Mekong Delta	Improved utilization of remote sensing technology to inform eco-tourism and improved road access.
IDA project ?Cambodia Agricultural Sector Diversification Project?	2019-2025 91.7 million USD	Cambodia	Improved agricultural value chains and improved irrigation, involving surface and groundwater.
MARD, Viet Nam	2021-2025 221.3 million USD	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 Delta project	2010-2017 100 million USD	Binh Thuan, Dak Lak, Dak Nong, Khanh Hoa, and Ninh Thuan Provinces in Viet Nam's Mekong Delta	Upgrading irrigation systems, involving the upgrade of pressurized pipe systems, the development of improved groundwater and water productivity assessments, and micro-irrigation systems.
ADB's Climate Resilience Cambodia project	2012-2017 7 million USD	Cambodia	Increased utilization of groundwater resources.
GEFTF/FAO Integrated Sustainable Landscape Management in the Mekong Delta (FOLUR ID) (GEF ID 10245)	2022-2027 5,354,587 USD	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

Climate resilience measures

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.

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 European Union is also supporting the project 'Promoting climate resilient livelihoods for Small-Scale Farmers': this is primarily focused on drylands.

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. Table 8 summarises baseline projects relevant for climate resilience under Component 2, highlighting in yellow those which included Groundwater.

Table 8: Baseline projects relevant for climate resilience under component 2

Current Projects	Investment & period	Area	Objective
WISDOM project	until 2013	Viet Nam's Mekong Delta	Flood and drought management
World Bank/GEFTF Integrated Climate Resilience and Sustainable Livelihoods (ICRSL) project (GEF ID 9265)	Since 2016 392,990,831 USD	Viet Nam's Mekong Delta: An Giang, Dong Thap (upper delta); Ben Tre, Tra Vinh, Vinh Long, Soc Trang (delta estuary); Ca Mau, Bac Lieu, Kien Giang (coastal peninsula)	Flood drainage, livelihood adaptation, coastal erosion prevention, aquaculture improvements, monitoring of surface and groundwater. Enhance tools for climate-smart planning and improve climate resilience of land and water management practices 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
GEFTF/IUCN: Sustainable Management of Peatland Ecosystems in Mekong Countries (GEF ID 9232)	2016-2021 13,367,511 USD	Mekong basin incl Cambodia and Vietnam's Mekong Delta	To sustainably manage peatland ecosystems in targeted countries and to conserve biodiversity and reduce GHG emissions
GEFTF/FAO: Promoting Climate-Resilient Livelihoods in Rice-Based Communities in the Tonle Sap Region. <i>Under preparation.</i> (GEF ID 10177)	2022-2027 75,527,700 USD	Cambodia	Rice based communities in the Tonle Sap region of Cambodia reduce their climate vulnerability and increase their resilience to climate change through an ecosystem based, market driven approach

IFAD and RGC funded ASPIRE (national and provinces)	2014-2022 41.1 million USD	24 provinces and Phnom Penh	Support Agriculture extension service with climate resilient on horticulture, crops, livestock etc. Support Policy formulation and Policy planning on agriculture sector in Cambodia.
World Bank's Integrated Water Resource Management (IWRM) project	Third phase until 2021 16.5 million USD	Mekong Delta, Cambodia & Viet Nam	Riverbank erosion, salinity intrusion, flooding (major focus), and sluice gate management.
JICA's Water management project	2017-2022 266.9 million USD	Ben Tre Province, Viet Nam	To prevent salinity intrusion and ensure water distribution with adequate salinity level by constructing water sluices and related facilities
World Bank/GCF: Transforming the Mekong Delta (GCF project ID: P167595)	<i>in preparation</i> 40 million USD	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
World Bank IDA Mekong Delta Region Urban Upgrading Project	2012-2018 292 million USD	Viet Nam's Mekong Delta	Upgrading drains, canals and roads in response to climate change (e.g. sea-level rise, flood & drought management)

Baseline for Component 3: Transboundary cooperation mechanisms

There has been cooperation in research, sharing information on water resources and sustainable development of water resources with countries in the cooperation frameworks of Mekong River Commission (MRC), Lancang-Mekong Cooperation Mechanism (LMC); Greater Mekong Subregion Cooperation (GMS). Cambodia and Viet Nam are both members of all of these cooperation mechanisms.

Baseline for Component 4: Joint strategies and action programs

Legislative and policy frameworks

Besides many significant signs of progress of groundwater investment project, the Royal Government of Cambodia (RGC) has developed several important legislative documents to ensure the efficiency of water uses and water management including the groundwater in Cambodia including:

1. Endorsement of National Law on water resources management in Cambodia has been enacted on 29 Jun 2007 and approved 5 sub-decrees subsequently supporting the operationalization of the water law of 2007.
2. Endorsement of National Strategy for Rural Water Supply in 2011-2025
3. Endorsement of the water supply and sanitation regulatory law for Cambodia
4. Approved the National Groundwater Strategy for Cambodia

Legal framework: Central and Province Governments have issued a range of legal documents to improve the management of groundwater resources in the Mekong Delta. This includes at the central level:

- The Government's Decree "Regulations on restricting groundwater exploitation" (2018).
 - The Government's program on research and processing of information on groundwater exploitation and the risks it poses for land subsidence in the Mekong Delta (2019).
 - The Ministry of Natural Resources and Environment (MONRE) support of the Project "Investigation and evaluation of the exploitation and use of groundwater, impacts on land subsidence in the urban area. Hanoi City, Ho Chi Minh City, Mekong Delta, orientations for management, exploitation and sustainable use of groundwater resources? (2017).
 - MONRE program on "Regulations on the protection of groundwater in the activities of drilling, digging, exploring and exploiting groundwater (2017).
 - MONRE program on "Regulating the classification and requirements in conducting investigation and assessment of groundwater resources" (2018).
 - MONRE program on "Regulating the practice of groundwater drilling" (2014).
- At the provincial level it is critical to highlight that all provinces in the Mekong Delta and Ho Chi Minh City have had issued their legal documents on groundwater exploitation and use in the province, some of them are listed below:
- Ho Chi Minh City: "Decision on Promulgating the plan to reduce groundwater exploitation and filling up underground wells in Ho Chi Minh City by 2025" (2018).
 - Soc Trang province: "Decision on the Regulation on the authority to organize the registration of groundwater exploitation in Soc Trang province" (2017).
 - Long An province: "Directive on the strengthening management and exploitation of groundwater resources in Long An province" (2016).
 - Ca Mau province: "Resolution on the fee for granting permits for groundwater exploration, exploitation and use; exploitation, use of surface water and discharge of wastewater into water sources and irrigation works in Ca Mau province" (2015).
 - Tien Giang province: "Resolution on regulating rates of collection, management and use of fees for appraisal of the projects, the reports of exploration, exploitation and use of groundwater; exploitation and use of surface water; wastewater discharge into water sources in Tien Giang province" (2014); "Resolution Stipulating rates, collection, payment, management and use of fees for appraisal of projects, reports on exploration and assessment of reserves, exploitation and use of groundwater in Tien Giang province" (2020).
 - Kien Giang province: "Resolution of Regulating fees for appraisal of projects, reports on exploration and assessment of reserves, exploitation and use of groundwater; fee for assessment of project on exploitation and use of surface water and seawater; evaluation fee for

wastewater discharge project into water sources and irrigation works in Kien Giang province" (2018).

- An Giang province: Resolution of Regulating the rates, collection, exemption, payment, management and use of the project evaluation fee, reporting results of the exploration and evaluation of groundwater reserves, An Giang province" (2018).
- Dong Thap province: 'Resolution of Regulating the rate, collection, payment, management and use on the evaluation fee for the project of exploration and exploitation of surface water and groundwater environmental impact assessment, improvement and restoration of the environment in Dong Thap province" (2016).
- Bac Lieu province: "Directive on strengthening the management of exploitation and practice of groundwater drilling in Bac Lieu province" (2008).
- Can Tho city: "Decision on Appraisal fee for projects, reports on exploration, exploitation and use of groundwater; exploitation and use of surface water; discharge of wastewater into water sources, irrigation works" (2008).
- Kien Giang province: "Resolution on Promulgating a list of fees for evaluation of projects, reports on exploration, exploitation and use of groundwater; exploitation and use of surface water; discharging wastewater into water sources and irrigation works in Kien Giang province (2017)".
- Long An province: "Decision on Promulgation of regulations on the management and licensing of exploration, exploitation and practice of groundwater drilling" (2004).

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.

Table 9: Baseline projects relevant for policy frameworks under component 4

Current Projects	Investment & period	Area	Objective
IFAD and RGC funded ASPIRE (national and provinces)	2014-2022	24 provinces and Phnom Penh	Support Policy formulation and Policy planning on agriculture sector in Cambodia.

Resource planning

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. The Ministry of Natural Resources and Environment acknowledges that excessive groundwater extraction is one of the causes of land subsidence in the area of Ho Chi Minh City and 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. Central and Provincial Governments have taken many actions to improve groundwater resources in the Mekong Delta.

The Mekong delta Integrated Region Planning for the period of year 2021-2030 with a vision to the year of 2050 - in which water resources are considered as the foundation for the sustainable and prosperous development of the Mekong Delta (WB loan).

Table 10: Baseline projects relevant for Resource planning under component 4

Current Projects	Investment & period	Area	Objective
Mekong Delta integrated Regional Planning in period of 2021-2030 and vision to 2050	USD 10 million 2019-2021	Mekong delta in Viet Nam	<p>Promoting the rational use of resources to ensure compliance with the characteristics of land / water resources</p> <p>? Encourage the sustainable use of water resources under the motto ?living with fresh water, brackish water and salt water?.</p> <p>? Reduced groundwater extraction and excessive sand exploitation.</p> <p>? Encourage natural and man-made systems to be more resilient to the impacts of climate change and upstream development activities.</p> <p>? Strengthen management and control of environmental pollution (water, land and air).</p> <p>? Restore terrestrial and aquatic ecosystems biodiversity.</p> <p>? Promote sustainable production and environmental quality of products.</p>
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.

Resource governance

Institutional aspect: The Ministry of Natural Resources and Environment (MONRE) (Central) and the Departments of Natural Resources and Environment (DARD) (Province) are assigned with ?Zoning and announcing restricted areas, restricted groundwater extraction zones, areas to be supplemented.

artificial groundwater, minimum flow, threshold for groundwater extraction as prescribed by law; to guide the implementation of the regulations on the establishment and management of water source protection corridors according to the provisions of law; determine and announce the sanitary protection area of the area where domestic water is taken.

Table 11: Baseline projects relevant for Resource Governance under component 4

Current Projects	Investment & period	Area	Objective
Enhancing Local Water Government in Mekong delta (UNDP ?VNWP)	2020-2021	Mekong delta in Viet Nam	The UNDP GoAL-Waters (Governance, Accountability, and Learning for Water Sustainability) programme supports equitable, efficient and environmentally sustainable use and protection of freshwater and marine resources. It helps in identifying priorities and opportunities and addressing gaps and constraints in water and ocean governance by developing policy reform plans and actions at national and local levels. It supports the 2030 Agenda with an emphasis on SDG6 to "Ensure availability and sustainable management of water and sanitation for all" and SDG14 to "Conserve and sustainably use the oceans, seas and marine resources for sustainable development."

Summary of the baseline (without project) scenario

The information on baseline projects presented above emphasizes that while substantial investments have targeted specific water related challenges in the Mekong Delta (groundwater decline, land subsidence, salinization, loss of wetlands and fish), 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, transboundary 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 CMDA.

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.

Table 12: Main challenges and responding programs in the CMDA Area

Challenge	Key drivers	Investment focus		
		Research/Data/ Monitoring/Modelling	Implementation (Livelihoods or infrastructure)	Transboundary cooperative frameworks for groundwater management

Land subsidence	Groundwater over-extraction; Sea-level rise;	KIGAM (CA&VN); BMBF (VN); IUCN (VN);	VN Gov (limited) JICA (VN); MARD (VN); MoNRE (VN)
Lowering of the water table	Land use change; Infrastructure development; Upstream hydropower development	MARD (VN); MoNRE (VN); many independent studies (mostly, VN; e.g. Mekong Delta Futures)	
Salinity intrusion			
Floods	Climate change; Upstream hydropower development	MRC (VN&CA); MARD (VN); MoNRE (VN); WISDOM (VN); independent studies (mostly VN)	WB ICRSL (VN) & RUUP (VN); ADB (CA); MARD (VN); MoNRE (VN)
Sustainable land use & land restoration	Salinity intrusion; floods; climate change	FAO (VN); IRRI (VN); MARD (VN); MoNRE (VN)	FAO FOLUR (VN)
Groundwater quality degradation	Pollution from anthropogenic sources		
Loss of groundwater dependent ecosystem services	Reduced aquifer recharge and groundwater quality		

Table 12 maps current and planned investments against the sustainability challenges in 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.

c. The proposed alternative scenario with a brief description of expected outcomes and components of the project and the project's Theory of Change.

The proposed foundational IW project will seek to strengthen environmental sustainability and water security in the Lower Mekong Basin by investing, for the first time in the region, in 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 effective nature-based solutions and technologies (new to the CMDA area) to optimize groundwater use, reverse salinization trends and increase resilience to climate change (e.g.: Aquifer Storage Recovery and Reuse ? ASR/MAR; demand management);
- Identifying major groundwater challenges through Aquifer Vulnerability mapping and demonstrating solutions to mitigate related risks, e.g. agricultural pollutant contamination
- Improving the management of freshwater dependent ecosystems by unravelling the role of groundwater in sustaining their functioning and reversing the groundwater decline;
- Facilitating policy coordination with relevant sectors especially at national level, in particular with policies for surface water management, sustainable land-use planning, agriculture (including food security for the rural population) 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. This will be achieved using a state-of-the-art model;
- Reinforcing the countries' institutional capacity in groundwater governance, including socio-economic aspects;
- Creating the enabling environment and policy frameworks for transboundary cooperation in the management of the shared aquifer resources and dependent ecosystems and ecosystem services for the rural population.

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 basins 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 entire project will be gender-mainstramed through a tailored gender integration and equality approach described in Annex N2. The intervention logic is outlined in Figure 18 while the detailed Theory of Change is shown in Figure 19.

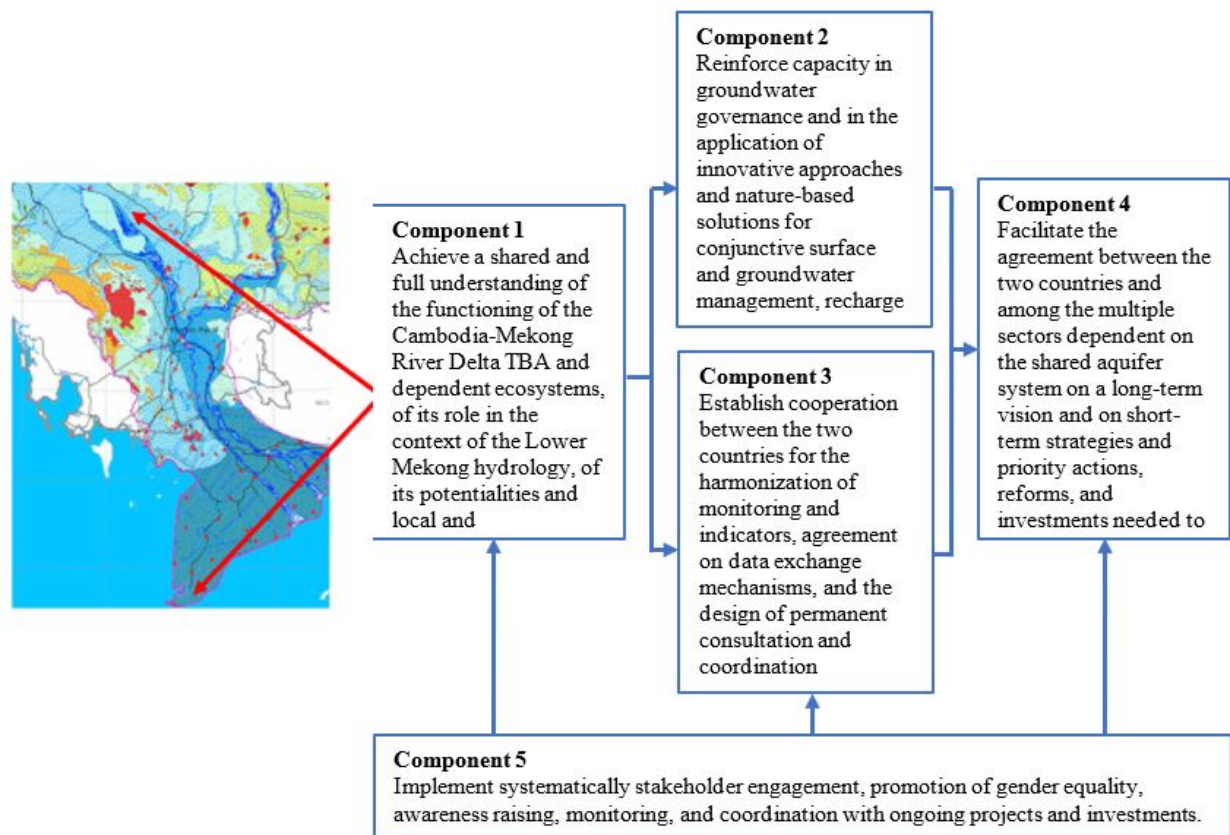


Figure 18: Intervention logic (Created by authors)

Theory of change narrative

The **long-term goal** to which the project will work will be that the implementation of sustainable groundwater management, in line with the provisions of the binationally developed and agreed Strategic Action Programme (SAP), will lead to the sustainable and efficient use of groundwater, the preservation of ecosystems and their services, the mitigation of land subsidence, and adaptation to climate change across the CMDA region. The completion of the SAP by the end of the project will establish the foundation for the achievement of the **project objective**, which is to strengthen environmental sustainability and water security in the Lower Mekong Basin by investing, for the first time, in improved governance and sustainable utilization of the Cambodia-Mekong River Delta Transboundary Aquifer.

The project objective will be achieved through activities ? outputs - outcomes structured into five interdependent causal pathways, which correspond to the five components of the project.

Actions under **Causal Pathway 1 (CP1)** will focus on the realization of a joint science-based diagnostic of biophysical and socioeconomic conditions and problems in the CMDA area, leading to consensus among countries on key transboundary and national concerns affecting the aquifer. This consensus will be reached through joint fact-finding, which will open pathways to concerted remedial actions (e.g. recommendations for the design of demonstration projects and strategic actions). The principal output of this process will be a Transboundary Diagnostic Analysis (TDA) document (Output 1.3) together with agreed environmental status indicators (Outcome 1.4).

Actions under **Causal Pathway 2 (CP2)** will complement those under CP1, focusing on piloting solutions for improved transboundary groundwater management, in order to fill gaps in knowledge and experience in the region. These demonstration pilots will introduce nature-based and technological solutions that are new to the CMDA area.

Actions under **Causal Pathways 3 (CP3)** and 4 (CP4) will result in the formulation of bilateral cooperation mechanisms and planning instruments (in particular, the Transboundary Consultation and Coordination Body or TCCB and the Strategic Action Programme or SAP, respectively) which are the key elements on which the achievement of the objective ultimately depends.

The ToC features key linkages (indicated in the ToC diagram) among the sets of Causal Pathways:

- I. The results generated through CP1 and CP2 (the TDA and demonstration projects) will feed inputs of information, models and experiences into the processes of negotiated binational planning and coordination foreseen under CP3 and CP4.
- II. Causal Pathway 5 will support the overall process (CP1-4) through actions focused on ensuring the existence of the required conditions of institutional capacities, effective stakeholder participation, gender mainstreaming and monitoring and coordination.

These causal pathways would operate in parallel, with the following sequence:

- During the first 15 months, the SAP process will focus on creating groups critical for transboundary dialogue and subsequent planning, and the development of a holistic vision for the management of the CMDA;
- By the end of that same initial 15-month period, it is foreseen that the TDA will be available as a draft.

- The presentation of the draft TDA and its resulting recommendations will then permit the confirmation of the demonstration projects, as well as providing the basis for the in-depth discussions leading to the formulation of the SAP.
- Once established, the demonstration projects will be managed in parallel to the process of formulation of the SAP, with their results serving to progressively inform the SAP process.

The functioning of these causal pathways in leading to the eventual achievement of the long-term goal of the project is dependent on a number of assumptions (shown in the ToC diagram):

- A1: the achievement of consensus, as expressed in the TDA, on the nature of the problems to be addressed through binationally coordinated management (Outcome 1) is dependent on the TDA process being adequately 'owned' by national actors. To this end, the relevant institutions in both participating countries will be fully engaged in the definition of the terms of reference for the technical studies on which the TDA will be based, and the selection of the teams of specialist consultants responsible for carrying out the studies; fully consulted by the technical teams selected on the nature of the problems, including through inclusive technical workshops; and fully involved in the discussion and validation of the TDA findings.
- A2: the establishment and effective functioning of transboundary cooperation mechanisms will depend on the existence of adequate and durable levels of political will for binational collaboration. The measures proposed to maximize national ownership of the TDA will help to ensure that this assumption is realized, as it will help to ensure awareness among actors in both countries of the benefits achievable through collaboration. The project will also emphasize effective knowledge management, so that such information is continually available, in accessible formats, to stakeholders throughout the process of negotiating the establishment of the TCCB.
- A3: the achievement of the medium-term goal of full, sustained and effective implementation of the SAP will depend on there being continued commitment by both countries to transboundary groundwater governance. This commitment will be fomented by ensuring, during the project lifetime, maximum engagement of national actors in the processes of developing the TDA and the SAP, including sufficient representation of women, youth and ethnic minorities at all instances of stakeholders' involvement (Annex N2); by focusing on ensuring the durability of knowledge products generated through the project; and by promoting the inclusion in the SAP of concrete provisions and roadmaps for the formulation of supportive policy and regulatory instruments, that will outlast the project and commit stakeholders to implementing binational IWRM.
- A4: the long-term goal of achieving sustainable management of groundwater and dependent ecosystems, through the implementation of the provisions of the SAP, will depend on the threats and pressures affecting the CMDA remaining within the tolerance limits of the measures proposed in the SAP. To this end, the TDA will adopt a long-term vision in considering alternative future scenarios, including the potential implications of 'worst-case' scenarios of climatic, economic and demographic change: the selection of the scenario to which the SAP will be designed to cope will be the role of the participating national stakeholders, based on considerations of levels of acceptable risk. The SAP will furthermore be designed as a 'living document', allowing its provisions to be reviewed and adjusted in the future in response to changing circumstances.

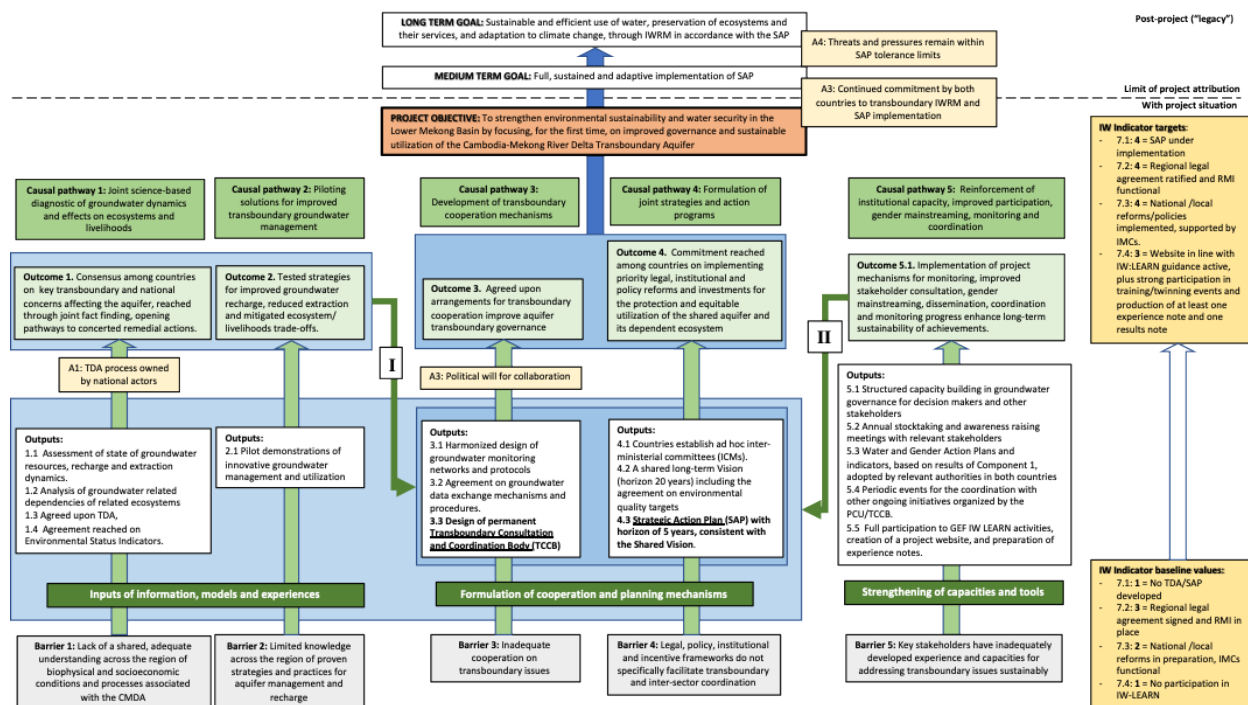


Figure 19: Theory of Change (Created by authors)

Outcomes and Outputs

COMPONENT 1: Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods

Outcome 1: Consensus among countries on key transboundary and national concerns affecting the aquifer, reached through joint fact finding, opening pathways to concerted remedial actions.

Outcome Indicator: TDA and the Environmental Status Indicators (ESI) endorsed by the country representatives in the Steering Committee.

The Outcome expected to be achieved by this Component is 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. By month 15 of the project life span, the assessment of the aquifer's water resources current state and projected scenarios, as well as of the evaluation of dependent ecosystems, will have been finalized; and month 18, the Transboundary Diagnostic Analysis (TDA), with corresponding Environmental Status Indicators, will have been submitted for endorsement to the Steering Committee.

The outcome will be obtained through four main outputs:

Output 1.1. Assessment of current state of groundwater resources, recharge and extraction dynamics

The jointly conducted assessment of the aquifer and its groundwater resources including (i) mapping of recharge and discharge areas, (ii) current water-table levels and of groundwater quality, exploitation and recharge dynamics, and (iii) the identification of trends for main drivers for groundwater exploitation and recharge (e.g. land use change, wetland management, agricultural water use). This will be complemented by (iv) a joint transboundary assessment of the socio-economic state related to groundwater resources. Furthermore, a detailed (v) assessment of groundwater governance will be conducted considering underpinning drivers for trends in groundwater extraction, groundwater recharge, surface water use, land use change, and groundwater quality changes.

This assessment will be implemented largely by national teams, supported by international experts, and in close collaboration with provincial and central planning agencies to ensure up-to-date data. UNESCO and its International Groundwater Resources Assessment Centre (IGRAC) have developed guidelines for multidisciplinary assessments of transboundary aquifers, a useful reference for this project (www.un-igrac.org/areas-expertise/transboundary-groundwaters). Experiences acquired from the implementation of multiple GEF IW projects will be brought into these component activities and shared with the National Teams, including the information contained in the Global Groundwater Information System (GGIS) and UNESCO's international knowledge network.

Selected by their Government local experts will be trained in among other topics modelling using an available state-of-the-art groundwater model. The existing model will be extended and updated with new information collected by the project to perform advanced system dynamics analyses and scenarios computations on groundwater flow and recharge, land subsidence and salinization. This process will also involve a data gap analysis to identify investment requirements to inform critical gaps for further improving evidence planning and decision making. Training activities and modelling will be carried out in collaboration with University of Padova, Italy (Pietro Teatini) and Wageningen University, The Netherlands (Philip Minderhoud). Pietro Teatini and Philip Minderhoud are members of UNESCO-LasII (Land Subsidence International Initiative).

Output 1.2. Analysis of groundwater related dependencies of related ecosystems

The jointly conducted analysis of groundwater dependent ecosystems (GDE) will include (vi) the evaluation of ecosystems state (e.g. wetlands) and ecosystem services (groundwater recharge, flood retention, nutrient reduction) at selected sites; and (vii) 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.

Similarly to Output 1.1, the general approach will be based on desk studies in coordination between national consultants / institutions and the international/regional consultant with possible support of research centers and compilation of data and information in a joint database when possible and relevant.

The results will identify which ecosystems are facing the highest risk and which ecosystem services are likely to experience further decline. The analysis will take a whole-of-system perspective to identify cause-effect relationships that connect drivers (e.g. groundwater extraction) with aquifer related outcomes (e.g. declining groundwater and lowering of land elevation in certain areas) with specific

ecosystems (e.g. wetland) with ecosystem service (e.g. fish habitat and fisheries productivity). Revealing important dynamics in the complex social-ecological system is paramount for laying grounds for the identification of actions. This process will also involve the identification of possible intervention points for safeguarding groundwater dependent ecosystems (e.g. wetlands and subsequently fish), which will be focused on interventions most pertinent for mitigating adverse transboundary dynamics.

Output 1.3. Agreed upon Transboundary Diagnostic Analysis (TDA), including assessment of related governance, socio-economic, legal and gender aspects

A Transboundary Diagnostic Analysis (TDA) of the aquifer, based upon the above jointly conducted science-based assessments of the current state of groundwater resources and related ecosystems 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: (viii) the review of existing legislative and policy frameworks related to groundwater and freshwater ecosystems; (ix) an analysis of socio-economic considerations, with focus on poverty, ethnic minorities, and gender inequalities; (x) the evaluation of existing and potential conflicts at the water nexus. The TDA process will facilitate an evidence-based discussion between Cambodia and Viet Nam that involves the identification and prioritization of transboundary problems to lay the foundation for the SAP process to specify strategic actions for joint implementation. The prioritization will be guided by indicators both countries will agree on and consider evidence for cause-effect relationships between bio-physical and socio-economic outcomes. To include socio-economic and gender aspects in the TDA, a gender analysis of ecosystem services, with particular emphasis on access, control over and use of groundwater resources will be conducted to inform gender-responsive transboundary groundwater management, and establish corporation mechanism. Detailed descriptions of gender analysis activities are described in Annex N2.

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.

Output 1.4. Agreement reached on Environmental Status Indicators

With support from the project, a limited number of simple and feasible Environmental Status Indicators will be 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.

All assessments will be done by national teams and supported by international experts. The two national teams will be coordinated by a regional TDA coordinator, who will be responsible for Component 1.

COMPONENT 2: Piloting solutions for improved transboundary groundwater management.

Outcome 2. Tested strategies for improved groundwater recharge, reduced extraction and mitigated ecosystem/ livelihoods trade-offs

Outcome Indicator: Demonstration project designs, implementation reports, and upscaling-focused assessments for three demonstration projects for improved groundwater management (extraction and recharge) in each country

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 demonstration projects of innovative groundwater management and utilization practices and solutions (Output 2.1.). The project preparation phase facilitated these discussions but, largely because of COVID measures restricting field missions, did not allow for the finalization of the design or (site) selection of demonstration projects: the identification of demonstration projects including site selection will therefore be concluded during the first year of the project execution phase, in parallel to the TDA process.

The ultimate selection and design of demonstration projects and the specific location of implementation will be made based on TDA results, and is expected to commence about 12 months after project start. Finalization of the design of the demonstration projects will allow them to start promptly in the second year of the project. Demonstration projects will be limited in number (approx. 2-3 per country) and size according to budget availability and country needs. The identification and design of demonstration projects will also consider short and long-term changes related to climate change.

An initial list of ideas for demonstration projects was identified during the project preparation phase, but as explained above will be confirmed during the first year of the project in parallel to the TDA process. These initial proposals are as follows:

1. Testing proven technology that is largely new to the CMDA area for improving groundwater use efficiency for agriculture. Options include:
 - Alternate wetting and drying (AWD) instead of continuous flooded irrigation methods. This demonstration project would review AWD as a water-saving technology for rice cultivation and identify most suitable areas. AWD reduces irrigation water consumption in rice fields without decreasing rice yield by applying irrigation water a few days after the disappearance of the ponded water. However, demonstration sites need to be selected carefully as many rice paddies are also used to farm fish.
 - Artificial groundwater recharge pumping, utilizing current infrastructure to introduce systematic Aquifer Storage Recovery and Reuse (ASR/MAR). This demonstration project would explore options and effectiveness of injection wells to increase aquifer recharge during the wet season.

- IoT solutions for improved irrigation control.

The combination of modern sensor technologies, the Internet, and advanced irrigation equipment combined in an Internet of Things (IoT) approach allow a relatively precise control of agricultural irrigation and creating the opportunity for high efficiency of water use for agricultural demands. Such systems have been trialed elsewhere and provided farmers with improved irrigation control according to seasonal and daily irrigational needs while reducing irrigation water demands.

- Drip and micro irrigation for upland crops.

Drip irrigation can provide very efficient irrigation for a variety of crops as it comes with the advantage of lower evaporation than other irrigation methods. Drip irrigation is one of the more advanced techniques being used today because, for certain crops, it is much more efficient than traditional spray, furrow or flood irrigation, where a larger portion of the water is lost to evaporation.

2. Artificial wetlands and the improved management of existing wetlands to reduce the infiltration of agricultural pollutants into groundwater.

This demonstration project would identify locations for artificial wetlands to effectively improve aquifer recharge as a nature-based solution in locations where recharge requires most improvement. Similarly, wetland management of existing wetlands would be reviewed to identify potential improvements for increased groundwater recharge without compromising on other existing goals such as biodiversity and flood mitigation. The project preparation phase allowed for commencing this discussion based on the lists provided in Table 25 and Table 26.

3. Testing of the effectiveness of artificial macro-pores in soils with poor infiltration.

Macro-pores have proven to be a very effective nature-based solution for a variety of issues ranging from improving degraded soils to increasing aquifer recharge. The demonstration project would identify suitable locations and test the effectiveness of different types of macro-pores (e.g. empty or fiber-filled macro-pores) and different techniques for creating artificial macro-pores.

4. Design and test community and household incentive schemes for reducing groundwater extraction and increase groundwater recharge (e.g. aforementioned nature-based solutions, incl. wetlands and macro-pores, but also new technologies for monitoring, artificial recharge, and uptake of water use efficiency enhancing irrigation and women-friendly, labor-saving technology, responding to women's and men's needs).

5. Integrated land use planning for selected key sections of the CMDA to incorporate groundwater recharge and spatial aquifer vulnerability in land use change decisions.

A few ongoing planning processes at central and province government level will be selected and injected with groundwater-focused information to advise planners regarding direct and indirect impacts on groundwater and flow-on effects. The PPG process has identified candidates for targeted planning processes, including the selection of areas for reforestation, establishment of wetlands, changes in wetland management, and changes in crop production systems.

COMPONENT 3: TRANSBOUNDARY COOPERATION MECHANISMS

Outcome 3. Agreed improvements of transboundary cooperation improve aquifer transboundary governance

Outcome Indicator: Agreement on the creation of a Bilateral coordination and consultation body (TCCB) signed by two countries.

This Component will focus on the design and establishment of arrangements for transboundary cooperation mechanisms between Viet Nam and Cambodia, aimed at improving transboundary governance of the aquifer (outcome). Firstly, the most relevant agencies in both countries at the various levels of governance (village, district, province, state) will be identified and their roles and responsibilities will be defined. In light of the lack of gender responsive governance arrangements over transboundary groundwater resources, it is key to take gender inequalities into consideration from an early stage on, as an important component of groundwater governance. This will be done through a tailored Gender Integration and Equality Approach for Transboundary Aquifers described in Annex N2. By project mid-term, the design and TORs of new cooperation mechanisms will have been prepared by the Joint Technical Committee, and by project end a shared vision and design of new permanent cooperation frameworks and mechanisms will have been submitted for clearance to the Steering Committee.

Outputs of Component 3 will consist of:

Output 3.1: Harmonized design of groundwater monitoring networks and protocols.

The most important item in this phase, is that the countries agree about a purpose of the monitoring (i.e. which groundwater-related issues are relevant) and about data/info required to be shared. 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 meteorological data, aquifer recharge, and wetland condition.

Initially, existing groundwater monitoring networks and their effectiveness will be assessed. This will involve field missions and interviews with practitioners. Existing monitoring systems will be compared with state-of-the-art solutions and existing gaps and potential for improvements will be specified. One of the solutions to be proposed to CMDA stakeholders will be the recently developed UNESCO's IGRAC framework for a regional groundwater data collection and management that includes a groundwater monitoring (<https://www.un-igrac.org/resource/sadc-framework-groundwater-data-collection-and-management>), which can facilitate an agreement on data exchange mechanisms and procedures, responsible institutions, frequency and means of communication, maintenance and support of common information portal, etc.

The model will be used to identify the most critical data gaps, in space and type, and provide a scientific basis to optimize monitoring network planning for piezometric level, and land subsidence.

This process will involve at least one workshop to showcase the design and implementation of monitoring networks in regions with comparable aquifers. Upon definition of needs and design for a harmonized monitoring system, high-priority monitoring equipment will be purchased and applied and the relevant capacity building for practitioners and decision makers will be conducted.

Output 3.2: Agreement on groundwater data exchange mechanisms and procedures.

Lack of modern groundwater monitoring networks has been identified during the project preparation phase as a major obstacle to sustainable groundwater management. The project will hence engage in the design of a modern multi-purpose (surface and) groundwater monitoring networks taking into consideration the results of Component 1, the socio-economic conditions of the countries and network sustainability issues. The purposes of the network will be to provide information on:

- Groundwater level changes
- Groundwater recharge dynamics
- Groundwater quality
- Groundwater salinity
- Land subsidence following aquifer exploitation
- Wetland condition and subsequent impacts on fisheries
- Interactions of surface and groundwater;

The networks should ensure a homogeneous, albeit sparse, coverage of the CMDA segments in each country. It will include both quantity and quality (salinity) detection systems. Stations will include data loggers, and real time transmission of data (very remote areas, etc.).

The feasibility and sustainability of such networks will be pilot tested in each country, and a very limited number of stations will be acquired and installed based on the equipment purchased for the related work of Output 3.1. Optimization of station location and depth will take advantage of the dynamic modelling analyses. The networks design - including monitoring protocols, real-time data exchange mechanisms ? will be developed by JTCs in consultation with provincial and local administrations and communities. Approval of a formal data sharing protocol (such as an MoU) and so far, information management systems will be responsibility of the SC. An official written request will be made to the benefiting countries asking them to overtake the ownership of the equipment, their operation and maintenance and to integrate them to the national network.

Output 3.3: Design of a transboundary consultation and coordination board (TCCB).

Under this activity, the project will design and establish a transboundary consultation and coordination board (TCCB) for the CMDA area. The TCCB will cover the entire CMDA area and operate through periodic meetings and be formed by officials of the relevant ministries and governmental agencies. 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. In a participatory process, both countries will co-design roles and responsibilities of the TCCB and its members, based on agreed upon TORs and be supported by a

Secretariat. The countries will also nominate TCCB members. Special efforts will be made to ensure sufficient representation of women, youth and ethnic minorities within the TCCB as described Annex N2. The TCCB will meet at least twice per year.

COMPONENT 4: JOINT STRATEGIES AND ACTION PROGRAMS

Outcome 4: 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

Outcome Indicator: SAP approved/signed by the relevant Minister(s) in each country.

Component 4 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):

Output 4.1: Countries establish Joint Technical Committees (JTCs) and ad hoc inter-ministerial committees (IMCs)

The JTCs will involve national experts and decision makers from both countries and will be established for each of the core topics, e.g. groundwater recharge (incl. wetlands), and groundwater extraction (incl. irrigation). The JTCs will be critical for section indicators (Output 1.4), developing a shared vision (Output 4.2), and for discussing the TDA results to draft and finalise the Strategic Action Programme (SAP) (Output 4.3).

The IMC committees 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. The most critical role will be to present cross-sector impacts from the TDA and contribute to the design and implementation of solutions that require improved cross-sector coordination or the mitigation of cross-sector trade-offs. Consequently, IMCs will be a critical element of the SAP process, particularly for the implementation of the bilaterally agreed action plan for improved transboundary groundwater management in national action plans, which will require sector specific actions. During the PPG phase a list of key province and central Government agencies to be involved in the IMC was identified. This is shown in the stakeholder engagement plan and will be further developed during the first months of the project implementation phase. The inception meeting will be held during the first quarter of the project.

Output 4.2: A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets

The shared long-term Vision, based on the results of the previous Components, will be elaborated by the TCCB with the support of project experts, and will be translated into mutually agreed concrete

long-term environmental quality targets (e.g. groundwater level, land subsidence rate, groundwater recharge target, groundwater extraction quota). The visioning process will build on evidence in form of an assessment of main drivers and trends for a set of priority policy indicators. The shared holistic vision will be compiled during two workshops and will distinguish between most desirable, most likely, and least desirable futures. During the workshop participants will debate options for required interventions to avoid least desirable futures (risk management strategy) and actions that shift the most likely to the most desirable future.

Output 4.3: Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision.

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 IMCs. The TDA will provide from a whole-of-systems perspective the causal understanding for intervention points while the shared vision will provide the desirable future as jointly defined by both countries. These two inputs (TDA and shared vision) will provide the necessary inputs for both countries to debate 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. These strategic actions will reduce groundwater extraction and/or increase groundwater recharge in the areas most critical for unsustainable transboundary developments. Strategic actions will be formulated as specific investment needs with clearly articulated underpinning assumptions and a rationale for what biophysical and socioeconomic benefits are expected from these investments. This process will be completed in a series of at least three workshops that build on the visioning workshops and on the TDA results. The Water and Gender Action Plans developed as part of this project (see Output 5.3 and Annex N2) will inform and contribute to the preparation of the SAP. The SAP will be submitted for countries' endorsement and is to be endorsed by a Minister from each country. The SAP will also be presented to the international donor community and other stakeholders to trigger if possible immediate funding of proposed actions or supporting initiatives.

COMPONENT 5: Reinforced institutional capacity, improved participation, gender mainstreaming, Monitoring and coordination

Outcome 5: Implementation of project mechanisms for monitoring, improved stakeholder consultation, gender mainstreaming, dissemination, coordination and monitoring progress enhance long-term sustainability of achievements.

Outcome Indicator: Skills and knowledge on transboundary issues of 100 gender-balanced national staff increased by 50% over baseline levels.

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:

Output 5.1: Structured capacity enhancement in groundwater governance for decision makers and other stakeholders

The project will support 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. Of particular relevance are (1) the overall assessment framework, which will guide the TDA, (2) the opportunities for addressing the gaps in groundwater governance (e.g. modern technologies for data acquisition, legal instruments for transboundary, aquifers, coherent groundwater management planning, involvement of the private sector), and (3) following recommended principles (equitable access, sustainability, transparency, participation, accountability, functional integration, precautionary principle, knowledge management).. It will also include study visits to international exemplary cases of successful transboundary aquifer management efforts (e.g.: Guarani Aquifer, shared by Argentina, Brazil, Paraguay and Uruguay). During the first six months, of the project a capacity gap analysis will be conducted together with key project stakeholders. Based on the gaps, a systemic capacity enhancement program will be developed, which will be annually revisited and revised as needed to adapt to the evolving project outputs (e.g. TDA recommendations, demonstration project design). The project will enable training of Vietnamese and Cambodian experts, in order to manage the scientific tools developed within the project and support decision makers and other stakeholders, also after the project conclusion. Complementary to these assessments, a diagnostic study of gender responsiveness of water policy frameworks in both countries, and a gender and ethnicity knowledge needs assessment will be carried out and included in the comprehensive capacity needs assessment report (Annex N2).

Output 5.2: Annual stocktaking and awareness raising meetings with relevant stakeholders (e.g. local, national and regional meetings)

Annual stocktaking and awareness raising meetings will be carried out with the participation of all relevant stakeholders, including the private sector, held at local, national and regional levels. Special efforts will be made to ensure sufficient representation of women, youth and ethnic minorities at all instances of stakeholders' involvement. The annual stocktaking will elaborate on activities implemented during the course of the project to raise the profile of the project and its various components as well as to improve the communication flow between the project team and other stakeholders. The meetings will be held in the CMDA area and will be hosted by the PMU and the TCCB, including the lead agencies of both countries.

Output 5.3: Water and Gender Action Plans including gender indicators and budget for sustainable water groundmanagement, based on results of Component 1, adopted by relevant authorities in both countries

Water and Gender Action Plans for sustainable groundwater management and specific gender-sensitive indicators will be prepared, based on results of the gender analysis undertaken within the TDA under Component 1, for adoption by relevant authorities in both countries. Findings and insights collected with the the adoption of the Gender Integration and Equality Approach for Transboundary Aquifers by the project (Annex N2) will inform the development of the Water and Gender Action Plans (GAP). This activity will involve the specification of gender-sensitive indicators and related budgets to address

gender inequalities identified for groundwater use, related livelihoods, and groundwater dependent ecosystems and ecosystem services key for rural livelihoods as well as the design of draft affirmative actions to overcome gender inequalities over a specified time frame with selected monitoring mechanisms.

Output 5.4: Periodic events for the coordination with other ongoing initiatives organized by the PMU/TCCB

Periodic events will be held for the coordination with other ongoing initiatives organized by the PMU/TCCB. The events will improve the coordination with other projects by providing succinct presentations of the project's progress, and findings. This will involve the provision of assessment reports or data to baseline projects. The workshop will include discussions to identify additional potential for cross-project synergies and processes to realize these synergies.

Output 5.5: Full participation to GEF IW LEARN activities, creation of a project website, and preparation of experience notes.

The full participation in GEF IW LEARN will ensure that CMDA project activities can benefit from lessons learnt elsewhere as well as providing insights from the CMDA context for projects in other parts of the world. All results in form of assessment reports and summary of workshops and other events will be provided on the project webpage together with mechanisms to allow for immediate cross-project exchange (e.g. online forum).

d. 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:

- Advance information exchange and early warning. The project will support the following kinds of investments highlighted under GEF-7 guidance: nature-based solutions (under Component 2); enhanced quality, coverage and free availability of sound information on surface and groundwater availability and use and natural resources (under Component 1); increased capacity to gather, distill and process global and regionally increasingly available traditional and innovative data sources into policy relevant analysis, including the economic evaluations of ecosystem services (under Component 1); enhanced capacity on country level and dialogue among countries to draw conclusions from increasingly complex and innovative information sources to support decision making and to identify joint opportunities for action (under Component 1);
- Enhance regional and national cooperation on shared freshwater surface and groundwater basins. The project will support the following kinds of investments: common, participatory fact-finding and agreement on cooperative opportunities and shared constraints and a vision for a shared future (via the TDA and SAP under Components 1 and 3); identify and leverage resources for investments addressing SAP identified priorities (under Component 3); engagement with national,

regional and global stakeholders to increase collaboration and cross support to investments and processes, through IW-LEARN (under Component 4).

- Investments in water, food, energy and environmental security. A number of the kinds of investments highlighted in GEF-7 IW guidance will be included in the pilots proposed under Component 2, subject to confirmation by national stakeholders.

The project implementation process will follow GEF's TDA-SAP guidelines and will be aligned with IW guideline documents.

e. Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing;

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).

Table 13. Summary of Incremental Logic

Barriers	Selected baseline investments	Gaps in the baseline	Project components and incremental value added

Barriers	Selected baseline investments	Gaps in the baseline	Project components and incremental value added
1: Lack of a shared, adequate understanding across the region of biophysical and socioeconomic conditions and processes associated with the CMDA	<p>Research, monitoring and knowledge management:</p> <ul style="list-style-type: none"> - Groundwater mapping and monitoring (e.g. MRC; ADB, World Bank, UNICEF and CNMC in Cambodia; MONRE/MARD in Viet Nam) - Research cooperation e.g. MRC, LMC, GMS - Land subsidence monitoring (e.g. Rise and Fall in Viet Nam) 	<p>Investments in research, monitoring and knowledge management are largely country- and issue specific and not channeled effectively to policy - makers in such a way as to allow the development of a shared vision.</p>	<p>1: Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods)</p> <p>? Shared, harmonized and integrated understanding of CMDA issues of transboundary significance</p>

Barriers	Selected baseline investments	Gaps in the baseline	Project components and incremental value added
2: Limited knowledge across the region of proven strategies and practices for aquifer management and recharge	Water/wetland management: <ul style="list-style-type: none"> - Wetland conservation (e.g. MoE, KFW, LMC, WB in Cambodia) - Irrigation and water management (e.g. JICA, ADB; MARD and FOLUR in Viet Nam) Climate resilience measures: <ul style="list-style-type: none"> - e.g. WB/ICRSL in Viet Nam Mekong Delta 	Knowledge resulting from investments in technical approaches to CMDA management is not effectively generated, shared or applied, with a vision of shared/trans-boundary problems.	2: Piloting solutions for improved transboundary groundwater management ? Enhanced availability of knowledge on options for addressing ground-water related issues of transboundary significance in an integrated manner
3: Inadequate cooperation on transboundary issues	Cooperation in research, sharing information on water resources and sustainable development of water resources (MRC, LMC, GMS)	Existing cooperation mechanisms do not specifically or adequately address CMDA issues	3: Transboundary cooperation mechanisms ? Conditions for effective and institutionally-sustainable coordination on transboundary issues
4: Legal, policy, institutional and incentive	Strong nationally-specific legislative and policy frameworks	Frameworks have limited focus on	4: Joint strategies and action programs - Negotiated, evidence-

Barriers	Selected baseline investments	Gaps in the baseline	Project components and incremental value added
frameworks do not specifically facilitate transboundary and inter-sector coordination	Resource planning: <ul style="list-style-type: none"> - Mekong Delta Master Plan (Viet Nam) - IUCN Integrated Planning Project Viet Nam - Australian Aid funded Mekong Delta Futures project Resource governance <ul style="list-style-type: none"> - Enhancing Local Water Government in Mekong delta (UNDP ?VNWP) 	country- and sector-specific issues	based and actionable road map for putting collaborative action into practice
5: Key stakeholders have inadequately developed experience and capacities for addressing transboundary issues sustainably	National institutional structures (e.g. Ministries of Environment and Agriculture)	Limited institutional focus on national and sector-specific issues	5: Reinforced institutional capacity, improved participation, gender mainstreaming, monitoring and coordination. <ul style="list-style-type: none"> - Durable capacities for participatory, gender-sensitive, adaptive and collaborative approaches to CMDA management

f. Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

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. Many risks cannot be mitigated by one country alone as the complex aquifer system connects both countries. Consequently, transboundary solutions become paramount for addressing land subsidence and salinity intrusion, as well as the rapid decline of groundwater and the widening threat of arsenic and other pollutants. Successful transboundary groundwater management in the CMDA area will improve the resilience of globally important ecosystems, including the Tonle Sap and the Mekong Delta and a list of significant (partly RAMSAR-listed) wetlands.

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 (Annex N2). 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 resilience of groundwater dependent ecosystems (e.g. wetlands, fish abundance and diversity ? including globally important wetland ecosystems and species, and long-range migratory fish);
- Improved water security of around four million households depending directly or indirectly on groundwater;
- Increased sustainability of globally-important food production systems (e.g. irrigated rice, aquaculture), associated with the sustainably improved conditions of the transboundary water resources on which they depend).

g. Innovativeness, sustainability, potential for scaling up and capacity development. ?

Innovation

The project capitalizes on and extends a state-of-the-art hydrogeological model, capable of modelling groundwater flow, and land subsidence from the Vietnam portion of the delta to the entire CMDA area. The model will allow understanding how anthropogenic activities (groundwater pumping, managed aquifer recharge, etc) and climate change scenarios (e.g., change of rainfall distribution in time and space) will affect i) the piezometric head distribution in space, depth, and time; ii) the expected land subsidence; and iii) the consequences on target ecosystems (Output 1.1 and Output 1.2). State-of-the-art implementation will allow quantifying uncertainties in the modelling outcome and possibly reducing them by assimilating records provided by the data collected during the project and the optimize monitoring networks (Output 3.1).

The project addresses, amongst others, a challenge faced by many large transboundary aquifers globally, as demonstrated by the findings of the TWAP project (<http://gefwap.org/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 groundwater resources. It does so by fostering the design and applying an innovative multi-purpose groundwater monitoring network (Output 3.1) based on the best science available, and the definition of sampling/monitoring protocols harmonized across the two project countries. Realizing such a science-based transboundary aquifer cooperation mechanism is innovative considering that only a handful of these exist worldwide. Furthermore, the comprehensive scientific understanding of groundwater dependent systems (e.g. food production, wetlands, and fish production) is still innovative for southeast Asia and also globally. Also, the demonstration project will

introduce nature-based solutions and technologies that haven't been trialed before in the CMDA area.

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. The project will ensure country commitments by providing robust evidence through the TDA that specifies the benefits each country will gain when improving transboundary groundwater management. This will reach from obtaining improved data for the support of planning processes to jointly agreed investment programs that improve water and food security on both sides of the border. This evidence-based approach will create already during the lifetime of the project positive experiences that will showcase these benefits. The creation of the TCCB and the IMCs will create a new institutional foundation for transboundary groundwater management and establish the relevant links between government agencies in both countries. While the project cannot guarantee that the TCCB or the IMCs will be maintained after the project ended, the project will establish the benefits both countries gain from continuing and even deepen the transboundary groundwater management framework.

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.

While demonstration projects will not be fully designed before the TDA results are available, which aims to ensure a contextual focus and prioritization, demonstration projects are likely to include innovative groundwater monitoring (e.g. automated, real-time monitoring sensor systems) or artificial aquifer recharge technologies, incentive mechanisms for improved groundwater use, and/or advanced transboundary groundwater governance mechanisms. These applications, while piloted in selected sites, they will have the potential to be replicated and scaled up, in the CMDA area and beyond. The lessons learnt will be able to inform during upscaling activities:

- Other countries experiencing rapid land subsidence due to groundwater over-extraction (e.g. Bangkok, Thailand; Jakarta, Indonesia)
- Coastal areas experiencing salinity intrusion (e.g. Benin; Pakistan),
- countries facing risks of losing groundwater dependent ecosystems such as wetlands (e.g. China; India),
- Countries suffering from high levels of arsenic and other contaminants (e.g. Nepal; Bangladesh; India), and
- Areas experiencing unsustainable groundwater use (e.g. India; China).

Capacity building

Component 5 of the project will conduct a broader capacity building program encompassing a wide array of topics relevant for transboundary groundwater management. The detailed curriculum for the 5-year program will be determined after a capacity gap analysis has been conducted in the first months of project implementation and prioritization of those by the key stakeholders involved.

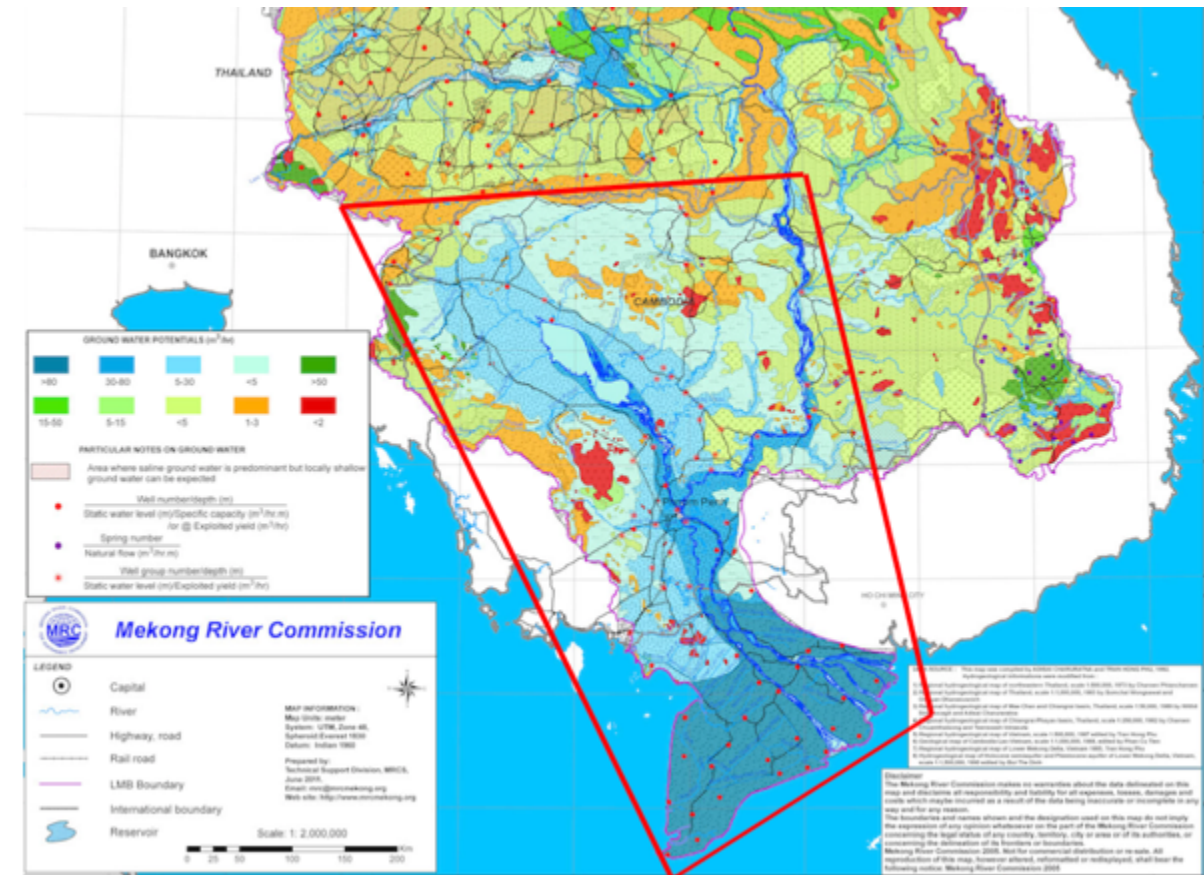
To fully mainstream and integrate gender and ethnic minority considerations across the activities, the project will strengthen the capacity of relevant stakeholders to adopt gender-responsive approaches and effectively integrate gender and minorities into TBA governance, as well as the use of disaggregated water data (by gender, age, and ethnicity) and of gender-responsive indicators. Details of the capacity development approach are provided in Annex N2.

2) Summary of changes in alignment with the project design with the original PIF

ProDoc section	Change
Output 4.4: Countries establish Joint Technical Committees (JTCs) and ad hoc inter-ministerial committees.	We added ?Joint Technical Committees (JTCs) and? to allow for an effective mechanism for transboundary coordination at the technical level. This was unintentionally omitted from the PIF.
Output 5.4: Periodic events for the coordination with other ongoing initiatives organized by the PMU/TCCB.	We changed PCU to PMU to have a consistent reference to the Project Management Unit (PMU) instead of a Project Coordination Unit (PMU).
Output 5.5: Full participation to GEF IW LEARN activities, creation of a project website, and preparation of experience notes	This was unintentionally omitted from the version of the PIF in the GEF portal but has been included in the ProDoc.
Table B Project Description	Final figures updated and M&E budget included
Table C Cofinancing	<p>? USD 15,000,000 of the ?Viet Nam Irrigation investments and economic restructuring? cofinancing has been reclassified as Investment Mobilized, without affecting the total.</p> <p>? The final co-financing value confirmed by the Cambodian Government has increased if compared to the PIF stage.</p> <p>? Partners? co-financing added</p> <p>? Overall co-financing increased to a ratio of 1:7.64</p>

1b. Project Map and Coordinates

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



Indicative map of Cambodia-Mekong Delta aquifer (Seebacher, Groundwater in the Mekong Region ? transboundary aquifers, HCMC, Vietnam, Mekong River Commission Secretariat, 2014. Highlight by authors)

1c. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

N/A

2. Stakeholders

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

Civil Society Organizations Yes

Indigenous Peoples and Local Communities Yes

Private Sector Entities Yes

If none of the above, please explain why:

Stakeholder Name	Stakeholder Type	Stakeholder profile	Consultation Methodology	Consultation Findings	Date	Comments
H.E Choup Paris, GDEKI	Direct beneficiary	<i>National Government Institution body</i>	<i>Face to face meeting</i>	<i>Agreed on scope of the project and project design and work plan</i>	16-Nov 2020	
H.E Khieu Borin ,GDLC	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	<i>Face to face meeting</i>	<i>Sharing information and data for formulation of the project and agreed on co-finance letter</i>	18-Nov 2020	
NCS D	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	<i>Face to face meeting</i>	<i>Sharing information and data for formulation of the project and agreed on co-finance letter</i>	18-Nov 2020	
GDANCP	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	<i>Face to face meeting</i>	<i>Sharing information and data for formulation of the project and agreed on co-finance letter with additional comments on PD</i>	24-Nov 2020	
MAFF: GDA	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	Zoom meeting	<i>Sharing information and data for formulation of the project and agreed on co-finance letter with additional comments on PD</i>	01-Dec 2020	
MAFF: FiA	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	Zoom Meeting	<i>Sharing information and data for formulation of the project and provide additional comments on PD</i>	06 Dec 2020	

MOWRAM: PMU, DHRW, DIA, DWSS, Head of Gender, CNMC, TSA	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	Zoom Meeting	<i>Sharing information about MOWRAM activities related to surface and groundwater and comments to improve the PD</i>	02-Dec 2020	<i>Second meeting is required</i>
CNMC	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	Face to Face meeting	<i>Sharing information data for formulation of the project and agreed on co-finance letter with additional comments on PD</i>	20-Nov 2020	
MRD: DRWS, Head of Gender	<i>Indirect Beneficiary</i>	<i>National Government Institution body</i>	Zoom meeting	<i>Sharing information data for formulation of the project and agreed on co-finance letter with additional comments on PD</i>	17-Nov 2020	
MoWA	<i>Partner</i>	<i>National Government Institution body</i>	Zoom meeting	<i>Sharing information and data for formulation of the project</i>	30 Nov 2020	
Svay Rieng						
PDOE	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	26-Nov 2020	
PDAFF	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	27-Nov 2020	
PDRD	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	27-Nov 2020	

Field visit to community	<i>Indirect Beneficiary</i>	<i>Local community</i>	Direct Interview	<i>Collect information about positive and negative and issues related groundwater water use and roles gender participation in groundwater uses</i>	28 Nov 2020	
Prey Veng						
PDOE	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	03-Dec 2020	
PDAFF	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	04-Dec 2020	
PDRD	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	04-Dec 2020	
Field visit to community	<i>Indirect Beneficiary</i>	<i>Local community</i>	Direct Interview	<i>Collect information about positive and negative and issues related groundwater water use and roles gender participation in groundwater uses</i>	05- Dec 2020	
Kg. Cham						
PDOE	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	08-Dec 2020	

PDRD	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	09-Dec 2020	
PDAFF	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	10-Dec 2020	
Siem Reap						
PDOE	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	16-Dec 2020	
PDAFF	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	17-Dec 2020	
PDRD	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	17-Dec 2020	
Field visit to community	<i>Indirect Beneficiary</i>	<i>Local community</i>	Direct Interview	<i>Collect information about positive and negative and issues related groundwater water use and roles gender participation in groundwater uses</i>	18 Dec 2020	
Sihanoukville						
PDOE	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	23-Dec 2020	

PDAFF	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	24-Dec 2020	
PDRD	<i>Indirect Beneficiary</i>	<i>Local Government Institution/body</i>	Face to Face meeting	<i>Sharing information about the project, data collection and collect comments for including in updated PD</i>	24-Dec 2020	

Please provide the Stakeholder Engagement Plan or equivalent assessment.

Cambodia

The inception workshops and site visits aimed to collect and analyze stakeholder interest, needs, expectations and concerns as well as to identify the possible field of participations, measurement, and approaches may be applied during project implementation in order to ensure the effectiveness of the project intervention. Table 1 summarizes stakeholder interests and concerns. **Annex Q** provides descriptions of stakeholder groups and their mandate.

Table 1: Key stakeholders and their engagement during the implementation phase in CAMBODIA

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
National Level: Ministry of Environment				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
1	General Department of Education and knowledge management (GDEKM)-MOE	<p>GDEKM is mandated to manage environment-related data and information. GDEKM also supports the coordination and facilitation of promotion and education on environmental information in Cambodia.</p> <p>National GEF Focal point ?</p> <p>Project Focal point</p>	<p>Need joint transboundary environmental management related to groundwater changes.</p> <p>Need establishment of a database for groundwater resources and promoting the efficient use of groundwater to improve the balance with wetland and habitat management, and conservation</p> <p>Concerns:</p> <p>Environmental pollution;</p> <p>Reduction of wetland, forest, biodiversity;</p> <p>Inconsistent legal framework.</p>	<p>Execution of parts of the project (e.g. demonstration projects).</p> <p>GDEKM can be engaged by:</p> <p>? Facilitate cross sector coordination.</p> <p>? Provide technical advice and guidance on for the SAP.</p> <p>? Support the development of transboundary cooperation mechanisms.</p>

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
2	Department of Freshwater Wetland Conservation (DFWC)	DFWC is mandated to ensure the conservation of national freshwater wetlands in consevation zones under the Ministry of Environment. DFWC develops the national strategy for wetland conservation in Cambodia.	Interests: Groundwater dependent wetlands and how to create resilient wetlands. Concerns: rapid changes of freshwater wetland and losing of natural habitat due to rapid changes of surface water flow and decline of groundwater.	DFWC can provide technical assistance in implementing the follwing key actions: ? Support the TDA. ? Co-designing and executing demonstration projects. ? Assist in SAP and NAP. ? Data and information related to freshwater wetlands. DFWC will participate in national consultation meeting and implementation of pilot project and scientific study and policy and strategy formulation
3	National Council for Sustainable Development (NCSD)	NCSD is mandated for promoting the national sustainable development plan (e.g. climate change, biodiversity conservation, and green growth) and promoting the use of science and technology for environmental management and protection.	Interests: Improved groundwater management for better and sustainable biodiversity and improved efficiency for better environmental management. Concerns: Loss of freshwater wetlands and natural habitat due to rapid changes of surface water flow and groundwater decline. Impact of groundwater quality on biodiversity and people?s health.	NCSD can provide support for the the SAP, help improve institutional capacity, and develop national policies and plans for substainable groundwater use. NCSD will participate in national consultation meeting and implementation of pilot project and scientific study and policy and strategy formulation

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
4	Department of Climate Change (DCC)	DCC is mandated to coordinate and facilitate climate change management, policy formulation and the national strategy on climate change management and mitigation.	Interests: The impact of climate change on groundwater resources and how to mitigate losses. Concerns: surface water flow and groundwater decline due to climate variation. Impact of climate change in groundwater quantity and quality.	DCC can be engaged in various ways: ? Support the TDA. ? Support SAP regarding climate change. ? Intergrate SAP in national strategies and action plans for climate change management and adaptation. DCC will participate in national consultation meeting and implementation of pilot project and scientific study and policy and strategy formulation
National Level: Ministry of Water Resources and Meteorology				
5	Department of River work and hydrology (DRWH)- MoWRAM	DRWH manages the hydrology and river monitoring data and information in Cambodia. DRWH also provide technical services for realtime monitoring of river water level, flood and drought monitoring and forecasting. DRWH also monitors river sediments and discharge in Cambodia.	Interests: DRWH is interested in monitoring of groundwater resources in realtime and comparision of groundwater and surface water level. DRWH aims to extend IWRM in groundwater management in Cambodia. Concerns: Lack of groundwater monitoring in Cambodia. The reason groundwater reduction is unclear due to insufficient groundwater monitoring.	DRWH will play an important role in the project in many ways including: ? Technical support and guidance on surface groundwater dynamics and relevant monitoring systems. ? Assist in TDA for groundwater and surface water assessments. ? Share hydrological data. DWRH will participate in national consultation meeting and implementation of pilot project and scientific study and policy and strategy formulation

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
6	Department of Irrigation (DOI)-MoWRAM	DOI is mandated to design and implement irrigation development in Cambodia and leads the development of the national strategy and plan for irrigation project development and improvement.	Interests: DOI is interested in using groundwater resources for irrigation systems in drought prone area. Concerns: limited knowledge and understanding about groundwater resources and how these link to irrigation. Also how to better support farmers and the rural poor.	DOI will playing important role in many ways of the project including: Development of national SAP regarding groundwater use and the revision of national irrigation plans. Assist in implementation of TDA for groundwater dynamics (recharge & extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods.
Cambodia National Mekong Committee (CNMC)				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
7	Cambodia National Mekong Committee (CNMC)	CNMC is the mandated national institution to coordinate under direct supervision of the Royal Government of Cambodia the management, preservation, conservation and development of water and other related resources in the Mekong River Basin.	<p>Interests: CNMC is interested in transboundary groundwater cooperation, development of groundwater strategies and action plans and the joint TDA for groundwater dynamics between Cambodia and Viet Nam which is part of its mandate under the MRC cooperation framework.</p> <p>Concerns: no concrete action on transboundary groundwater cooperation has been developed.</p> <p>Knowledge gaps on groundwater dynamics including monitoring data and maps, and limited planning for management and the development of groundwater resources.</p>	<p>CNMC can engage in the project in various important roles such as :</p> <ul style="list-style-type: none"> ? Support the TDA ? Assist as national coordinator for development of transboundary cooperation mechanisms ? Provide technical advice and guidance on transboundary cooperation mechanisms ? Assist in design and execution of demonstration studies ? Assist in development of strategies and action programs ? Interlink and coordinate with MRC ? Coordination of data and information sharing with relevant line agencies <p>The Department of Information and Knowledge Management will lead on transboundary cooperation, TDA, SAP, and coordination with MRC.</p>
Tonle Sap Authority (TSA)				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
8	Tonle Sap Authority (TSA)	TSA is mandated to provide technical assistance to the RGC for the development of the Tonle Sap catchment, including the development of a national strategy and action plans for the management of the Tonle Sap basin.	Interests: TSA is interested in the application of sustainable groundwater management in the Tonle Sap basin, improved monitoring, and improved assessments of surface-groundwater dynamics. Concerns: limited groundwater data and activities related to groundwater monitoring and mapping of groundwater quality and quantity.	TSA can engage in the project by providing strategic advice on the implementation of the SAP and the coordination of demonstration projects in the Tonle Sap basin as well as sharing data and information. The Department of Natural Resources will participate in the TDA, national consultation meetings and SAP.
Ministry of Rural Development				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
9	Department of Rural water supply and sanitation of the Ministry of Rural Development (MRD)	Department of Rural water supply and sanitation plays a key role in supplying clean water to rural households in Cambodia including providing wells and promote hygiene. At provincial level, there is a provincial department of rural development undertaking the implementation of national key priorities.	<p>Interests: Groundwater monitoring, groundwater mapping, groundwater master plan and identify potential areas for groundwater well installation.</p> <p>Concerns: groundwater quality and quantity decline.</p> <p>Insufficient water supply for rural areas and unsafe water for rural communities.</p>	<p>Department of Rural water supply and sanitation should be involved in this project by many ways:</p> <p>? Mandated to manage rural wells installation, management and maintenance.</p> <p>? Manage groundwater development in rural communities;</p> <p>? Maintains knowledge and data on groundwater and water supply in rural communities.</p> <p>The Department of Rural Water Supply and Sanitation will participate in the TDA, national consultation meetings, SAP and demonstration projects.</p>
Ministry of Woman Affair (MWA)				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
10	Ministry of Woman Affair (MWA)	MWA advocates public institutions, civil society and the private sector to integrate gender equality into their policies and programs, and coordinates gender mainstreaming. MWA is responsible for monitoring and evaluating policies and programs to assess gender equality and the empowerment of women.	Interests: Gender mainstreaming and relevant action plans Concerns: gender inequality in groundwater dependent communities and in groundwater management and water supply for rural communities.	MWA can be engaged for the development of national policies and planning and the Gender Action Plan and assist to mainstreaming of gender issues in the national and regional plan. The Department of Gender will participate in the TDA, national consultation meetings and SAP.
Ministry of Agriculture, fishery and forestry				
11	Department of Planning and Statistics (DPS)-MAFF	DPS-MAFF manages all statistical information and detailed planning for the agriculture sector in Cambodia. At provincial level, the department has channels for data collection and undertakes data mining on agricultural planning and development.	Interests: DPS-MAFF wish to integrate data related to the groundwater information in the agriculture sector and concrete plans on groundwater uses planning for agriculture sector. Concerns: groundwater quality and quantity for agriculture production in rural communities. Lack of available water supply for agricultural areas and irrigation especially during the dry season.	DPS-MAFF has a potential role by providing clear strategic development plans for agriculture using groundwater resources. This department also have data and information which will be required for the implementation of the TDA and preparation of the SAP. DPS will participate in TDA, national consultation meeting and policy formulation and implementation of pilot study.

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
12	General Directorate of Agriculture (GDA)-MAFF	GDA plays a key role in agricultural land management and development including crop management and planning, soil fertility management and development, and the development of national strategies for agricultural development, soil fertility management, crop zoning and planning.	<p>Interests: GDA-MAFF aims to develop crop planning and agriculture production planning using groundwater information. Develop groundwater mapping for rice production zoning.</p> <p>Concerns: reduction of groundwater recharge, high rate of groundwater extraction and impact of climate change on soil fertility in non-irrigated areas.</p>	<p>GDA can engage with the project by providing national plans for crop zoning and management of agriculture land zoning. GDA can assist the project for development of the SAP and its implementation in the NAP for agriculture.</p> <p>GDA-MAFF also can provide all necessary data and maps related to soil fertility, crop zoning, agricultural zoning.</p> <p>The GDA will participate in TDA, national consultation meeting and policy formulation and implementation of pilot study.</p>

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
13	Fisheries Administration ? FiA -MAFF	FiA manage the fishery resources management including wild and aquaculture including the fishing lots in Cambodia. FiA also manages two important national institutes on fresh and marine fisheries in Cambodia. FiA also manage the local fishery communities in Cambodia and protection of fishery and ecological functions in Cambodia.	Interests: FiA is interested in conservation of fisheries and aquatic resources and also in groundwater uses for aquaculture production. Concerns: rapid loss of wetlands and aquatic resources due to the development in the Mekong Basin. Also the in-balance of groundwater recharge and extraction, which will be leading to the loss of fish stocks and aquatic habitat and ecosystem services in Cambodia.	FiA is playing a vital role in the groundwater project especially related to the TDA and drafting the SAP for conservation of wetland and aquatic habitats in Cambodia. FiA can also help to provide strategic guidance on the impact assessment of groundwater uses on environmental, ecological resources and livelihood of fisheries communities and integrate the SAP into national actions plan. FiA also can share many important fisheries and aquatic resources data for the TDA. The FiA will participate in TDA, national consultation meeting and policy formulation and implementation of pilot study
Ministry of Foreign Affairs and International Cooperation (MOFAIC)				
14	Ministry of Foreign Affairs and International Cooperation (MOFAIC) Department of Southeast Asian - South Asian - South Pacific Affairs	Government agency with the mandate to guide transboundary negotiations		Support the transboundary dialogue and facilitate cross-sector discussions

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
PRIVATE SECTOR				
15	CAVAC Innovation Agriculture	CAVAC supports the RGC to improve the quality, sustainability and effectiveness of irrigation systems in Cambodia	Innovation of irrigation systems. Sustainable irrigation services to communities. Irrigation infrastructure investment and policy advice.	Sharing experiences. Support of policy formulation and planning. Assessment of irrigation demand. Participation in the implementation of demonstration projects and policy and national strategy formulation
16	Cambodia Water Partnership (CWP)	CWP is a part of global Water Partnership created to foster IWRM.	IWRM approach; Water resources networking; Transboundary cooperation; Water governance.	Sharing experiences. Providing scientific experts and technical inputs for TDA. Participation in the implementation of demonstration projects and policy and national strategy formulation
17	National universities and research institutes	Universities and research institutes in Cambodia play an important role in research and education related to groundwater, biodiversity, ecology and fisheries.	New findings on groundwater research. Promote sustainable development. Assess the ecosystem services and functions of wetland related to groundwater dynamics.	Sharing experiences. Providing scientific experts and technical input for TDA. Participation in the implementation of demonstration projects and policy and national strategy formulation
NGOs and IGOs				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
18	NGOs and IGOs	There are many NGOs (e.g. CCC, NGO Forum, HACC, NEP, CDPO, 3S Networking) working in the Cambodia as well as IGOs (e.g. MRC, WB, UNDP, ADB, GIZ, IFAD, OXFAM)	Sustainable management of agriculture, fishery, forestry, water governance, climate change adaptation, gender, socio-economic development. Tranboundary cooperations.	Sharing experiences, data, information and planning. Joint collaboration on some related project activities. Promote and conduct gender mainstreaming and contribute to the socio-economic aspects of the TDA. Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops, technical forum)
Provincial Level (17 provinces and city: Siem Reap, Kampong Thom, Battambang, Banteay Mean Chey, Pursat, Kampong Chhnang, Stung Treng, Kratie Kampong Cham, Takeo, Prey Veng Svay Rieng, Kampot, Sihanoukville, Koh Kong, Kep and Phnom Penh Capital city.)				
	Department of Environment	Province Government Agency responsible for natural resource management and environmental protection.	Provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops and meetings). Conducting demonstration projects.	
	Departments of Agriculture, Fishery and Forestry	Province Government Agency responsible for planning and monitoring in agriculture, fishery and forestry		
	Department of Rural Development	Provincial management on rural development planning and groundwater investment		
	Department of Water Sources and Meteorology	Provincial management on water resources and irrigation development and investment		
	Department of Women Affair	Provincial management on woman affair, gender mainstreaming, and community development-based gender action plan.	Support to project design and execution regarding gender equality and mainstreaming.	
	Local community and individual households			Household survey and village focus group discussions to support TDA and SAP.
International cooperation entities				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Engagement
	Donor organizations (e.g. GEF, DFAT, AWP, World Bank, ADB, JICA, SIDA, GIZ and AFD, KOICA)			Will be invited to annual Stocktaking Meetings.

Viet Nam

There are a range of stakeholders involved in groundwater management in Viet Nam's Mekong Delta and its eastern outreach to Ho Chi Minh City. The key stakeholders are identified in Table 2 together with their respective profiles, interests, concerns and potential engagement in this project are presented. Further details for these key stakeholders are provided in **Annex P**.

The project will ensure information of the project will be made available to the public so that the environmental and social risks and impacts associated with the project, as well as opportunities provided by the project will be informed properly to all stakeholders. This will enable project data, information can be used for decision makers as well as supporting policy building process in Mekong delta provinces.

On an ongoing basis, the project will have a routine disclosure and consultation on the project's environmental and socio-economic performance including grievances and other new emerging issues on the project. The disclosures will be done to all stakeholders' thorough project briefs or annual reporting through brochures. While providing this disclosure, the project will also provide:

1. An update on the Project achievements and how its contributing to enhancing transparency in reporting for river basins management in the country
2. An overview of the stakeholder engagement process and how affected parties can participate and provide feedback through meeting or other avenues;
3. Project impacts on development and how the government is using the project data to enhance the livelihoods of the ethnic people at the same time conserve the environment and report and forecast on river basins water management and climate change related events.

Table 2: Key stakeholders and their engagement during the implementaton phase in Viet Nam

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
	Ministry of Natural Resources and Environment (MONRE)			

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
1	Department of Legislation (DOL), MONRE	National focal point for MONRE in the GEF Project		MoNRE will execute parts of the project (e.g. Component 2). All process of the project formulation and implementation
2	Department of International Cooperation (ICD), ONRE	Support for setting up the legal documents for transboundary cooperation between Mekong countries		Participation in national consultation and policy development
3	Department of Water Resources Management (DWRM), MONRE	Setting up the transboundary water cooperation mechanism		Participation in national consultation and policy development
4	Environment Administration (EA), MONRE	Government Agency responsible for the protection of the environment, including endangered species, and the sustainable management of ecosystems, incl. wetlands.		Participation in national consultation and policy development
5	Institute of Meteorology, Hydrology, and Climate Change (IMHEN) - MONRE	Government agency responsible for and providing climate change projections.		Participation in national consultation and policy development
6	Viet Nam Meteorological and Hydrological Administration (VMHA)	Government Agency responsible for Meteorological and hydrological monitoring and forecasting.		Participation in national consultation and policy development
7	Division for Water Resources Planning and investigation for the South of Viet Nam (DWRPIS)	Planning, investigation, reconnaissance, exploration and exploitation of water resources (including thermal water, mineral water and mineral mud). Groundwater exploitation drilling. Groundwater monitoring.		Participation in national consultation and policy development
Ministry of Agriculture and Rural Development (MARD)				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
8	Directorate of Water Resources (DWR), Ministry of Agriculture and Rural Development (MARD)	Government agency responsible for developing policies and plans for design, implementation and maintenance of irrigation infrastructure.		Participation in national consultation and policy development
9	General Department of Disaster Prevention and Control (GDDPC), MARD	Government agency responsible for the development of policies, regulation and plans for the prevention of natural disaster prevention and control.		Participation in national consultation and policy development
10	Institute of Water Resources Planning (IWRP), MARD	Government agency responsible for providing the technical support for water resource planning.		Participation in national consultation and policy development
11	Viet Nam Academy for Water Resources (VNWRA), MARD	Government agency responsible for providing the technical support for water resources management and disaster risk reduction.		Participation in national consultation and policy development
12	Directorate of Fisheries (DF), MARD	Government agency responsible for policies, regulation, and management of capture fisheries and aquaculture.		Participation in national consultation and policy development
13	Administration of Forestry (AF) MARD	Government agency with the mandate to provide the technical support for forest management and forest protection.		Participation in national consultation and policy development
14	Viet Nam National Mekong Committee (VNMC)	Inter-ministry Agency-a focal point of Viet Nam in Mekong River Commission (MRC)		Participation in national consultation and policy development
Ministry of Industry and Trade (MOIT)				
15	General Directory of Energy, Ministry of Industry and Trade (MOIT)	Government agency responsible for the development of policies and plans for energy related investments.		Participation in national consultation and policy development

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
Ministry of Foreign Affairs (MOFA)				
16	Department of Southeast Asian - South Asian - South Pacific Affairs, MOFA	Government agency with the mandate to guide transboundary negotiations.		Will support the transboundary dialogue and facilitate the cross-sector discussion.
Ministry of Planning and Investment (MPI)				
17	Department of Science, Education, Natural Resources and Environment	Government agency responsible for management over planning and investment for natural resources and environment; coping with climate change; low emission development, green growth		Will examine, monitor the implementation of the project
Ministry of Finance (MOF)				
18	Department of International Relation	Coordinating to build integration negotiation plans, consulting ideas with ministries and agencies in negotiating, signing treaties and international agreements.		
National CSOs				
19	National CSOs: Viet Nam River Network (VRN), Sustainable Agriculture and Environment Development, VRCR: Viet Nam Red Cross Union, Some NGOs under Viet Nam Union of Science and Technology Associations (VUSTA)	Various CSOs that focus on sustainable development in the two target basins.	Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops, stocktaking)	
Provincial Level (13 provinces and city: Tien Giang, Long An, Dong Thap, Ben Tre, Vinh Long, Kien Giang, Can Tho, Soc Trang, Bac Lieu, Tra Vinh, Ca Mau, An Giang and Hau Giang, and Ho Chi Minh city				

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
20	DONRE: Department of Natural Resources and Environment	Province Government Agency responsible for the management of natural resources and the protection of the environment. DONRE plays a key role in management of natural resources and environmental protection in the province. At district level, there is a Sub-DONRE. At commune level: there is a staff per commune responsible for natural resources and environmental management.	Need trans-boundary water and natural resources management; Need effective regional planning in the VMD; How to involve (difficult to involve) enterprises, other stakeholders in water management; Environmental pollution; Reduction of wetland, forest, biodiversity; Inconsistent legal framework.	DONRE should be involved in this project by many ways: ? Have power in term of land and water management in the province ? management at landscape level; ? Share data and information regarding to natural resources, environmental quality, land use, etc.; ? Have capacity to apply technology in management of natural resources and environment. Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops and meetings). Conducting demonstration projects at the project sites.

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
21	DARD: Department of Agriculture and Rural Development	Province Government Agency responsible for planning and monitoring in agriculture and rural development. DARD plays a key role in management of agriculture and development of rural area in the province. At district level it is called Sub-DARD. At commune level, it has 1-3 staff per commune.	What are alternative crops to reduce water use? Market problems: unstable price of all agricultural products, increasing input prices; Lack of successful demonstration, package of hi-tech, cooperative, adaptation to climate change; Small-scale farming, lack of cooperation; Overuse of agri-chemicals causing water pollution; Upper hydropower dams.	DARD may be engaged by many ways: ? Provide technical and experienced staff; ? Implement and monitor demonstration, transfer of technology; ? Connect with farmers and private companies for better collaboration; ? Co-operate with their current projects and programs (agricultural extension, new rural development, one commune one product, etc). Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops and meetings). Conducting demonstration projects at the project sites.
22	Department of Planning and Investment (DPI)	Provincial management on planning and investments		Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops and meetings). Conducting demonstration projects at the project sites.
23	Department of Industry and Trade (DIT)	Provincial management on energy and industry development (hydro power management, processing industry?)		Will provide on-the-ground support to project design and implementation. Will also be periodically engaged based on stakeholder engagement plan (e.g. workshops and meetings). Conducting demonstration projects at the project sites.

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
24	Provincial Women Union, Farmer Union, Youth Union, and Ethnic Committee	Social organizations responsible for social affairs, social network and mobilization		Will provide on-the-ground support to project design and implementation. Mainly on awareness raising events, livelihood strategies, land use change, and land management. Demonstration project design will consider livelihood development on project sites
25	PCONRD: Program Coordination Office of the National Target Program on New Rural Development	Under DARD or People Committee, to implement effectively NTP on new rural development	Socio-economic development in rural area; Rural infrastructure improvement; Environmental protection; Cultural conservation; Capacity building for rural people.	Integrate with existing activities to improve rural livelihoods and living conditions (trainings, job creation, technology transfer, one commune one product, etc.).
26	DOLISA: Department of Labors, Invalids and Social Affairs	DOLISA performs state management function on the following areas of labor, wage and salary, employment, vocational education, social insurances, occupational safety and hygiene, people with special contribution to the country, social protection, children related issues, gender equality, social vices control and prevention in the province.	High poverty rate, especially in remote areas and minority groups; Low education of the poor, Chemical use in agriculture ? health related issues and environmental pollution; Not attract young labors in the province; Migration to cities, industrial parks and oversea (exporting labors)	DOLISA have staff, school for vocational training; It may help to carry out activities related to poverty reduction, children, gender, minority groups, vulnerable people, vocational education;

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
27	VNWU: Vietnamese Women's Union	Similar to VNFU, VNWU has the same role as social-political organization but focusing more on women and children. It also has the same structure, organizing from national level to provincial, district, commune and hamlet.	Contamination, unsafety food, chemical residue on vegetables; Environmental pollution, climate change affects to women and children; Lack of knowledge on climate change Vocational education for women, ensuring stable jobs, high income; Improve roles of women in family and society.	Similar to VNFU, there are some opportunities for collaboration with VNFU in our project such as: VNWU has good structure to grass-root level, staffs from center to province, district, commune and hamlet. VNWU has collaboration with related Departments ? good network. VNWU has its own budget to support women and children.
28	Regional university and research Institutes	Universities and research institutes in the region play an important role in research and education in the Mekong Delta	Among the best education centers Sustainable development Climate change adaptation	Sharing experiences Providing scientific experts Implementing demonstration project sites, demonstration Collaborating with the local governments and departments
29	Ethnic minorities communities? groups, individual households			Household survey and village focus group discussions to support TDA and SAP. Mainly eliciting livelihood strategies, risk perceptions, and likely behavioral responses and participation in livelihood development activities.

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
30	Agricultural Cooperative	Cooperative is considered as a production unit and operated under Law of Cooperative. Their key role is getting farmers together for large scale production, better incomes, easier to implement governmental policies.	Leadership: Low education, lack of skill and knowledge; Lack of strategy and planning; Contract farming broken; Issues related to transparency, book keeping, benefit sharing; Members do not believe in cooperatives;	They already have structure. The project should make use of these organizations to demonstrate how (ground) water use and management in efficient way
Private Sector				
31	VNFU:Vietnamese Farmer's Union	VNFU is a social-political organization of Viet Nam's peasantry under the leadership of the Communist Party. VNFU has been playing a key and central role in farmers' movements and building new rural areas.	Small scale farming, too much chemical use, conventional practices, difficult to change farmers behavior; Climate change impacts; Fluctuation of agricultural product prices; Migration to cities, industrial parks; Weak human resources (qualified) in VNFU system at all level.	VNFU has good structure to grass-root level, staffs from center to province, district, commune and hamlet. This structure can be used to increase farmer awareness under project implementation and after; VNFU has collaboration with related Departments ? good network. VNFU has its own budget (farmer supporting funds) to help farmers.
32	Viet Nam Dairy Products Joint Stock Company (Vinamilk), Branch in Can Th? city	Vinamilk is Viet Nam's largest dairy company, which produces a wide range of dairy products for the domestic and export markets.		Participation in the implementation of demonstration projects.

No	Stakeholders	Stakeholder profiles	Interests and concerns	Potential engagement
33	Angiang Fisheries Import Export Joint Stock Company	Angiang Fisheries is a Viet Nam-based seafood processing company. It primarily manufactures, processes, markets, and exports aquatic frozen seafood and agricultural products, as well as merchandises materials and equipment for agricultural activities		Participation in the implementation of demonstration projects.
34	Minh Phu Seafood Cooperation	Minh Phu is Viet Nam's biggest seafood processing company in the Mekong delta		Participation in the implementation of demonstration projects.
Other Stakeholders				
35	Donor organizations (e.g. GEF, DFAT, AWP, World Bank, ADB, JICA, SWaM, SIDA, GIZ, UNDP)			Will be invited to annual Stocktaking Meetings.
36	Alliance for Water Stewardship	Recognizes best practice water management by industry		Facilitate private sector engagement
37	NGOs and IGOs	There are many NGOs working in the Mekong Delta as well as IGOs (e.g. MRC, WB, UNDP, GIZ, IFAD)	Sustainable agriculture, organic agriculture, aquaculture, forestry, water governance, climate change adaptation, gender, socio-economic development, etc.	Sharing experiences; Collaboration on some related activities; Negotiating with other upper stream countries Will be invited to the annual Stocktaking Meetings

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement

During the execution phase, the project will engage with the following stakeholder groups:

- Government: Line ministries in the capital city, officials at the provincial and district level and community-based organization.
- Development Partners: Multilateral and bilateral development partners in the study area.
- Civil Society Organizations: International non-profit organizations, local non-profit associations, academia and research groups.
- Private Sector: Representatives from the business sector, small and medium enterprises.
- Community Based Organization: Village organization unit, and local people.

The engagement process will include both face-to-face meetings as well as online/web-based platform to enable participation by a wide range of stakeholders. The structure of face-to-face meetings will allow plenary presentations and discussions and, if needed, small group discussions, and reporting with a neutral facilitator. For online engagement an online survey will be available to people interested to participate who may not be invited.

Governments, private sector, and development partners will be engaged with in the required language with simultaneous translation if needed. The engagements of provincial, district officials, civil society organizations and other local groups will be conducted in Khmer language simultaneous translation if needed.

Select what role civil society will play in the project:

Consulted only; Yes

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain)

3. Gender Equality and Women's Empowerment

Provide the gender analysis or equivalent socio-economic assessment.

Viet Nam recognizes gender equality as key component for sustainable agricultural development, including water management. Viet Nam has made significant progress in promoting gender equality in all sectors by endorsement or revision of legal frameworks and policies on gender equality and the advancement of women, most notably the Gender Equality Law and the National Strategy for Gender Equality. This reflects Viet Nam's commitment to Gender Equality and a range of international conventions and national commitments the Government ratified. However, there still exist gender gaps in agriculture and the water sector in Viet Nam's Mekong Delta: (i) poor sanitation, water borne diseases, health problems; (ii) participation in decision making and capacity building/training; and (iii) economic conditions and income.

In Cambodia, there are no existing legal instruments, strategies and action plans advancing gender equality in the context of groundwater access and management. Focus group discussions during the PPG field missions confirmed that although women are mainly responsible for collecting groundwater for household consumption, only 30% of the management committee members for tube wells in five visited provinces are women. Furthermore, although women are in charge of collecting groundwater for households and short-term vegetables cultivation, technologies (e.g. irrigation timers, comfortable water collection methods) that could reduce their burden are extremely limited.

The project will be aligned with the GEFs and FAOs Policies on Gender Equality, the FAO Regional Gender Strategy and Action Plan 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. A Gender Integration and Equality Approach for Transboundary Aquifers has been specifically developed for this project, with the overall goal of ensuring an equitable participation of women and ethnic minorities in project activities, and of fostering the empowerment of women in the Mekong Delta Transboundary Aquifer, responding to the gender equality challenges listed above. It aims at providing a roadmap for full integration of gender considerations into the project long-term Vision as well as inform and contribute to the SAP preparation. Details are provided in **Annex N2**.

The Water and Gender Action Plan (GAP) is provided in **Annex N1** to ensure that gender considerations are considered 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:

- TDA, including gender analysis

- Capacity development to national stakeholders on the impacts of groundwater management and aquifer recharge on women and men's livelihoods.
- 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.

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 Yes

Generating socio-economic benefits or services or women Yes

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

Yes

4. Private sector engagement

Elaborate on the private sector's engagement in the project, if any.

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 consultations with 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.

List of Private Sectors	Types of business	Relevant to the project / Objective	Location	Form of engagement
Phnom Penh Water Supply Authority	Water supply	Water treatment and development of urban water supply system	Phnom Penh	Included in the list of stakeholder consultation for preparation of SAP
Niroth Water Treatment Plant	Water supply		Phnom Penh	

Kampong cham water supply	Water supply	Surface and Groundwater supply system for urban	Kampong Cham	Stakeholder engagement meeting on Project implementation phase on design for groundwater use for urban and community
ANCO Water Supply	Water supply		Preah Sihanouk	
Siem Reap Water Supply	Water supply		Siem Reap	
WE Venture Co. Ltd	Water supply	Safe water for urban and rural community	Phnom Penh	
24/7 Private Water Operators	Water supply	Groundwater user for urban water supply	23 provinces	
ENVICARE WATER CO., LTD	Water supply		Phnom Penh	
Sala 5 Water Supply	Water supply		Kampong Chhnang	
Kompongchomlong Water Supply	Water supply		Prey Veng	
Mong Rithy Group	Agriculture and food production	Innovation and technology for Agriculture production and food processing	Sihanoukville, Kampong Spue, Kampot	Engage in sharing of technology and innovation technology for high agriculture production and food processing
Golden Rice	Rice exporter	Rice harvesting technology for export	Country-wide	
CP Cambodia	Food processing	Animal and food processing technology	Phnom Penh and Siem Reap	
Baca-Villa Productions Co Ltd	Agriculture	Rice harvesting, animal and food processing technology and fertilizer technology	Siem Reap	
Harvest Centre (Cambodia) Co., Ltd	Agriculture exporter		Phnom Penh	
Viet Nam Dairy Products Joint Stock Company (Vinamilk)	Dairy products	Major water user, food processing	Can Th? city	

Minh Phu Seafood Cooperation	Largest seafood processing company in the Mekong delta	Major water user, main client for many aquaculture farms in the Mekong delta.	Ca Mau	
Angiang Fisheries Import Export Join Stock Company	Fisheries	Major water user, fisheries and fish farming	Long Xuyen city, An Giang Province	

5. Risks to Achieving Project Objectives

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.(table format acceptable):

Part A of this section focuses on external risks to the project and Part B on the identified environmental and social risks from the project.

Section A: Risks to the project

In the section below, elaborate on indicated risks to the project, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.

Description of risk	Impact[1] ¹	Probability of occurrence	Mitigation actions	Responsible party
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<p>Risks related to COVID-19:</p> <p>a) Delays due to COVID-19 lead to slow implementation or stalling, and/or impacts the stakeholder engagement process.</p> <p>b) Impacts from COVID-19 affects the availability of technical expertise and capacity.</p> <p>c) Enabling environment and changing government priorities/ availability of co-financing.</p> <p>d) Future risks of similar crises (including from human-livestock-wildlife interaction)</p>	M	Medium	<p>Potential impacts of COVID-19 will be closely monitored.</p> <p>a) The project will implement adaptive management, and the work plan and stakeholder engagement plan would be adjusted, if necessary, to reflect the impacts of COVID-19. It is anticipated that, even if face-to-face interactions are reduced, the project would still be able to organize meaningful consultations with local stakeholders through the local representatives. Remote communication via email, online meetings and phone may be used increasingly to adjust to the new situation.</p> <p>b) It is not currently anticipated that the COVID-19 restrictions would affect the availability of national expertise. The project relies mostly on national experts for its implementation. With regard to any international experts, it is expected that expertise could be provided remotely, if necessary.</p> <p>c) As explained above, increasing exports as well as environmental protection, poverty alleviation, and green economic recovery are among the priorities of the Governments, which is aligned with the GEF-7 project goals. Measures are being developed under the socioeconomic response frameworks and the COVID response plans both Governments have put in place. These aim to support the socio-economic recovery and increase</p>	IUCN (PMU)
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Ensuring effective multi-stakeholder involvement from both countries can be time and resource consuming ? specially to ensure that people and institutions involved effectively represent their sector or stakeholders	H		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.	IUCN (PMU)
Climate risks including incorrect assumptions regarding future climate change trajectories.	M		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 considered when devising strategies to manage climate risks.	UNESCO IHP, IUCN (PMU)
Demonstration projects are successfully designed for current climate conditions but fail for future climate conditions (e.g. increasing variability).	H		The demonstration projects will be assessed against the backdrop of a wide range of climate change scenarios and safeguards will be applied.	UNESCO IHP, IUCN (PMU)
Lack of sustained political support to establishing transboundary cooperation frameworks.	M		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.	IUCN (PMU)

<p>Limited interest or involvement by target stakeholders, local communities and the inhabitants of the two basins.</p>	<p>M</p>	<p>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. To further reduce this risk, a highly participatory approach will be used to design, evaluate and upscale pilots with communities, CSOs and other relevant stakeholders on the ground.</p> <p>Based on our experience working in the CMDA area, farmers are willing to invest in flood friendly crops and other NBS when there are clear economic benefits. Accordingly, we will organize experiential study visits, and farmer to farmer exchanges to further minimise engagement related risks.</p> <p>These measures will not only increase the real-world impacts of this project, but also create meaningful ownership among relevant stakeholders, which from experience creates substantial interest in engaging with the project.</p>	<p>IUCN (PMU)</p>
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National processes ? particularly approvals for plans and legal mechanisms ? may be complex and lead to uneven progress between countries that may undermine different countries interest/ engagement	H		The project will facilitate knowledge sharing and provide guidance based on lessons learned and other similar experiences ? but this will not affect the normal processes in each country, and it is expected that countries will move at difference paces. When necessary, 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.	IUCN (PMU)
Weak participatory processes, with no meaningful integration of the often under represented (marginalized) households depending on irrigated agriculture and aquaculture.	H		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 demonstration project 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.	IUCN (PMU)

COVID-19 pandemic: Short, medium, and long-term effects

COVID-19 impacts on the life of Southeast Asian countries have suddenly increased in January 2021 after experiencing very low number of cases for the first ten months of the global pandemic. According to the John Hopkins University of Medicine statistics (accessed 29 September 2021) Viet Nam has so far had 770.640 cases and 18.936 deaths. Only 8,286,558 people have been fully vaccinated, representing 8.59% of the population. However, 39m doses have been administered, indicating that the vaccination program is

now rapidly improving. Cambodia had so far 110,792 cases and 2,287 deaths, while 23.8M people 66% of the population being already fully vaccinated.

The early design of the proposed project has taken steps to minimize the risks related to the COVID-19 global pandemic in the area of community health. While the project will not directly generate risks related to construction or hazardous materials, there is a risk that travel to or from areas where COVID-19 is prevalent could pose a risk to the population of Cambodia and Viet Nam, and to project staff, consultants/contractors. The project detailed design will include active steps to mitigate this risk, including training on pandemic-related guidance for project staff and stakeholders during the inception phase, and the expansion of standard monitoring of project operations and ensure that they are in conformity with FAO policies regarding travel, risk reduction, and other areas regarding the COVID-19 pandemic. The Project Manager will report on compliance to the Project Steering Committee and take any necessary steps to protect the health of staff, consultants/contractors, and beneficiaries required by the situation.

The COVID-19 pandemic affects jobs and livelihoods in many sectors, including those related to freshwater resources. The proposed project will improve the resilience of communities to climate change, conservation of the integrity of freshwater ecosystems, and fostering environmentally sustainable water resources management, which in combination will improve the COVID related recovery process and improve the long-term resilience of communities to future shocks.

Section B: Environmental and Social risks from the project ? ESM Plan

This section is based on the risk matrix obtained during risk screening in the concept note (in FPMIS) and based on further update and revision by the PTF under the responsibility of the LTO.

Project Risk Certification

Entity Number: 673261

Project Title: Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer

Recipient Country(ies): Regional Asia & Pacific

Estimated total budget in USD: 15,000,000 \$

Risk Certification

Certified by: Whiting, Louise (RAPDD)

Date: 17-Feb-2020

The proposed action is classified as: Low

[1] H: High; M: Moderate; L: Low.

6. Institutional Arrangement and Coordination

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

6.a Institutional arrangements for project implementation.

Upon approval of the project, FAO, in its capacity as implementing agency, initiated a consultation with the counterparts in Cambodia and Viet Nam, to identify the suitable execution partner(s) for the technical assistance components.

The process as agreed with the lead agencies from Cambodia and Viet Nam was as follows:

1. Identification and initial assessment of potential partners by all parties.
2. Invitation to submit an execution proposal proposals to identified potential partners
3. Contact with candidates to confirm their interest and request their written proposals.
4. Review and technical evaluation of proposals
5. Recommendation of Operation Partner or Consortium of Operational Partners to Government Agencies, based on proposals received.

In the first step, nine (9) organisations were identified as potential partners. These included: AIT, ICEM, IGRAC, IUCN, IWMI, MRC, MERFI, UNESCO and WWF. Their capacities were initially assessed (step 1) by your agencies and FAO via agreed evaluation criteria, based on current knowledge and experience, in January 2021. Following the conclusion initial assessment, it was agreed to proceed to an Invitation for Proposals.

For the written proposal step, FAO initiated a formal and transparent procedure to identify Operational Partners, through their proposals for the execution of the CMDA project. An internal FAO technical evaluation panel comprising of experienced and technically competent FAO staff members was established, and evaluation criteria already agreed in step 1 were further enriched, to allow in-depth technical evaluation in order to advice Governments of both countries. On 29 March 2021, FAO issued an Invitation for Proposals to the select nine (9) organisations identified in step 1. These were invited to submit a full proposal to become Operational Partners for the execution of the CMDA project, in its entirety or for specific components. A total of six (6) proposals for the execution of the projects in its entirety or specific components were received and reviewed. Based on the evaluation results, FAO and the lead government agencies from Cambodia and Viet Nam, agreed on the execution arrangements featured in Table 16 and in Figure 21. Execution partners were selected at Output level based on their respective strengths. The International Union for Conservation of Nature, IUCN, has been selected as the overall lead execution agency (Lead Operational Partner, LOP) that will be responsible for coordinating the Regional Project Management Unit (RPMU). IUCN will be in charge of subcontracting the services of the Mekong

Region Futures Institute (MERFI) as Operational Partner, and will coordinate the work with the United Nations Educational, Scientific and Cultural Organization, UNESCO (International Hydrological Programme, IHP & World Water Assessment Programme, WWAP) as Operational Partner. UNESCO will be contracted directly by FAO through a UN to UN agreement. Operational Partners also include in Cambodia the General Directorate of Environmental Knowledge and Information (GDEKI), under the Ministry of Environment (MOE) and potentially MOWRAM, MOE/PDOE, MRD, MAFF/PDAFF, depending on their capacity assessments. In Viet Nam, Operational Partners include Department of Legal Affairs(DLA) under the Ministry of Natural Resources and Environment (MONRE) and potentially MONRE/DONRE and MARD/DARD, according to capacities for the execution of Pilots in Component 2. Further to the above, the National Mekong Commissions, Cambodia National Mekong Commission (CNMC) and Viet Nam National Mekong Commission (VNMC) will be subcontracted by IUCN to support the delivery of Components 3, 4 and 5. All operational partners will be responsible and accountable to FAO for the timely implementation of the agreed project results, operational oversight of implementation activities, timely reporting, and for effective use of GEF resources for the intended purposes and in line with FAO and GEF policy requirements..

Component 1 (TDA) will be executed by UNESCO (IHP & WWAP) and MERFI, as shown in Table 15. The disciplinary split has been made based on the experiences and strengths of these organisations. UNESCO will undertake the groundwater assessment (Output 1.1.) and related dependencies of ecosystems (Output 1.2.). MERFI will conduct the integrated assessment as part of Output 1.3 and will therefore be responsible for merging disciplinary TDA components into one consistent TDA report and will further elaborate on the environmental Status indicators (Output 1.4).

Component 2 (Pilots) will be executed by the two countries. The final selection of executing agencies will depend on the respective government mandate and the related capacities. Consequently, the ultimate selection of pilots will determine the specific execution arrangements for Component 2. Main executing agencies for pilots (pending on capacity assessments) will be in Viet Nam MONRE/DONRE and MARD/DARD, and in Cambodia MOWRAM, MOE/PDOE, MRD, and MAFF/PDAFF.

Component 3 will be executed by UNESCO and IUCN, with the support of the CNMC, the VNMC, and MERFI.

Component 4 will be executed by IUCN with the support CNMC, VNMC, and MERFI.

Component 5 will mainly be executed by IUCN while UNESCO WWAP takes on the lead of the gender focused Output 5.3, complementing its gender assessment role in the TDA. Support for Component 5 activities will be provided by UNESCO IHP and MERFI.

Table 1: Execution arrangements

Lead Operational Partner: IUCN			
Component	Output	Operational Partner	Support
Component 1 (Technical Assistance) Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods	Output 1.1 Assessment of current state of groundwater resources, recharge and extraction dynamics	UNESCO-IHP	IUCN
	Output 1.2 Analysis of groundwater related dependencies of related ecosystems	UNESCO-IHP	MERFI, government agencies as needed IUCN
	Output 1.3: Agreed upon Transboundary Diagnostic Analysis (TDA), including assessment of related governance, socio- economic, legal and gender aspects.	MERFI	UNESCO-WWAP IUCN
	Output 1.4: Agreement reached on Environmental Status Indicators.C2	MERFI	IUCN
Component 2 (investment) Piloting solutions for improved transboundary groundwater management	Output 2.1: Pilot demonstrations of innovative groundwater management and utilization after adequate feasibility studies	Viet Nam: MONRE/DONRE, MARD/DARD; Cambodia: MOWRAM, MOE/PDOE, MRD, MAFF/PDAFF	NMCs, technical support from IUCN or other partners as needed
Component 3 (Technical Assistance) Transboundary cooperation mechanisms	Output 3.1: Harmonized design of groundwater monitoring networks and protocols	UNESCO-IHP	MERFI, CNMC, VNMC and government agencies

	Output 3.2: Agreement on groundwater data exchange mechanisms and procedures.	UNESCO-IHP	IUCN, CNMC, VNMC, MERFI, UNESCO-WWAP and government agencies
	Output 3.3: Design of permanent transboundary consultation and coordination body (TCCB)	IUCN	CNMC, VNMC, and relevant government agencies
Component 4 (Technical Assistance) Joint strategies and action programs	Output 4.1: Countries establish ad hoc inter-ministerial committees.	IUCN	CNMC and VNMC
	Output 4.2: A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets.	IUCN	MERFI, UNESCO-WWAP
	Output 4.3: Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision.	IUCN	MERFI, CNMC, VNMC, UNESCO-WWAP, relevant government agencies
Component 5 (Technical Assistance) Reinforced institutional capacity, improved participation, gender mainstreaming, monitoring and coordination.	Output 5.1: Structured capacity building in groundwater governance for decision makers and other stakeholders.	IUCN	UNESCO-IHP, UNESCO-WWAP
	Output 5.2: Annual stocktaking and awareness raising meetings with relevant stakeholders (e.g. local, national and regional meetings)	IUCN	All

	Output 5.3: Water and Gender Action Plans and indicators, based on results of Component 1, adopted by relevant authorities in both countries	UNESCO-WWAP	All
	Output 5.4: Periodic events for the coordination with other ongoing initiatives organized by the PMU/TCCB	IUCN	All
	Output 5.5: Full participation to GEF IW LEARN activities, creation of a project website, and preparation of experience notes.	IUCN	UNESCO-WWAP, All OPs

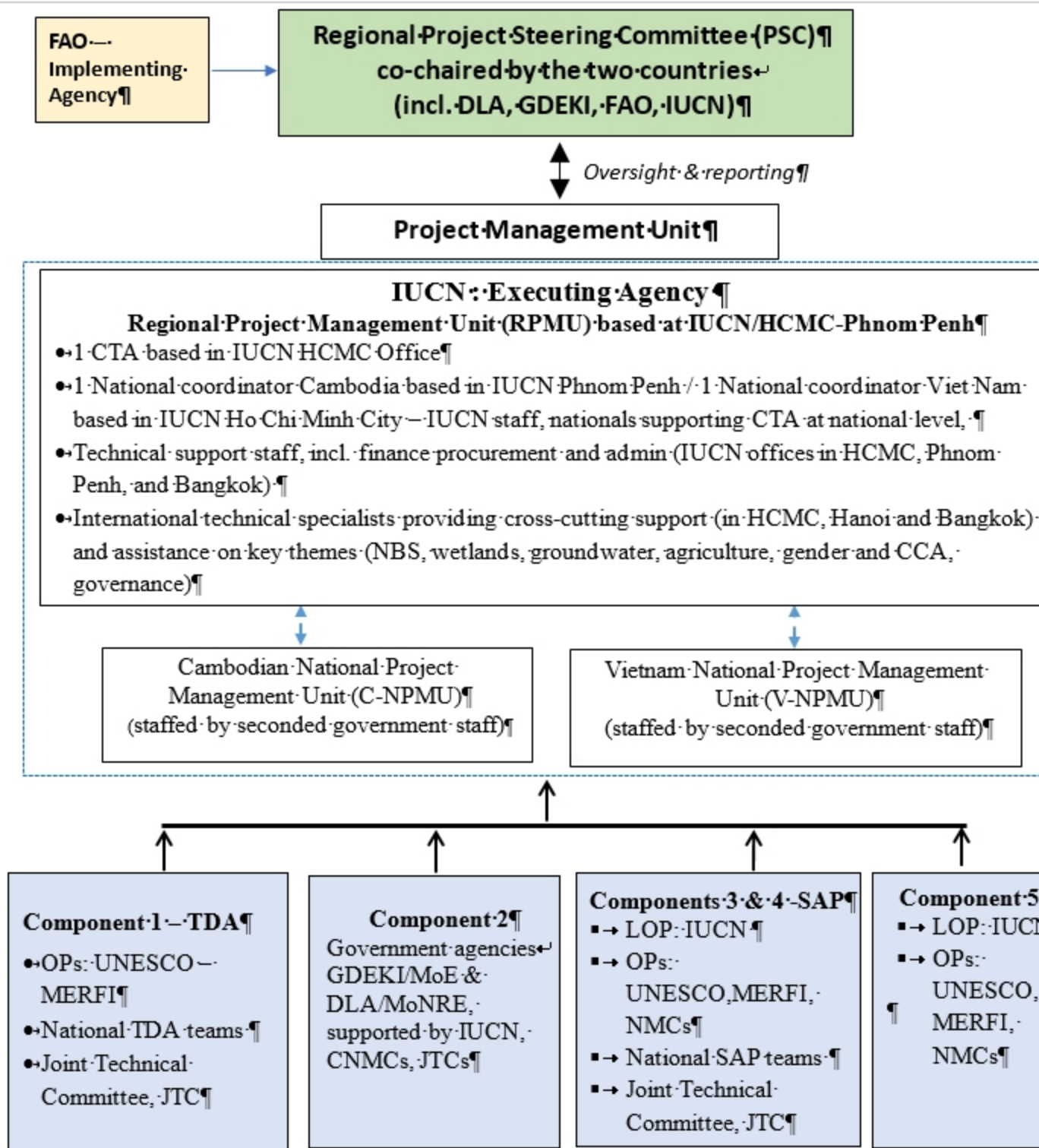


Figure 1: Execution arrangement scheme (Created by authors)

FAO is the implementing agency and has the ultimate responsibility to GEF for delivering all milestones according to work plan. The GEF will make its payments based on these milestones. It should be noted that

the identified Operational Partner(s) or OP results to be implemented by the OP and budgets to be transferred to the OP are non-binding and may change due to FAO internal partnership and agreement procedures which have not yet been concluded at the time of submission of this funding proposal.

Figure 1 visualises the institutional arrangements for this projects according to GEF and FAO rules and considering the transboundary groups the project aims to establish. Component 1 (TDA) will be conducted by two national teams of consultants. An international team of experts designs and reviews the national assessments across a range of relevant disciplines, and will then synthesise the national assessments into a transboundary assessment report. This component will also include an assessment of pilot project ideas to inform the selection of pilots for Component 2. Components 3 and 4 cover the various steps of the SAP process, starting with the establishment of the Joint Technical Committee(s) (JTC), the Transboundary Consultation and Coordination Body (TCCB), and the Interministerial Committee (IMC). These groups are meant to create a sustainable structure that maintains transboundary management of the CMDA beyond the lifetime of the project. The JTC will be involved in the TDA and in the SAP while the TCCB and the IMC will mainly be involved in the SAP (Components 3 and 4). The SAP steps will involve a visioning process for the transboundary context of the CMDA followed by the drafting of strategic actions, which will be prioritized and tested in pilots based on TDA results and recommendations from Component 1. Component 5 will provide project wide support by delivering on cross-component activities, including capacity building, gender mainstreaming, and communication.

IUCN will have the executing and technical responsibility for the project, with FAO providing oversight as GEF Agency as described below. IUCN will act as the lead executing agency and will be responsible for the day-to-day management of project results entrusted to it in full compliance with all terms and conditions of the Operational Partnership Agreement to be signed with FAO. As Lead Operational Partner (LOP) of the project, IUCN is responsible and accountable to FAO for the timely implementation of the agreed project results under its direct responsibility, and in collaboration with UNESCO for their inputs, coordination among all operational partners and contractors, operational oversight of implementation activities, timely reporting, and for effective use of GEF resources for the intended purposes and in line with FAO and GEF policy requirements.

IUCN's major responsibilities are:

1. Management: set up and operationalize the Regional Project Management Unit (RPMU) to be based in HCMC or Phnom Penh, and oversee all project activities, liaise with FAO and coordinate with other OPs and development partners, set up and operationalize the Regional Project Steering Committee (PSC), handle technical and financial reporting, facilitate national and transboundary coordination across multiple stakeholders.
2. Technical: play supporting technical role in the TDA/SAP to ensure that these processes and outputs meet GEF standards, integrate the latest knowledge and expertise into the TDA/SAP and pilot projects so that they are mutually reinforcing, ensure that TDA/SAP are aligned and coordinated with relevant institutional reforms, provide direct technical expertise on water governance and on nature-based solutions (NbS) including FLR and EBA, design and lead training programmes in both countries.

3. Procurement: recruit Chief Technical Advisor (CTA), National Project Coordinators (NPCs), and other positions described in the prodoc, contract MERFI, CNMC and VNCM and individual consultants needed to deliver successful TDA/SAP and pilot projects, and ensure compliance with FAO and GEF guidance as well as IUCN procurement rules.

In addition to playing the lead management and procurement role, IUCN will provide technical expertise in the following areas: water governance and policy, agro-ecology (agriculture/aquaculture, climate change, NbS, landscape restoration), hydrology (agriculture, irrigation, and IWRM), ecology (biodiversity and wetlands) and gender. IUCN will source this expertise from existing in-country and regional staff. The ability to 'buy into' existing capacity enhances IUCN's contribution in terms of both technical expertise and value for money.

A National Project Director (NPD) will be designated by each government. Located in GDEKI, Cambodia and in DLA, Viet Nam respectively, the NPDs will be responsible for coordinating the activities with all the national bodies related to the different project components, as well as with the project partners. They will also be responsible for supervising and guiding the Project Coordinator on the government policies and priorities. The NPDs in each country will co-chair the Regional Project Steering Committee (PSC) which will be the main governing body of the project.

A regional Project Steering Committee (PSC) will be established to provide strategic guidance to the Project Management Unit and to all executing partners and take decisions related to the project implementation including approval of annual work plans and budgets and revisions on an annual basis. The PSC will be comprised of representatives from DLA, GDEKI, FAO and IUCN. The NPD in each country will co-chair the Regional Project Steering Committee (PSC) which will be the main governing body of the project.

The members of the PSC will each assume the role of a Focal Point for the project in their respective agencies. Hence, the project will have a Focal Point in each concerned institution. As Focal Points in their agency, the concerned PSC members will: (i) technically oversee activities in their sector; (ii) ensure a fluid two-way exchange of information and knowledge between their agency and the project; (iii) facilitate coordination and links between the project activities and the work plan of their agency; and (iv) facilitate the provision of co-financing to the project.

The RPMU CTA and NPCs will serve as Secretaries to the PSC. The PSC will meet at least twice per year to ensure:

- i) Oversight and assurance of technical quality of outputs;
- ii) Close linkages between the project and other ongoing projects and programmes relevant to the project;
- iii) Timely availability and effectiveness of co-financing support;
- iv) Sustainability of key project outcomes, including up-scaling and replication;
- v) Effective coordination of governmental partners work under this project;

vi) Approval of the six-monthly Project Progress and Financial Reports, the Annual Work Plan and Budget;

vii) Making by consensus, management decisions when guidance is required by the National Project Coordinator of the PMU.

A Project Management Unit (PMU) consists of the RPMU and the two National PMUs (NPMU). The PMU will be co-funded by the GEF grant.. The RPMU will be located in HCMC, the Vietnam NPMU (V-NPMU) will be based in Hanoi, and the Cambodian NPMU (C-NPMU) will be based in Phnom Penh. The main functions of the PMU, following the guidance of the Project Steering Committee, are to ensure overall efficient management, coordination, implementation and monitoring of the project through the effective implementation of the annual work plans and budgets (AWP/Bs). The RPMU will be composed of an international CTA, two National Project Coordinators (NPCs), Technical Support Officers, including Finance, Administration and procurement officers, who will work for the project lifetime to coordinate the components implemented by other Operational Partners (Component 1,3,5).

The CTA, NPCs and UNESCO Technical Advisor and Technical Project Officers will oversee daily implementation, management, administration and technical supervision of the project, on behalf of the Operational partners and within the framework delineated by the PSC. They will be responsible, among others, for:

i) Overall technical lead for the implementation of all project outputs and activities and ensure technical soundness of project implementation;

ii) Coordination and close monitoring of the implementation of project activities;

iii) Coordination with relevant initiatives;

iv) Ensuring a high level of collaboration among participating institutions and organizations at the national and local levels;

v) Ensuring compliance with all Operational Partners Agreement (OPA) and the UN to UN agreement provisions respectively during the implementation, including on timely reporting and financial management;

vi) Tracking the project's progress and ensuring timely delivery of inputs and outputs;

vii) Providing technical support and assessing the outputs of the project national consultants hired with GEF funds, as well as the products generated in the implementation of the project, including knowledge management and communication outputs;

viii) Approving and managing requests for provision of financial resources using provided format in OPA annexes;

ix) Monitoring financial resources and accounting to ensure accuracy and reliability of financial reports;

- x) Ensuring timely preparation and submission of requests for funds, financial and progress reports to FAO as per OPA reporting requirements;
- xi) Maintaining documentation and evidence that describes the proper and prudent use of project resources as per OPA provisions, including making available this supporting documentation to FAO and designated auditors when requested;
- xii) Implementing and managing the project's monitoring and communications plans;
- xiii) Organizing project workshops and meetings to monitor progress and preparing the Annual Budget and Work Plan;
- xiv) Submitting the six-monthly Project Progress Reports (PPRs) with the AWP/B to the PSC and FAO;
- xv) Preparing the first draft of the Project Implementation Review (PIR);
- xvi) Supporting the organization of the mid-term and final evaluations in close coordination with the FAO Budget Holder and the FAO Regional Evaluation Specialist under the guidance of FAO Independent Office of Evaluation (OED);
- xvii) Submitting the OP required technical and financial reports to FAO and facilitate the information exchange between the OP and FAO, if needed;
- xviii) Informing the PSC and FAO of any delays and difficulties as they arise during the implementation to ensure timely corrective measure and support.
- xix) Providing draft terminal report for BH two months before the ending date of the OPA or the project;
- xx) Leading and supervising the preparation of various technical outputs, e.g. knowledge products, reports and case studies;

FAO will be the GEF Implementing Agency (IA) for the Project, providing project cycle management and support services as established in the GEF Policy. As the GEF IA, FAO holds overall accountability and responsibility to the GEF for delivery of the results. In the IA role, FAO will utilize the GEF fees to deploy three different actors within the organization to support the project (see Annex J for details):

- The Budget Holder, the FAO Assistant Director General, Regional Office Asia and the Pacific (RAP), will provide oversight of day to day project execution;
- The Lead Technical Officer from FAO's Regional Office for Asia and the Pacific, in collaboration with experts drawn from across FAO will provide oversight/support to the projects technical work in coordination with government representatives participating in the Project Steering Committee;
- The Funding Liaison Officer(s) within FAO will provide oversight support the project cycle to ensure that the project is being carried out and reporting done in accordance with agreed standards and requirements.

FAO responsibilities, as GEF agency, will include:

- Administrate funds from GEF in accordance with the rules and procedures of FAO;
- Oversee project implementation in accordance with the project document, work plans, budgets, agreements with co-financiers, Operational Partners Agreement(s) and other rules and procedures of FAO;
- Provide technical guidance to ensure that appropriate technical quality is applied to all activities concerned;
- Conduct at least one supervision mission per year; and
- Report to the GEF Secretariat and Evaluation Office, through the annual Project Implementation Review, the Mid Term Review, the Terminal Evaluation and the Project Closure Report on project progress;
- Financial reporting to the GEF Trustee.

TORs of key staff and consultants to be hired by the project are included in **Annex R**. Terms of Reference of key staff and consultants.

IUCN's executing experience and capacity

IUCN has recent and ongoing experience and capacity to implement and execute GEF projects and transboundary dialogues in the Mekong Region.

1) In Myanmar, IUCN is the GEF Implementing Agency for the GEF 6 project 'Reversing Myanmar's forest degradation and deforestation and restoring forest landscapes through local multi-stakeholder co-management' 2019 and 2023. This is a child project of the GEF global project The Restoration Initiative (TRI) programme. The overall goal is to contribute to the restoration and maintenance of critical landscapes to provide global environmental benefits and enhanced resilient economic development and livelihoods, in support of the Bonn Challenge.

Programme Components:

Component 1. Policy Development and Integration

Component 2. Implementation of Restoration Programs and Complementary Initiatives

Component 3. Institutions, Finance, and Upscaling

Component 4. Knowledge, Partnerships, Monitoring and Assessment

2) IUCN also serves as GEF IA for the regional peatlands project 'Sustainable Management of Peatland Ecosystems in Mekong Countries' 2019 and 2023. The project is being executed in the 3 countries of Myanmar, Cambodia, and Lao PDR. The Lao executing agencies include DWR and the LNMC in

MONRE. The goal of the project is to sustainably manage peatland ecosystems in the target countries and to conserve biodiversity and reduce greenhouse gas (GHG) emissions, by:

1. Expanding the network of protected peatland ecosystems in the countries in line with Aichi Target 11;
2. Strengthening the capacity for sustainable peatland management at local, national and sub-regional levels; and
3. Strengthening the management of peatland in existing protected areas to demonstrate sustainable management of peatland to conserve biodiversity, reduce GHG emissions and strengthen sustainable livelihoods for local communities.
4. IUCN has been designated as LOP for three GEF IW projects: 'Fostering Water and Environmental Security in the Ma and Neun/Ca Transboundary River Basins and Related Coastal Areas' between Viet Nam and Lao PDR; 'Promoting the Blue Economy of the Gulf of Thailand through the Ecosystem Approach to Fisheries' between Viet Nam, Cambodia, Thailand, and Malaysia; and the 'Bay of Bengal Large Marine Ecosystem'. FAO serves as IA for all three projects.

UNESCO's executing experience and capacity

UNESCO's Intergovernmental Hydrological Programme (IHP) is the only intergovernmental programme of the UN system devoted to the scientific, educational and capacity building aspects of hydrology. UNESCO has long recognized the importance of hydrology for the rational utilization of water resources. Since its inception in 1975, IHP has evolved from an internationally coordinated hydrological research programme into a comprehensive programme to facilitate education and capacity building, and enhance water resources management and governance. Originally implemented in six-year phases and now in eight-year phases since 2014, IHP stimulates and encourages hydrological research, and assists Member States in research and training activities. IHP facilitates an interdisciplinary and integrated approach to watershed and aquifer management, which incorporates the social dimension of water resources, and promotes and develops international research in hydrological and freshwater sciences.

UNESCO-IHP works to build the scientific knowledge base to help countries manage their water resources in a sustainable way through a global network that includes:

1. **Affiliated research centers:** 29 water-related research centers are working under the auspices of UNESCO on relevant thematic and geographic priorities in their areas of expertise. Four of these centers are focused on groundwater, namely the International Groundwater Resources Assessment Centre (**UN-IGRAC**) in Netherlands, the Regional Centre for groundwater management for Latin America and the Caribbean (**CEREGAS**) in Uruguay, Regional Centre for Shared Aquifer Resources Management (RCSARM) in Libya and the Regional Centre on Groundwater Resources Education, Training and Research in East Africa (RCGRE) in Kenya.
2. **Water-related chairs:** Chairs serve as think tanks and as bridge builders between academia, civil society, local communities, research and policymakers. Chairs are hosted at universities, and promote

international inter-university cooperation and networking to enhance institutional capacities through knowledge sharing and collaborative work.

3. UNESCO- LASII (Land Subsidence International Initiative). It involves scientists from 15 countries (from all the continents) and have organized studies and international symposia on the topic since the mid-1980s. In this project the member from the University of Padova, Department of Civil, Environmental and Architectural Engineering (UP-DICEA), Italy, and the Wageningen University, Soil Geography and Landscape group (WU-SGLG), The Netherlands, will be specifically involved in the development of the dynamic modelling activities and training Cambodian and Vietnamese experts.

Groundwater related activities

Within UNESCO-IHP Secretariat, the Groundwater Systems and Settlements Section is responsible for groundwater-related activities. The work of the GSS section is articulated along 5 focal areas, listed below.

- Focal Area - Enhancing sustainable groundwater resources management
- Focal Area - Addressing strategies for Management of Aquifer Recharge (MAR)
- Focal Area - Adapting to the impacts of climate change on aquifer systems.
- Focal Area - Promoting groundwater quality protection
- Focal Area - Promoting management of transboundary aquifers

UNESCO-IHP has been involved as executing partner in the following GEF projects:

- DIKTAS I - GEF / UNDP (2010-2015): Development of Transboundary Diagnostic Analysis; Identify Baseline conditions, and environmental status indicators; establishing multi-country consultative body; adopt water resources and environmental quality targets; establish ad-hoc inter-ministerial committees.
- DIKTAS II - GEF / UNDP (2020-2025): Setting the basis of sound groundwater governance in the Dinaric Karst region. catalyze effective multi-country cooperation for the sustainable management of the Dinaric Karst Aquifer System and its ecological resources by strengthening national and regional groundwater governance frameworks and institutional capacity.
- Nubian - GEF / UNDP (2018-2022): Initiate regional SAP implementation through legal, policy and institutional reforms and addressing gaps identified in the SAP, supporting rational and equitable integrated management, socio-economic development and the protection of the ecosystem and resources of the NSAS in the four Nubian Countries
- Med I (Child Project 1.1) - GEF / UNEP/MAP (2010-2015): Assessing the risks to coastal aquifers and associated uncertainties, the preparation of sub-regional action plans, demonstrations in collaboration with ICZM, Integrated Water Resources Management (IWRM) and Marine Protected Areas and the identification of the legislative, policy and institutional reforms needed in 13 Mediterranean countries.
- Med II (Child Project 2.1) - GEF / UNEP/MAP (2020-2025): Operationalize priority actions to reduce major transboundary environmental stresses in its coastal areas while strengthening climate resilience and water security and improving the health and livelihoods of coastal populations of 9 Mediterranean countries.

- GWG (Groundwater Governance) - GEF/FAO/World Bank/IAH (2011-2014): First Phase: Review of the global situation of groundwater governance and aimed to develop a Global Groundwater Diagnostic integrating regional and country experiences with prospects for the future. Second Phase: develop a Global Framework for Action consisting of a set of policy and institutional guidelines, recommendations and best practices designed to improve groundwater management at country/local level, and groundwater governance at local, national and transboundary levels.
- Bug and Neman - GEF / UNDP (2019-2023): Improve and harmonize the countries' knowledge of the transboundary water resources, and of the expected impacts of increased climate variability and change. Facilitating the establishment of cooperation mechanisms and institutions among countries sharing the basins and their water resources. Testing of conjunctive surface and groundwater management approaches, through the application of the principles of eco-hydrogeology. Facilitating countries' commitment to joint priority actions. Communication, Dissemination and Replication Activities
- ITTAS GEF/UNEP ? (2019-2023): The full-size project aims at improving knowledge-based management, governance and resources conservation of the Niger Basin and the Iullemeden-Taoudeni/Tanezrouft Aquifer System (ITTAS) to support Integrated Water Resources Managements (IWRM) for the benefit of communities and the resilience of ecosystems.
- TWAP - GEF / UNEP IGRAC (2012-2015): Assessing 199 transboundary aquifers and 43 Small Island Developing States. collect data and information management, while designing and development of software specifications for the TWAP Groundwater Information Management System. Co-organizing and presenting at regional workshops. Participation in the cross-cutting working groups on governance and data and information management.
- DRIN ? GEF/UNDP, GWP-MED (2018-2020): Executing a pilot project with the aim to design and pilot test a modern multi-purpose transboundary groundwater monitoring network and related proposal of monitoring and data collection.

UNESCO World Water Assessment Programme ([UNESCO-WWAP](#))

UNESCO World Water Assessment Programme aims at monitoring freshwater issues in order to provide recommendations, develop case studies, enhance assessment capacity at regional and national level, and inform decision-making processes. WWAP's primary product, the United Nations World Water Development Report (WWDR), is an annual and comprehensive review providing an authoritative picture of the state of the world's freshwater resources. Another WWAP's objective is to help bridge the gap in gender data and advance gender equality and women's empowerment. WWAP's methodology on the collection of sex-disaggregated water data with the use of gender-responsive indicators ([UNESCO WWAP 2019 Toolkit on Sex-disaggregated Water Data](#)), plays a significant role in overcoming the gender data gap. The capacity development programme is designed to strengthen skills in collecting and analyzing sex-disaggregated water data to inform policy making, and water planning.

Related publications:

-[Tool 1 ?Gender-responsive indicators for water assessment, monitoring and reporting?](#) features 105 gender-responsive indicators in 10 priority topics aligned with the 2030 Agenda (water governance; WASH; knowledge resources; transboundary water management; water for agriculture; water for industry

and enterprise; human rights-based water resources management; water, migration, displacement, and climate change; indigenous knowledge and community water rights; water education and training).

-[Tool 2 ?Methodology for the collection of sex-disaggregated water data?](#) describes the methodological approaches and concepts collecting good quality data.

-[Tool 3 ?Guidelines on the collection of sex-disaggregated water data?](#) covers data collection methods for different users and different geographic regions.

-[Tool 4 ?Questionnaire for the collection of sex-disaggregated water data?](#) lists 364 questions with instructions for developing surveys and interviews to collect qualitative and quantitative data in the field.

UNESCO-WWAP will be responsible for all gender activities, including gender analysis and action plan, working across all components to mainstream gender across all project activities.

MERFI's executing experience and capacity

MERFI, established in 2015, is specialised in transboundary water management and its leadership team draws their expertise from both global and international transboundary water management initiatives. MERFI and its staff have implemented and been involved in water-related projects across the region, including specifically in Cambodia, Viet Nam and with the MRC. MERFI was the first group in the world to conduct an applied Nexus assessment, which focused on hydropower development and the expansion of irrigation areas and involved a range of stakeholders from Cambodia and Viet Nam.

MERFI is also highly experienced in conducting visioning processes for transboundary water management and climate adaptation across the Asia Pacific. Over the past 15 years, it has implemented several visioning processes in Cambodia and Viet Nam with a wide range of stakeholders, including provincial and central government agencies, and non-government stakeholders. MERFI's mandate is not limited to policy focused research but has also a strong focus on capacity building.

MERFI implemented a number of participatory TDA-SAP type processes in Cambodia and Viet Nam involving many provincial and central government agencies. This includes the so-called MRC Council Study (2017-18), for which MERFI contributed the socio-economic, macro-economic, cumulative impact assessments, and advised the overall technical coordination of the multidisciplinary team. MERFI also conducted TDA-type assessments for various sub-basins in the Mekong basin, including the Tonle Sap and parts of the Mekong Delta. More recently, MERFI developed an integrated assessment model for the MRC and the NMCs (2019-2020), the Mekong Region Simulation model (MerSim) that is focused on simulating the impact of alternative development trajectories informing a wide array of socio-economic indicators, which have been derived from the UN SDGs and contextualised for the Mekong basin during a participatory process with the NMCs.

6.b Coordination with other relevant GEF-financed projects and other initiatives.

The GEF IW project will be closely coordinated with the other GEF projects listed in the table below, through the knowledge exchange mechanisms proposed under section 8, as well as through periodic meetings between their respective implementation teams. This coordination will further be facilitated by the fact that many of the same national institutions are engaged in the different projects.

Coordination will focus on the following issues:

- Exchange of knowledge and results on ecosystem management options with potential for inclusion in pilots and for subsequent application and scaling out;
- Coordination of watershed management actions in order to optimize aquifer recharge potential;
- Consistency and complementarity with institutional capacity enhancement activities addressing shared institutional stakeholders;
- Consistency and complementarity with work on policy and planning processes with relevance to natural resources and groundwater management.

Regarding the coordination with non-GEF investments, the PMU will work in Viet Nam primarily, but not exclusively, through the Mekong Delta Development Partners Working Group (MDWG) to share information and to coordinate the project with the baseline projects. IUCN is a founding member of the (MDWG) and an active member of the group. The MDWG is currently co-chaired by the World Bank and the Netherlands. As stated in its ToR, the stated objective of the MDWG is to ? ? enhance the coordination, complementarity and coherence of the efforts by the Government of Vietnam and Development Partners to improve the climate resilience of the Mekong Delta.? (MDWG Terms of Reference, 17 Dec 2015).

In Cambodia, IUCN will seek to establish a similar development partners working group for the Cambodian Mekong Delta among development partners in Cambodia. The initiative is currently being discussed with the ADB.

GEF ID, funding source, implementing agency, title and status	Objective/summary
<p>GEF ID 10177 (LDCF, FAO):</p> <p>Promoting Climate-Resilient Livelihoods in Rice-Based Communities in the Tonle Sap Region (Cambodia).</p> <p>Under preparation.</p>	<p>Rice based communities in the Tonle Sap region of Cambodia reduce their climate vulnerability and increase their resilience to climate change through an ecosystem based, market driven approach</p>
<p>GEF ID 9927 (GEFTF multi-focal, UNEP):</p> <p>Building Resilience of Cambodian Communities Using Natural Infrastructure and Promoting Diversified Livelihood (Cambodia).</p> <p>Under implementation.</p>	<p>Addressing the challenges of water resources management as a contribution to the water, food, energy, ecosystem security nexus by restoring and protecting mangroves, making the business case for natural infrastructure in order to build resilience and improve livelihoods in the Prey Nob region (Cambodia)</p>
<p>GEF ID 4945 (GEFTF multi-focal, UNDP): Collaborative Management for Watershed and Ecosystem Service Protection and Rehabilitation in the Cardamom Mountains, Upper Prek Thnot River Basin (Cambodia)</p> <p>Under implementation</p>	<p>To restore and maintain forest cover and watershed stability functions while providing for sustainable livelihoods and ecosystem services in the Upper Prek Thnot Watershed</p>

<p>GEF ID 9232 (GEFTF multi-focal, IUCN):</p> <p>Sustainable Management of Peatland Ecosystems in Mekong Countries (Regional)</p> <p>Under implementation.</p>	<p>To sustainably manage peatland ecosystems in targeted countries and to conserve biodiversity and reduce GHG emissions</p>
<p>GEF ID 9265 (GEFTF multi-focal, World Bank): Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project (Viet Nam)</p> <p>Under implementation.</p>	<p>To enhance tools for climate-smart planning and improve climate resilience of land and water management practices in selected provinces of the Mekong Delta in Viet Nam.</p>
<p>GEF ID 10245 (GEFTF multi-focal/FOLUR IP, FAO):</p> <p>Integrated Sustainable Landscape Management in the Mekong Delta (Viet Nam)</p> <p>Under preparation</p>	<p>To support the transformation of rice-dominated landscapes in the Mekong Delta towards sustainable, adaptive and resilient models of production and landscape management that deliver multiple environmental and social benefits</p>

7. Consistency with National Priorities

Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

Viet Nam's Government 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.

The project is also consistent with the Mekong Delta Integrated Regional Planning in period 2021-2030 and its vision to the year 2050 (MDIRP), which integrates a range of national priorities including freshwater fisheries, aquaculture and wetlands protection. The MDIRP constitutes the planning framework for Viet Nam's Mekong Delta. In regards to fisheries the MDIRP specifies that areas suitable for aquaculture will be prioritized for conversion to aquaculture, particularly focusing on the sustainable production of shrimp and pangasius. The MDIRP emphasizes the need to identify new aquaculture options to further diversify livelihoods and to promote biodiversity, and to limit extensive shrimp farming in coastal mangrove forests where it seriously affects the protection value and biodiversity and ecosystem of mangroves. The MDIRP highlights that the protection and regeneration of aquatic resources and restoration of habitats of native aquatic species is paramount. The MDIRP also defines critical strategies for wetlands as it requires local governments to restore biodiversity of terrestrial and aquatic ecosystems by establishing important wetlands and other areas of high biodiversity. The project will support the MDIRP's fisheries and wetlands focused strategies by assessing groundwater related implications.

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. To ensure efficient water uses and effective water management including groundwater in Cambodia, the 'Law on water resources management in Cambodia' has come into force on 29 June 2007. Subsequently, 5 sub-decrees supporting the law of 2007 have been developed by MOWRAM to support the implementation of water law of 2007. 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). Recently, to promote safe water supply and sanitation, the national law on 'the water supply and sanitation regulatory law for Cambodia' has been prepared. To mitigate water pollution of both surface and groundwater, MoWRAM has prepared and endorsed the [Sub-decree #27 on Water Pollution Control since 1999](#). Recently, to protect, conserve and maintain groundwater resources in Cambodia for sustainable long-term uses, MoWRAM developed the 'National strategy on groundwater in Cambodia' and it is expected that this important document will be approved officially by the RGC in 2021. To reduce the degradation of environmental assets and the loss of important conservation zones in Cambodia, the [Law on Environmental Protection and Natural Resource Management](#) has been approved by the national assembly of Cambodia and has been published in 1996 by RGC.

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, wetlands, mountains and drylands, in line with obligations under international agreements

With regard to fisheries focused policies, the policy is fully supportive and consistent with Cambodia's priorities. The enactment of the 2006 Fisheries Law represented a positive step towards better fisheries management, including the conservation of fish and their natural habitats. The new 125-article law replaces the outdated 1987 Fisheries Law. The 2006 Fisheries Law encourages the creation and proper maintenance of conservation area and promotes the development of aquaculture. It also aims to ensure long-term conservation and sustainable management of fishery resources considering social, economic and environmental factors.

The promotion of aquaculture is outlined in the National Aquaculture Development Strategy (NADS). The goal of NADS is a commercially viable and environmentally sustainable aquaculture sector contributing to food security and nutrition, socioeconomic development, GDP and export earnings. NADS strategies include the 'increase access to sufficient and consistent supplies of high-quality water, and to reduce flood risks' and to 'maintain environmental quality', which are both aligned with the project's goals.

The strategic planning framework for fisheries (2015-2024) defines the better management of fish stocks and aquaculture as an overarching national priority. The earlier Strategic Planning Framework for Fisheries (2010-2019) was fully adopted by the Royal Government of Cambodia, and subsequently integrated into the 'Rectangular Strategy' for Growth, Employment, Equity and Efficiency Phase III (RS III) and the National Strategic Development Plan 2014-2018 (NSDP). Further, the Strategic Planning Framework for Fisheries is closely linked to the Agriculture Sector Strategic Development Plan (ASDP), of which the fisheries programme represents the National Fisheries Management Plan.

In regards to wetland management in Cambodia the National Protected Area Strategic Management Plan (NPASMP) 2017-2031 is the first comprehensive strategy document for protected areas in Cambodia and aims for improving the nation's climate-resilience. Also relevant for wetland management is the Law on Environmental Protection and Management of Natural Resources (LEPMNR) (1996) influence the management of Cambodia's protected areas. The project is fully consistent with the NPASMP and the LEPMNR.

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 maximize synergies created by the proposed projects.

8. Knowledge Management

Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.

The following main needs for knowledge management (KM) have been identified in relation to the project:

- Collection, organization of existing knowledge on biophysical, productive and socioeconomic conditions in the CMDA and related ecosystems, and its input into the formulation of the TDA.
- Organization, analysis and interpretation of knowledge generated through the proposed pilots, and its channeling in support of the development and subsequent application of the SAP.
- Channeling of knowledge generated through the proposed pilots to stakeholders, to allow their scaling out across the region in parallel with and beyond the process of SAP formulation.
- Monitoring of trends in conditions and of the effectiveness of management strategies in the CMDA and its related ecosystems, and management of the resulting knowledge in order to guide the adaptive formulation and implementation of the SAP.
- Sharing of knowledge on challenges, strategies and results related to the management of the CMDA and related ecosystems across the GEF IW portfolio.

In line with FAO's Knowledge Strategy (2011) and GEF's Knowledge management Approach (2015), these KM needs will be met through the following strategies:

- 1) Collaborative and participatory formulation of protocols for monitoring (including environmental quality indicators) and the processing, management and exchange of data;
- 2) The full engagement of institutional and local stakeholders in the formulation and management of pilots, in order to maximize their receptiveness to information on their results; and in the definition of indicators and design of corresponding monitoring protocols, in order to foment their adoption, application and sustained application;
- 3) Targeted capacity enhancement of key stakeholders (based on capacity needs assessment at project start), in order to raise their receptiveness and ability to receive, manage, digest and apply knowledge;
- 4) Engagement of national and regional academic and research institutions, in the collation and generation of knowledge, in its dissemination (through educational curricula and training events), and as repositories of knowledge generated through the project (in Viet Nam, advantage will also be taken of the Mekong Delta Centre, being established through the World Bank/MONRE ICRSL project, as a knowledge hub);

- 5) Regular knowledge outreach, through printed and on-line publications and periodic stocktaking and dissemination meetings;
- 6) Orientation on the format and content of the TDA and SAP in order to optimize their accessibility and utility to stakeholders as sources of relevant and applicable knowledge.
- 7) Contribution to GEF IW:LEARN and Kaleo resources
- 8) Participation in GEF IW:LEARN, including participation of project members and stakeholders in international conferences (<https://iwlearn.net/events/conferences>) and the preparation and sharing of experience notes (<https://iwlearn.net/documents/experience-notes>)

9. Monitoring and Evaluation

Describe the budgeted M and E plan

The project will ensure transparency in the preparation, conduct, reporting and evaluation of its activities. This includes full disclosure of all non-confidential information, and consultation with major groups and representatives of local communities. The disclosure of information shall be ensured through posting on websites and dissemination of findings through knowledge products and events. Project reports will be broadly and freely shared, and findings and lessons learned made available.

Project oversight will be carried out by the Project Steering Committee (PSC), and FAO (BH, supported by the PTF, LTO and FLO and relevant technical units in FAO headquarters as needed). Oversight will ensure that: (i) project outputs are produced in accordance with the project results framework leading to the achievement of project outcomes; (ii) project outcomes are leading to the achievement of the project objective; (iii) risks are continuously identified and monitored and appropriate mitigation strategies are applied; and (iv) agreed upon project global environmental benefits/adaptation benefits are being delivered. The FAO Project Task Force and FAO GEF Coordination Unit will provide oversight of GEF financed activities, outputs and outcomes largely through the annual Project Implementation Reports (PIRs), periodic backstopping and supervision missions.

Project monitoring will be carried out by the PMU. Project performance will be monitored using the project results matrix, including indicators (baseline and targets) and annual work plans and budgets. A detailed M&E plan, which builds on the results matrix and defines specific requirements for each indicator (data collection methods, frequency, responsibilities for data collection and analysis, etc.) will also be developed during project inception by the M&E Consultant.

GEF Core Indicators: The project will use the GEF7 core indicators and report against them during MTR and final evaluation.

Lessons learned and knowledge generation: Results from the project will be disseminated within and beyond the project intervention area through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to the project. The project will identify, analyze and share lessons learned that might be beneficial to the design and implementation of similar projects and disseminate these

lessons widely. There will be continuous information exchange between this project and other projects of similar focus in the same country, region and globally.

Project Monitoring and Evaluation Plan

Table 1 below summarises the project monitoring and evaluation plan and budget.

Table 1: monitoring and evaluation plan and budget

M&E Activity	Responsible Parties	Timeframe	GEF Budget (USD)
Inception Workshop	IUCN and FAO	Within two months of project document signature	Online
Project Progress Reports (PPRs)	IUCN and FAO	Bi-annually	M&E Specialist USD 180,000 full duration of project and travel 70,000
Project Implementation Review reports (PIRs)	IUCN and FAO	Annually in July	Covered by above
Independent Mid-term Review	FAO	In the 3 rd quarter of the 2 nd year of the project	50,000
Independent Terminal Evaluation	FAO	To be launched within six months prior to the actual project completion date	70,000
Terminal Report	FAO	Two months before the end date of the project	6,550
Total Budget			376,550

Specific reports that will be prepared under the M&E program are: (i) Project inception report; (ii) Annual Work Plan and Budget (AWP/B); (iii) Project Progress Reports (PPRs); (iv) annual Project Implementation Review (PIR); (v) Technical Reports; (vi) co-financing reports; and (vii) Terminal Report. In addition, assessment of the relevant GEF-7 Core Indicators against the baselines will be required at mid-term and final project evaluation.

i) Project Inception Report. The PMU will prepare a draft project inception report in consultation with the LTO, BH and other project partners. Elements of this report should be discussed during the project Inception Workshop, to be held in the 1st quarter of project year 1 (PY1) and the report subsequently finalized. The report will include a narrative on the institutional roles and responsibilities and coordinating

action of project partners, progress to date on project establishment and start-up activities and an update of any changed external conditions that may affect project implementation. It will also include a detailed first year AWP/B and a draft M&E plan. The draft inception report will be circulated via e-mail to the PSC for review and comments before its finalization. The report should be cleared by the FAO BH, LTO and the FAO GEF Coordination Unit and uploaded in FAO's Field Program Management Information System (FPMIS) by the BH.

ii) Results-based Annual Work Plan and Budget (AWP/B). The draft of the first AWP/B will be prepared by the PMU in consultation with the FAO Project Task Force and reviewed at the project Inception Workshop. The Inception Workshop inputs will be incorporated and subsequently, the PMU will submit a final draft AWP/B to the BH within two weeks after the workshop. For subsequent AWP/B, the PMU will organize a project progress review and planning meeting for its progress review and adaptive management. Once PSC comments have been incorporated, the PMU will submit the AWP/B to the LTO for technical clearance, to the BH for non-objection, and the FAO GEF Coordination Unit for comments prior to uploading in FPMIS by the BH. The AWP/B must be linked to the project's Results Framework indicators to ensure that the project's work and activities are contributing to the achievement of the indicators. The AWP/B should include detailed activities to be implemented to achieve the project outputs and output targets and divided into monthly timeframes and targets and milestone dates for output indicators to be achieved during the year. A detailed project budget for the activities to be implemented during the year should also be included together with all monitoring and supervision activities required during the year.

iii) Project Progress Reports (PPR). PPRs will be prepared by the PMU based on the systematic monitoring of output and outcome indicators identified in the project's Results Framework (Annex A1). The purpose of the PPR is to identify constraints, problems, or bottlenecks that impede timely implementation and to take appropriate remedial action in a timely manner. PPRs will also report on the project's risks and implementation of the risk mitigation plan. The Budget Holder has the responsibility of coordinating the preparation and finalization of the PPR, in consultation with the PMU and the Project Task Force (PTF) members. After LTO, BH, and FLO clearance, the FLO will ensure that project progress reports are uploaded in FPMIS in a timely manner.

iv) Annual Project Implementation Review (PIR): The PMU, in collaboration with the BH and the LTO, will prepare an annual PIR covering the period July of the previous year through June of the current year. The PIR needs to be submitted to the FAO GEF Coordination Unit Funding Liaison Officer (FLO) for review and approval no later than end of June/early July each year (the exact timelines for submission are communicated each year by the GEF Coordination Unit). The PMU will submit the first PIR draft to FAO BH/LTO, once finalized, the BH/LTO will submit it to the FAO GEF Coordination Unit as part of the Annual Monitoring Review report of the FAO-GEF portfolio. PIRs will be submitted to the GEF and uploaded on the FPMIS by the FAO GEF Coordination Unit.

v) Technical Reports: Technical reports will be prepared by national, international consultants (partner organizations under OPA and other Agreements) as part of project outputs and to document and share project outcomes and lessons learned. The drafts of any technical reports must be submitted by the PMU to the BH who will share it with the LTO. The LTO will be responsible for ensuring appropriate technical review and clearance of said report. The BH will upload the final cleared reports onto the FPMIS. Copies

of the technical reports will be distributed to project partners and the Project Steering Committee as appropriate.

vi) Co-financing Reports: The BH, with support from the PMU, will be responsible for collecting the required information and reporting on co-financing as indicated in the Project Document/CEO Endorsement Request. The PMU will compile the information received from the executing partners and transmit it in a timely manner to the LTO and BH. The report, which covers the period 1 July through 30 June, is to be submitted on or before 31 July and will be incorporated into the annual PIR. The format and tables to report on co-financing can be found in the PIR.

vii) Terminal Report: Within two months before the end date of the project or the ending date of the project, the PMU will submit to the FAO BH and LTO a draft Terminal Report. The main purpose of the Terminal Report is to give guidance at ministerial or senior government level on the policy decisions required for the follow-up of the project, and to provide the donor with information on how the funds were utilized. The Terminal Report is accordingly a concise account of the main products, results, conclusions and recommendations of the project, without unnecessary background, narrative or technical details. The target readership consists of people who are not necessarily technical specialists but who need to understand the policy implications of technical findings and needs for ensuring sustainability of project results.

Evaluation Provisions

The BH will arrange an independent Mid-Term Review (MTR) in consultation with the PSC, the PMU, the LTO and the FAO-GEF Coordination Unit. The MTR will be conducted to review progress and effectiveness of implementation in terms of achieving project objective, outcomes and outputs. The MTR will allow mid-course corrective actions, if needed. The MTR will provide a systematic analysis of the information on project progress in the achievement of expected results against budget expenditures. It will refer to the Project Budget (see Annex A2) and the approved AWP/Bs. It will highlight replicable good practices and key issues faced during project implementation and will suggest mitigation actions to be discussed by the PSC, the LTO and FAO-GEF Coordination Unit.

As per the FAO policy on evaluation, the FAO Office of Evaluation (OED) will conduct an independent Terminal Evaluation (TE) of the project, to be launched within six months prior to the actual completion date (NTE date). It will aim at identifying project outcomes, their sustainability and actual or potential impacts. It will also have the purpose of indicating future actions needed to assure continuity of the process developed through the project. FAO Office of Evaluation will conduct the evaluation in consultation with project stakeholders and the donor, and share with them the evaluation report, which is a public document.

10. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

Under the project model, the delivery of improved global environmental benefits (in terms of improved biophysical conditions in the aquifer and its associated ecosystems, some of which are of global importance for biodiversity) will be inextricably accompanied by social benefits including the following:

- Improved access to adequate water of acceptable biological and chemical quality, by the approximately 2.5 million people who depend directly or indirectly on the aquifer;
- Sustainably improved availability of water required for economic activities, including for irrigated agriculture and industry, resulting in enhanced productive, employment and livelihood support opportunities;
- Reductions in the effects of aquifer decline on wetlands, resulting from improved management of the CMDA, will help to safeguard the livelihoods of wetland-dependent communities, especially those dependent on the fisheries sector;
- Improved management of the CMDA will also help to reduce the exposure of the region's population to environmental risks, especially subsidence-related flooding and sea water incursion in Viet Nam's portion;
- The above benefits will in turn contribute to the sustainability of livelihoods and, consequently, to demographic stability, thereby helping to address the environment-related drivers of human migration that currently causing social and environmental impacts across the region.

11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
Low			

Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

The project's objective is 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. The project has been assessed according to FAO's Environmental and Social risks, against several sets of relevant criteria including on: natural resources management; biodiversity, ecosystems and natural habitats; involuntary resettlement; decent work; gender equality and indigenous peoples. Risk assessment criteria involved, among others, potential degradation risks of key resources, land and water; water management practices that may have an impact on agriculture, environment and livelihoods, with subsequent socioeconomic impacts, also to vulnerable populations; access to water, potential increase in GHG emissions. It also considered potential impacts on indigenous peoples, as well as into gender equality. Taking into consideration, the project ranked as low-risk. The project formulation team has not identified any further risks during the development of the FSP. In fact, the project is expected to positively impact the populations in the CMDA area, by improving water governance and showcase solutions through the pilot applications for sustainable water use of shared water resources. During the project implementation, any potential risks identified, will be considered by the Project Steering Committee and the PMU and relevant technical experts will due action to mitigate these.

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
ESS Certificate	CEO Endorsement ESS	

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

[illegible]

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Component 1: Joint science-based diagnostic for groundwater dynamics (recharge and extraction) and effects on ecosystems (e.g. fish, wetlands) and livelihoods							
<u>Outcome 1:</u> Consensus among countries on key transboundary and national concerns affecting the aquifer, reached through joint fact finding, opening pathways to concerted remedial actions.	<i>TDA and the Environmental Status Indicators (ESI) endorsed by the countries? representatives in the Steering Committee.</i>	<i>Knowledge on the TBA is uneven between the countries and transboundary implications have not been assessed nor agreed upon.</i>	<i>Finalization of the assessment of the aquifer's water resources current state and projected scenarios, as well as of the evaluation of dependent ecosystems.</i>	<i>TDA with corresponding Environmental Status Indicators submitted for endorsement to the Steering Committee.</i>	<i>Minutes of the relevant SC meeting approving TDA</i>	<i>Effective and inclusive involvement by target stakeholders, local communities and the inhabitants of the aquifer area reached throughout project implementation</i>	<i>National executing partners and Joint Technical Committee</i>
Output.1.1 Assessment of current state of groundwater resources, recharge and extraction dynamics.	Assessment report submitted for SC approval F/M participation of officials from relevant ministries and institutions in the Assessment Team	Only fragmented and sectoral sets of data exist so far.	Assessment report cleared by the JTC. Availability of a state of the art model of the aquifer system allowing to quantitatively predict the evolution of piezometric head, and land subsidence in space and time.	Assessment reports cleared by the PMU.	<i>Minutes of the relevant SC meeting approving the Assessment report</i>	Effective support from national scientists, local communities, other stakeholders and administrative bodies	National executing partners and Joint Technical Committees

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 1.2 Analysis of groundwater related dependencies of related ecosystems	<p>Reports on groundwater dependent ecosystems submitted for PMU approval.</p> <p>Gender and ethnic minority considerations included in the reports on the groundwater related dependencies of related ecosystems.</p>	Ecosystems in both basins threatened by unsustainable groundwater management.	One report on ecosystems depending on groundwater in the Cambodia-Mekong Delta aquifer.	One report cleared by the PMU.			
Output 1.3 Agreed upon Transboundary Diagnostic Analysis (TDA), including assessment of related governance, socio-economic, legal and gender aspects.	<p>TDA, including considerations of gender equality aspects and the use of disaggregated data, endorsed by the countries' representatives in the Steering Committee.</p> <p>Participation by F/M (female/male) members in the Steering Committee.</p>	Lack of consideration of transboundary groundwater management and aquifer recharge strategies.	TDA cleared by Joint Technical Committee	TDA cleared by PMU	TDA submitted to the SC for approval		

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 1.4 Agreement reached on Environmental Status Indicators.	ESI technically cleared by the SC, and submitted for adoption by the relevant authorities in the two countries. Number of participatory consultation meetings with men and women from rural communities, including representatives of IP communities and private sectors.	Environmental indicators are novel to the region	Joint Technical Committee prepares proposal for ESI	Report presenting sets of indicators for the aquifer	Minutes of the relevant SC meeting	Sustained political support to the TDA process	Joint Technical Committee

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Component 2: Piloting solutions for improved transboundary groundwater management							
Outcome 2. Tested strategies for improved groundwater recharge, reduced extraction and mitigated ecosystem/livelihoods trade-offs.	<p>Demonstration project designs, implementation reports, and upscaling-focused assessments for at least three demonstration projects for improved groundwater management (extraction and recharge) in each country.</p> <p>Demonstration projects include disaggregated data by gender and ethnic minority.</p>	<i>Transboundary aquifer management and aquifer recharge strategies and practices that the project will test on the ground are new to the region.</i>	<i>Demonstration projects under implementation.</i>	<i>At least 2 demonstration projects implemented in each country.</i>	<i>Final reports of demonstration projects.</i>	<i>Countries reach consensus on the typology and location of the demonstration projects during the first year of the project implementation.</i>	<i>JTC and Country Execution Teams</i>

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 2.1 Pilot demonstrations of innovative groundwater management and utilization after adequate feasibility studies	<p>Agreement on the selection and design of the pilot demonstrations reached including procedures for gender balance participation.</p> <p>Participation of members of local communities and relevant stakeholders identified by gender, locality and ethnicity in the design and selection of pilot projects.</p>			The program and the design of the demonstration projects approved by the SC.	Minutes of the relevant SC meeting.		
Component 3: Transboundary cooperation mechanisms							
Outcome 3. Agreed improvements of transboundary cooperation improve aquifer transboundary governance.	<p>Agreement on the creation of a Bilateral coordination and consultation body (TCCB) signed by two countries.</p> <p>Procedures for gender balanced participation in the TCCB including ethnic minority balance</p>	<i>Neither country recognizes transboundary implications of aquifer management.</i>	<i>Design and TORs of new cooperation mechanisms prepared by the Joint Technical Committee.</i>	<i>Shared vision and design of new permanent cooperation frameworks and mechanisms submitted for clearance to the SC</i>	<i>Minutes of the relevant SC meeting</i>	<i>Sustained political support to establishing transboundary cooperation framework.</i>	<i>National Executives Partners, Joint Technical Committee and the PMU</i>

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 3.1 Harmonized design of groundwater monitoring networks and protocols	Design of a harmonized and optimised monitoring network covering groundwater extraction and recharge, land subsidence, and their dependent ecosystems ? prepared by the relevant JTC. Participation by F/M (female/male) within networks and protocols, including representatives of ethnic minorities	Monitoring is so far sporadic and lacks transboundary harmonization.	Draft design of monitoring networks ready for first review by governments.	Commonly agreed and developed by the JTC monitoring design submitted to the SC for approval.	Minutes of the relevant SC meeting	Countries willing to jointly coordinate monitoring network on status of groundwater resources.	JTC and the PMU
Output 3.2 Agreement on groundwater data exchange mechanisms and procedures.	One data exchange mechanism designed and agreed by both countries.	No data sharing agreement exists for groundwater resources.	Draft design of data sharing protocols ready for first review by governments.	Commonly agreed and developed by the JTC data sharing protocols submitted to the SC for approval.	Minutes of the relevant SC meeting.	Countries willing to share data on status of groundwater resources.	JTC and the PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 3.3 Design of permanent transboundary consultation and coordination body (TCCB)	<p>The TOR of the TCCB and of the Secretariat, including its modus operandi and balanced gender representation approved by governments, and TCCB established.</p> <p>Participation by F/M members in the TCCB, including in the leadership positions.</p>	<p>No transboundary consultation and coordination body exists for the target aquifer. Some issues are partially coordinated through the MRC from a broader lower Mekong basin perspective.</p>	<p>Draft TOR of the TCCB technically cleared by the SC.</p>	<p>The TOR of the TCCB submitted to governments for approval</p>	<p>Documentation proving submission</p>	<p>Sustained political support for transboundary cooperation</p>	<p>JTC and the PMU</p>

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Component 4: Joint strategies and action programs							
Outcome 4 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 ecosystem.	SAP approved/signed by the relevant Minister(s) in each country.	Countries? actions lack strategic vision and transboundary coordination	SAP being drafted based on TDA findings and shared Vision	SAP submitted for signature by at least one Minister in each country	Documentation proving submission.	Project development strengthens political commitment to transboundary cooperation	TCCB, IMC, JTC and PMU
Output 4.1 Countries establish <u>Joint Technical Committees (JTCs)</u> and <u>ad hoc inter-ministerial committees (IMCs)</u> .	Regional gender and ethnic minority balanced JTCs established and operational. IMCs established in each country, and operational.	Lack of consideration in countries? planning of the water-food-energy-ecosystems nexus.	JTCs and IMCs established .	JTCs and IMCs actively engaged in the drafting of SAP.	Minutes of JTCs and IMCs meetings.		TCCB, country execution teams, and PMU.

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 4.2 A shared long-term Vision (horizon 20 years) including the agreement on environmental quality targets.	Number of long term Vision and EQ targets for the transboundary aquifer and dependent ecosystems. Gender equality indicators and ethnic minority concerns included in the shared long-term vision.	Countries' plans and development strategies relevant for the transboundary aquifer lack harmonization and common targets.	Two long term visions and corresponding EQ targets submitted to the SC for approval.	One vision and corresponding EQ targets inform the SAP.	Minutes of the relevant SC meeting.	Enduring political commitment to the cooperation process.	JTC and the PMU.
Output 4.3 Strategic Action Program (SAP) with horizon of 5 years, consistent with the Shared Vision.	SAP, including reforms and investments, and incorporating the Gender Action Plan (5.3) completed. Ethnic and gender-responsive indicators for programme and project design, and legal frameworks.	Lack of joint strategies for transboundary aquifer management.	SAP being drafted based on TDA findings and shared Vision.	SAP submitted for signature at Minister level.	Documentation proving submission	<i>Project development strengthens political commitment to transboundary cooperation.</i>	TCCB, IMCs, JTC and the PMU.

Component 5: Reinforced institutional capacity, improved participation, gender mainstreaming, monitoring and coordination.

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Outcome 5.1 Implementation of project mechanisms for monitoring, improved stakeholder consultation, gender mainstreaming, dissemination, coordination and monitoring progress enhance long-term sustainability of achievements.	Skills and knowledge on transboundary issues of 100 gender-balanced national staff increased by 50% over baseline levels. Number of staff by gender, locality and age in capacity development activities and stakeholders engagement events. Guidelines on gender and ethnicity integration into TBA.	<i>Land and water administrators relevant for groundwater extraction and recharge lack experience in transboundary aspects.</i>		<i>At least 100 land/water administrators received training and attended SMs.</i>	<i>Report of training activities, and SM minutes.</i> <i>Written guidelines on gender and ethnicity integration into TBA</i>	<i>Project management able to raise interest of targeted groups</i>	PMU
Output 5.1 Structured capacity building in groundwater governance for decision makers and other stakeholders.	Number of training courses held during the project lifetime. Number of trained experts (F/M) from Cambodia and Vietnam in dynamic modelling Number of trainees by gender, locality and age.		5 courses held 2 experts trained in dynamic modelling At least 50 trainees	10 courses held 2 experts trained in dynamic modelling At least 100 trainees	Modules and reports of training courses.		PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 5.2 Annual stocktaking and awareness raising meetings with relevant stakeholders (e.g. local, national and regional meetings).	Number of Stocktaking Meetings (SM). Participation by F/M of relevant stakeholders with balanced representation by locality and ethnicity.	N/A	2 SMs held	4 SMs held	SMs report		PMU
Output 5.3 Water and Gender Action Plans and indicators, based on results of Component 1, adopted by relevant authorities in both countries.	Water and Gender Action Plans and indicators completed. Gender-responsive Monitoring and Evaluation (M&E) system using data disaggregated by sex, age and ethnicity.	Lack of Water and Gender Action Plans and indicators for transboundary groundwater management.	At least one Water and Gender Action Plan with set of indicators being drafted based on results of Component 1, and budgeted.	Water and Gender Action Plan with set of indicators submitted for signature at Minister level. Gender-responsive Monitoring and Evaluation (M&E) system in place.	Water and Gender Action Plan with set of indicators documents published, that will be integrated in the projects accountability /logframe.		TCCB, PMU

Results chain	Indicators	Baseline	Mid-term target	Final target	Means of verification	Assumptions	Responsible for data collection
Output 5.4 Periodic events for the coordination with other ongoing initiatives organized by the PMU/TCC B.	<i>Number of dissemination events and experience notes / documents / videos including on gender activities.</i> Coordination mechanisms with relevant national and international stakeholders implementing NRM, water and agricultural fisheries activities.	N/A	5 events 10 documents 1 video	10 events 30 documents 2 videos	Project website including a TBA Gender and Ethnicity on-line resource library		PMU, JTCs
Output 5.5 Full participation to GEF IW LEARN activities, creation of a project website, and preparation of experience notes.							

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

STAP Review comments	Responses
STAP welcomes the project from FAO entitled ?Enhancing sustainability of the Transboundary Cambodia - Mekong River Delta Aquifer.? The project fills an important gap, with past programming focused primarily on surface flows.	Thank you, much appreciated

Intervention logic is well summarized visually in Figure 1. The project would benefit, however, from identification of barriers to achieving objectives at scale, particularly given the fraught political history between the two countries. There is clear scaling intent, but mechanisms for scaling beyond the target aquifer need elaboration. Outcomes are largely dependent upon the quality of stakeholder engagement processes.	Barriers and challenges have been identified and discussed on pages 29-31.
Omission of international CSOs among stakeholders contributing technical expertise to design appears to be an important gap.	CSOs have been involved during the project preparation phase and will be part of the execution team (IUCN and MERFI).
Gender equality importance is noted, but treatment is minimal.	An extensive gender assessment has been conducted during the project preparation phase, see see Output 5.3 and Annex N2.
Description of KM plans are very high-level. Both would benefit from identification and elaboration of specific mechanisms to address anticipated barriers.	The description of the project's KM approach has been expanded, see pages 107-108.
Additional baseline data on the aquifer is required, but this is part of the investment.	The project preparation phase developed an extensive sector assessment, which builds a solid foundation for the TDA, see Annex M1-M4.
Intervention logic well summarized visually in Figure 1. Would, however, benefit from identification of barriers to achieving objectives at scale, particularly given the fraught political history.	Barriers and challenges have been identified and discussed on pages 29-31.
Clear scaling intent, but mechanisms for scaling beyond the target aquifer need elaboration.	Details have been added with specific examples, see page 74.
Relevant ministries and agencies appear well covered; identification of national CSOs appears very preliminary; international CSOs are included as a category but not named. Omission of international CSOs among stakeholders contributing technical expertise to design appears to be an important gap. Conservation International and IUCN, among others, are undertaking highly relevant work.	The project engaged with a few international NGOs and in particular with IUCN. IUCN was then also selected to become the lead execution agency.
Gender equality importance is noted, but treatment is minimal. Notes relevant policies and potential areas of attention. More specific identification of barriers and approaches to address these should be undertaken.	An extensive gender assessment has been conducted during the project preparation phase, see see Output 5.3 and Annex N2.

Good identification of relevant investments, and appropriate potential focus of learning exchange identified for proposed FOLUR project in Vietnam. Would benefit from similar identification of learning potential from the wide variety of other projects.	Details for learning exchange and collaboration with other projects have been added on page 105.
Is there adequate recognition of previous projects and the learning derived from them? Specific lessons of prior projects not well specified. Have specific lessons learned from previous projects been cited? Given consultations this is likely, but these should be better specified.	Details on prior projects have been substantially expanded on, including lessons learnt, see Pages 43-55.
Is there an adequate mechanism to feed the lessons learned from earlier projects into this project, and to share lessons learned from it into future projects? Mechanisms for harvesting and sharing of lessons is presumably a part of the periodic consultations planned; but the mechanisms should be spelled out.	This has been made explicit as part of outputs 5.2 and 5.4.
Description of KM plans are very high-level. Would benefit from elaboration of specific mechanisms, including approaches to monitoring and evaluating the outcomes of past efforts, generating lessons and sharing these through diverse communication channels, targeted (in language and accessibility) to key influencer groups.	The description of the project's KM approach has been expanded, see pages 107-108.
GEF Secretariat	Responses
The project is aligned with the GEF IW focal area objective 3 - water security. Please consider a split of the IW resources across the three sub-objectives (3.5 information; 3-6 institutions; and 3-7 investments (incl. pilots)).	A new split has been adopted in Table A as follows: 3-5: 4,500,000 3-6: 5,950,000 3-7: 4,550,000
Please include a component or sub-component on M&E activities (as part of the project execution).	Monitoring now appears in Component 5 (page 3 and 18)
Component 2 should be labelled as investments (pilots) not TA	Component 2 now labelled as investments

Please explain the use of the category "Public Investment"	The category Public Investment was used because these investments are new investments under Vietnam's upcoming five-year development plan and in Cambodia from recently started investments.
Please make sure that at endorsement, MTR and TER there is transparent alignment of co-finance and components.	FAO will continue to ensure the transparent alignment of co-finance with components at endorsement.
Please confirm that the World Bank ICRSL co-finance is new and additional and not already counted as co-finance towards the WB GEF 6 Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods project (GEF ID 9265) which was recently endorsed.	In consultation with Viet Nam and the World Bank, the ICRSL project has been replaced with government investment from MARD in Viet Nam.
- You may want to explore possible co-finance with the BGR efforts on groundwater/groundwater quality at selected sites of the delta.	Co-finance with BGR was explored, and given the high investment of the Vietnamese government already secured we decided to not specifically list the BGR investment. However we will continue to coordinate with this important initiative.
Please revise the entry in table C and put "regional" or "regional (Cambodia, Viet Nam)" instead of only one of the countries.	GEF financing in table D is listed as "Regional".
Please reevaluate the total number of people DIRECTLY benefiting from project (physical) interventions. The number of >20 million by that definition is way too high; please revise.	Done ? Direct beneficiaries would be the population in districts where pilot projects will be implemented during the project and where new institutional arrangements (e.g. transboundary aquifer management plan) will create immediate benefits (e.g. wetland protection, productivity improvements). This is likely to benefit at least 10% of the population (e.g. coastal districts, groundwater dependent agriculture), or 2.5 million people. Indirectly, due to the positive impacts effective transboundary aquifer management has, a large part of the entire population dependent on the Mekong Delta aquifer (~25 million people) will benefit as water security will be enhanced and land subsidence rates will slow down.
Please fill the Rio Marker on Adaptation.	Done

<p>Please note that the GEF project connected to ICRSL , the <i>Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods project</i> (GEF ID 9265) which is listed as <i>planned in table I</i> has recently been endorsed.</p> <p>By <i>endorsement</i>, please complete the picture incl. the few missing entries on implementation period and investment amounts.</p>	<p>The GEF-funded ICRSL project is now listed in Table 1 under 'current projects'.</p>
<p>The alternative overall is well described at concept/PIF stage and has responded to upstream discussions and suggestions with GEFSEC.</p> <p>Suggest to restate the PDO in the first para. Also, the first para under the heading of the <i>GEF alternative</i> misses to recap briefly what is described in detail in the justification, namely WHY there is a need for transboundary cooperation and why it is necessary to look at the entire aquifer across both countries in order to sustain both recharge and sustainability of ecosystems and their functions and aquifer uses in both countries. It would be useful to state this briefly upfront (~one sentence).</p>	<p>PDO is now restated as suggested.</p>
<p>- Table 2 is good and meant to show both what is already happening and then the gaps that this project will fill (blank boxes; BTW shading them would make that even more clear). For the ongoing projects, please indicate which are only in Viet Nam and/or Cambodia.</p>	<p>We added in Table 2 the location of the various investments (VN and/or CA)</p>
<p>Component 1:</p> <p>- The typical TDA is built on existing/readily available data. In this case this is different and the component will field a number of assessments (listed under points (i) to (vii)) on which the TDA will build on and also justifying the funds (4.5 million of the GEF grant plus co-finance) going into this. As some of these studies/assessments listed under the points mentioned are substantive outputs , please list the main ones (<u>not</u> necessarily all under (i) to (vii)) as outputs under this component in addition to the TDA.</p>	<p>Component 1</p> <p>The main studies/assessments are now listed.</p>

<p>Component 2:</p> <ul style="list-style-type: none"> - While this is at concept stage, it would be useful to provide an <u>indicative/rough</u> number of pilots (number of investment or expected/<u>indicative range</u> of \$\$ investments) 	<p>Component 2</p> <p>Approximately 2-3 pilots per country is now indicated.</p>
<p>Component 4:</p> <ul style="list-style-type: none"> - Environmental quality targets ? please ensure that these include quantifiable targets and not simple statements/targets to ?improve??. ?enhance?? etc. Please, include some <i>examples</i> of such status indicators in the PIF and, <u>by endorsement</u>, include some additional guidance and wording to that effect (i.e. on the need to include quantitative targets). - Please note <u>in the PIF</u> that the SAP is to be endorsed and signed by a Minister from each country (i.e. the SAP includes a commitment to actions by countries and hence needs more than only technical level endorsement) 	<p>Component 4</p> <p>Examples of status indicators have been added on page 18: ?(e.g. groundwater level, land subsidence rate, groundwater recharge target, groundwater extraction quota)?</p> <p>Ministerial level sign-off is now clearly indicated</p>
<p><u>By endorsement</u>, please refer to the IW:Learn TDA and SAP guidance which e.g. provides guidance to include local academe and civil society organizations in the TDA process; same for private sector to be involved in the discussions on the TDA and SAP. The private sector will be important in the successful implementation of SAP actions (both following enhanced regulatory measures, finance and investments).</p>	<p>Noted on the need to refer to IW:LEARN guidance at endorsement</p>
<p>Please expand the clarity of the incremental cost analysis. The para should outline how/why the regional increment leads to much larger benefits/GEBS than current national approaches.</p>	<p>More explanation has been added to Section 5 explaining that national interests are currently being pursued in a way that is unsustainable for both countries, and a regional approach will help to quantify potential impacts and take full advantage of collaborative efforts to manage the shared resource.</p>

<p>- You may want to be careful in the use of using the wording of promoting ?appropriate allocation?</p> <p>Please further develop the description of expected GEBs (e.g. drawing from what is already described in the PIF in the <i>project description</i> and the section <i>global environmental problems to be addressed</i>; Global environmental benefits and co-benefits could include contribution to sustaining fish habitats and migration, sustainability of food systems, and ecosystems functions). The current discussion of GEBs is more focused on process than GEB outcome.</p>	<p>The wording around allocation has been amended, using ?jointly agreed? allocation</p> <p>Examples of the GEBs are given including water security enhancements, improved resilience of groundwater dependent ecosystems (e.g. wetlands, fish abundance and diversity); and sustainable food production systems</p>
<p>Under innovation, you may want to mention that any functioning transboundary aquifer cooperation mechanism is innovative given there are only a handful of those around the globe.</p> <p>Further, the elucidation of intersectoral interdependencies on groundwater uses and dependency of low flows, coastal flows, sustainability of food systems, wetlands and their functions, and fish habitats etc. on sustainable groundwater uses and improved governance of the resource (both quality and quantity) is still new and innovative not only in the region but globally.</p>	<p>This is now revised.</p>
<p>The first para has little to do with the project (?) e.g. mentions the role of women in fisheries post-harvest activities and the fisheries value chain. True but hard to relate to the main actions of the project.</p> <p>Gender actions listed in the bullet points are generally well described.</p> <p>There is mention of strengthening women?s participation in decision making. During project design and implementation please also assure gender consideration in the design of all project components and especially participation in and access to resources and benefits from pilots.</p>	<p>Amended.</p>
<p>While the project justification outlines the climate risks and relevance of the project in increasing resilience, the risk section/table is silent on climate risks. Please summarize key risks and project mitigating actions in responding to these.</p>	<p>Climate risk screening has now been conducted and is included in the PIF.</p>

Please also explicitly include coordination with the GEF 6 (now endorsed) Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods project (GEF ID 9265) and the co-finance ICRSL in project design and implementation.	Done ? close coordination with this project is planned (but not as project co-finance)
Please provide short outlines (short para) of key national sectoral policies, strategies and MEA related action plans for both countries as relevant and refer to alignment of the project with these and/or how the project will inform revision processes .	We added food security related policies, which involve livelihood diversification and increased environmental sustainability. We already listed the main policies relevant for the Mekong Delta area and for Cambodia from a sector perspective. We also added how this project aims to support these policies, which involves improved water security for the new livelihood diversification strategies and for increased farm income.
<i>By endorsement</i> , please allocate at least 1 % of the GEF grant to IW:Learn related activities incl. participation in IWCs and regional and thematic meetings.	Noted, and will be taken into account by endorsement.
COUNCIL COMMENTS BY COUNTRIES	
France - comments	Response
This project aims to increase knowledge of the transboundary Mekong basin and strengthen cooperation between Vietnam and Cambodia. Is the Mekong River Commission, the international commission tasked with promoting and coordinating assistance for the management and use of water (from the Mekong basin), involved in all or a portion of this project?	Yes, the MRC is involved. As this is a bilateral project the mandate lies with the National Mekong Committees (NMCs) in Cambodia and Viet Nam. Both will have a central role during the SAP process, incl. coordinating and chairing all TDA-SAP workshops. The NMCs will also invite the MRCS to attend these workshops.
Do the project's five components (?(i) strengthening transboundary cooperation including joint fact finding and information exchange; (ii) enhancing groundwater recharge; (iii) supporting innovative solutions to optimize groundwater use, reverse salinization trends and increase resilience to climate change; (iv) reducing agri-pollutants contamination of ground and surface waters; (v) and contributing to protecting groundwater dependent ecosystems?) include an institutional approach or are they limited to a technical one?	The project will include a range of institutional elements as part of components 3 and 4, including the establishment of a transboundary consultation and coordination body for the management of the aquifer and the establishment of a joint technical committee,

Does the project make provision for consideration of the type of water uses? One of the areas of focus covers the reduction of agricultural pollution (qualitative aspect); a broader consideration of the type of needs and withdrawals would also pave the way to address the quantitative aspect.	The project will focus on both, the quantitative and the qualitative aspect of groundwater use (and recharge) and will not be limited to agricultural activities. Ultimately, water quantity will be most critical to manage land subsidence.
Germany - comments	Response
Germany requests taking into account that transboundary dynamics in the grand aquifer system in the Mekong Delta are marginal and that cross-border flows between Cambodia and Viet Nam only constitute a minor element in the groundwater balance of the Vietnamese delta. Local surface interactions like recharge through rain and rivers, as well as abstraction of groundwater through pumping have a far greater impact than cross-border flows.	This will be taken into account and the TDA will specify how marginal the connecting cross-border flows are.
Germany acknowledges the importance of surface-groundwater interactions as described in the PIF. Germany would prefer consequently including investigations into surface-groundwater interactions addressing aspects of recharge and discharge dynamics as well as groundwater demand as project components	Groundwater recharge will be a very important aspect of developing a transboundary aquifer management plan. It has been emphasised as part of the TDA (Outputs 1.1, 1.2 and 1.3), the design of pilots (Output 2.1) and the SAP process (Outputs 3.1, 3.2, and 4.3). Water demand is equally a critical aspect of aforementioned outputs and their underpinning activities.
Germany suggests assessing the hydrogeological settings locally in the border region as useful joint activities that can establish the baseline for further coordinated governance of groundwater between Cambodia and Viet Nam in the border region. Germany suggests the following addition to the project's outputs: Output 1.1: Assessment of current state of Groundwater resources, recharge and extraction dynamics, ?analysis of surface-groundwater interactions and the extent of connectivity across borders.?	The countries are expecting a wider assessment of groundwater resources, which means that we met resistance to change the title of the output. However, we added to the component description the following: ?These assessments will include the analysis of surface-groundwater interactions and the extent of connectivity across borders.? (p.60)
Germany is of the opinion that the limited availability of hydrogeological data for the Cambodian side of the aquifer should be addressed by the project.	We fully agree and the monitoring equipment that will be put in place (based on an agreed data sharing agreement) will improve the future groundwater data availability in Cambodia.
Germany proposes carrying out feasibility studies on managed aquifer recharge for the specific regions. - Germany suggests adding the following aspects to the project's outputs: Output 2.1: Pilot demonstrations of innovative groundwater management and utilization ?after adequate feasibility studies.?	Thanks, we made the suggested change.

Germany would appreciate it if existing regional organisations like the Mekong River Commission (MRC) could be considered as regional partner organisations for data sharing, and to avoid the creation of redundant bilateral bodies and duplication of water management plans.	Yes, the MRC is involved. As this is a bilateral project the mandate lies with the National Mekong Committees (NMCs) in Cambodia and Viet Nam. Both will have a central role during the SAP process, incl. coordinating and chairing all TDA-SAP workshops. The NMCs will also invite the MRCS to attend these workshops.
- Germany suggests adding the following aspects to the project's outcomes: Outcome 3: Agreed upon arrangements for transboundary cooperation ?embedded in existing transboundary mechanisms and organisations.?	Currently there is no transboundary mechanism for groundwater management in place. In consultation with the countries and relevant stakeholders, the suggested addition cannot be implemented.
Germany would prefer it if the project could account for the risk that improved irrigation systems and advocacy for groundwater use, as potentially through co-financed projects listed in this proposal, might increase groundwater abstraction rates. Germany further suggests working towards improved groundwater management policies and licensing as a management tool to address these developments.	We fully agree with this point, which is why these investments (e.g. irrigation expansion in Cambodia) are listed for ongoing coordination and exchange. The ultimate goal of this project is a transboundary action plan, and the revision of policies to improve the sustainability of the CMDA.
Germany would like to extend an invitation for consultation with the German BGR.	The BGR work is an important initiative in Viet Nam's Mekong Delta and this project lists the BGR work as a baseline project. Consultation will be coordinated as part of various components, incl. 1.1 and 5.4.

ANNEX C: Status of Utilization of Project Preparation Grant (PPG).
(Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: \$300,000			
<i>Project Preparation Activities Implemented</i>	<i>GETF/LDCF/SCCF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Consultant	159,400	157,161	2,239
Contracts	30,700	20,199	10,501
Administrative support and liaison with country counterpart	10,000	4,893	5,107

Meeting organization material and communication	2,100	2,079	21
Training	62,800	7,856	54,944
Travel	35,000	9,275	25,725
Total	300,000	201,463	98,537

ANNEX D: Project Map(s) and Coordinates

Please attach the geographical location of the project area, if possible.



Source: Lee, E., K. Ha, N.T.M. Ngoc, A. Surinkum, R. Jayakumar, Y. Kim, and K.B. Hassan. 2017. "Groundwater Status and Associated Issues in the Mekong-Lancang River Basin: International Collaborations to Achieve Sustainable Groundwater Resources." *Journal of Groundwater Science and Engineering* 5 (1): 1-13.

Northern boundary: 14.344721, 103.400917

Western boundary: 13.491628, 102.368202

Southern boundary: 8.554367, 104.895057

Eastern boundary: 10.806830, 106.740760

ANNEX E: Project Budget Table

Please attach a project budget table.

	FAO Cost Categories	Component 1	Component 2	Component 3	Component 4	Component 5		PMC	Total GEF
Agency		Total Outcome 1	Total Outcome 2	Total Component 3	Total Outcome 4	M&E	Total Outcome 5		
	5011 Salaries professionals								
IUCN	Chief Technical Advisor (SP)	85,000	0	65,000	90,000	0	110,000	100,000	450,000
IUCN	National Coordinators (Cambodia & Viet Nam) (P2)	58,000	0	48,000	72,000		82,000	100,000	360,000
IUCN	Water Governance and Policy Engagement Advisor (M1)		0	12,000	21,000		15,000		48,000
IUCN	Agro-ecologist - Agriculture/Aquaculture, Climate Change and NBS (SP)		0		33,000		44,000		77,000
IUCN	Hydrologist - Agriculture, Irrigation, and IWRM (SP)		0		33,000		44,000		77,000
IUCN	Ecologist - Wetlands and NBS (SP)		0		16,500		22,000		38,500
IUCN	Community Engagement Specialists - Livelihoods and Climate Change Adaptation (Cambodia & Viet Nam) (P1)		0				15,000		15,000
IUCN	Communications and Knowledge Management (P2)		0	10,000	30,000		60,000		100,000
UNESCO	Technical Advisor UNESCO (part time)	91,000	0	169,000	0		52,000		312,000
UNESCO	Technical Project Officers (Cambodia, Viet Nam, UNESCO Asia and Pacific Regional Bureau)	163,198	0	203,990			40,800		407,988
UNESCO	Administration Officer, UNESCO						0	52,000	52,000
	5011 Sub-total salaries professionals	397,198	0	507,990	295,500	0	484,800	252,000	1,937,488
	5012 GS Salaries						0		0
IUCN	Support officers (Cambodia & Vietnam)				102,000		154,500	154,500	411,000
UNESCO	Support Assistant, UNESCO						20,000		20,000
	5012 Sub-total GS salaries	0	0	0	102,000	0	174,500	154,500	431,000
	5013 Consultants						0		0
UNESCO	International Experts on Groundwater [Hydrogeology, Grounwater Dependent Ecosystems, Ecohydrology, Groundwater Monitoring], 6 experts for a total of 36 man/months	240,000	0	120,000	0		0		360,000
UNESCO	International socio-economic expert as support to TDA teams. One expert, for a total of 6 months	60,000	0	0	0		0		60,000
UNESCO	International experts in international Water Governance & Water Law. Two expert, for a total of 12 man/months	90,000	0	30,000	0		0		120,000
UNESCO	International communications consultant. One expert, for a total of 3 man/months	0	0	0	0		30,000		30,000
UNESCO	International Gender Expert WWAP	121,000		6,000	46,000		100,000		273,000
IUCN	Monitoring and evaluation expert					180,000	180,000		180,000
	Sub-total international Consultants	511,000	0	156,000	46,000	180,000	310,000	0	1,023,000
IUCN	Groundwater management specialists - Climate change impacts on groundwater (Vietnam & Cambodia)		0	12,000	12,000		24,000		48,000
UNESCO	National Experts on Groundwater [Hydrogeology, Groundwater Dependent Ecosystems, Ecohydrology, Groundwater Monitoring], 8 experts for a total of 96 man/months	288,000	0	96,000	0		0		384,000
UNESCO	National socio-economic expert as support to TDA teams. 2 experts, for a total of 12 man/months	36,000	0	0	0		0		36,000
UNESCO	National experts in international Water Governance & Water Law. Two expert, for a total of 12 man/months 2 experts, for a total of 12 man/months	80,000	0	16,000	0		0		96,000
UNESCO	National communications consultants. Total of 3 man/months	0	0	0	0		12,000		12,000
UNESCO	2 National Senior Gender and Water integration Experts (Viet Nam & Cambodia)	56,000		4,000	6,000		30,000		96,000
UNESCO	2 National Gender experts/Data collection (Viet Nam & Cambodia)	27,000		2,000	8,000		17,000		54,000
UNESCO	2 National Field Assistants (Viet Nam & Cambodia)	12,000		0	0		8,000		20,000
	Sub-total national Consultants	499,000	0	130,000	26,000	0	91,000	0	746,000
	5013 Sub-total consultants	1,010,000	0	286,000	72,000	180,000	401,000	0	1,769,000
	5650 Contracts						0		0
IUCN	Cambodia National Mekong Commission (CNMC)			80,000	50,000		20,000		150,000
IUCN	Viet Nam National Mekong Commission (VNMC)			80,000	50,000		20,000		150,000
IUCN	Communication and Oureach materials			0			50,962		50,962
IUCN	Contract MERFI	2,417,519	0	184,675	151,306	0	120,356	0	2,873,856
UNESCO	Knowledge Management- Gender publications, guidelines, and online library , incl translations			0			51,000		51,000
UNESCO	IGRAC. GW assessment & Monitoring activities	100,000	0	318,908	0		50,000		468,908
UNESCO	University Wageningen and University of Padova- numerical modelling of groundwater dynamics and land subsidence. Future projections and optimization of monitoring plan and training	150,000	0	120,000			10,000		280,000
UNESCO	Knowledge Management - Groundwater Management Publications/knowledge products, interpretation and translation and publication	44,201	0	89,095			17,500		150,796
UNESCO	National research and monitoring institutions	0	0	100,000			0		100,000
FAO	Audit costs Cambodia						0	64,000	64,000
FAO	Audit costs Viet Nam						0	85,500	85,500
FAO	Mid-term Review (MTR)	0	0	0	0	50,000	50,000		50,000
FAO	Terminal Report		0			6,550	6,550		6,550
FAO	Independent Terminal Evaluation (TE)	0	0	0	0	70,000	70,000		70,000
Viet Nam	Pilot Viet Nam		2,275,000				0		2,275,000
Cambodia	Pilot Cambodia		2,275,000				0		2,275,000
	5650 Sub-total Contracts	2,711,720	4,550,000	972,678	251,306	126,550	466,368	149,500	9,101,572
	5021 Travel						0		0
	National travel	56,000	0	67,000	22,000		50,000		195,000
	Travel for training/workshops and meetings	53,000	0	42,100	44,000		74,901		214,001
	International travel	60,605	0	57,940	42,154	70,000	194,354		355,053
	5021 Sub-total travel	169,605	0	167,040	108,154	70,000	319,255	0	764,054
	5023 Training						0		0
IUCN	10 training courses on transboundary aquifer management, data analysis and monitoring, including gender issues		0				150,000		150,000
IUCN	Transboundary engagement workshops	0	0	0	112,000		0		112,000
IUCN	IW LEARN (Training publications and materials)		0				60,000		60,000
UNESCO	Accomodation costs per training/workshop and/or meeting	66,000	0	40,000	16,000	0	91,599	0	213,599
	5023 Sub-total training	66,000	0	40,000	128,000	0	301,599	0	535,599
	5024 Expendable procurement						0		0
IUCN	Publications and translation services (VN/KH)	0	0	0	20,000		20,000		40,000
UNESCO	This budget line covers procurement for expandable items, in line with the FAOR definition	27,000	0	15,000	4,000		6,000		52,000
	5024 Sub-total expendable procurement	27,000	0	15,000	24,000	0	26,000	0	92,000
	6100 Non-expendable procurement						0		0
IUCN	Computers and office equipment	0	0				0	14,000	14,000
UNESCO	This budget line covers procurement of non expendable material, such as computers, furniture, monitoring equipment, technical equipment etc. Procurement will be done in line with UNESCO rules are regulations for	7,000	0	204,001			0		211,001

ANNEX F: (For NGI only) Termsheet

Instructions. Please submit an finalized termsheet in this section. The NGI Program Call for Proposals provided a template in Annex A of the Call for Proposals that can be used by the Agency. Agencies can use their own termsheets but must add sections on Currency Risk, Co-financing Ratio and Financial Additionality as defined in the template provided in Annex A of the Call for proposals. Termsheets submitted at CEO endorsement stage should include final terms and conditions of the financing.

n/a

ANNEX G: (For NGI only) Reflows

Instructions. Please submit a reflows table as provided in Annex B of the NGI Program Call for Proposals and the Trustee excel sheet for reflows (as provided by the Secretariat or the Trustee) in the Document Section of the CEO endorsement. The Agency is required to quantify any expected financial return/gains/interests earned on non-grant instruments that will be transferred to the GEF Trust Fund as noted in the Guidelines on the Project and Program Cycle Policy. Partner Agencies will be required to comply with the reflows procedures established in their respective Financial Procedures Agreement with the GEF Trustee. Agencies are welcomed to provide assumptions that explain expected financial reflow schedules.

n/a

ANNEX H: (For NGI only) Agency Capacity to generate reflows

Instructions. The GEF Agency submitting the CEO endorsement request is required to respond to any questions raised as part of the PIF review process that required clarifications on the Agency Capacity to manage reflows. This Annex seeks to demonstrate Agencies' capacity and eligibility to administer NGI resources as established in the Guidelines on the Project and Program Cycle Policy, GEF/C.52/Inf.06/Rev.01, June 9, 2017 (Annex 5).

n/a