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MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

CENTRAL PROJECTS OFFICE (CPO)

VIETNAM MEKONG DELTA INTEGRATED CLIMATE RESILIENCE AND
SUSTAINABLE LIVELIHOODS PROJECT

EXECUTIVE SUMMARY

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS

Hanoi, March 2016

ACRONYMS

CEOHSP	Contractor's Environmental and Occupational Health and Safety Plan
CPO	Central Project Office
CPMU	Central Project Management Unit
DARD	Department of Agriculture and Rural Development
DONRE	Department of Natural Resource and Environment
DPC	District People's Committee
EA	Environmental Assessment
ECOP	Environmental Codes of Practice
EM	Ethnic Minority People
EMDP	Ethnic Minority Development Plan
EMPF	Ethnic Minority Planning Framework
EPP	Environmental Protection Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMF	Environmental and Social Management Framework
GoV	Government of Vietnam
MARD	Ministry of Agriculture and Rural Development
MONRE	Ministry of Natural Resource and Environment
PMU	Project Management Unit
PPC	Provincial People's Committee
RAP	Resettlement Action Plan
REA	Regional Environmental Assessment
RPF	Resettlement Policy Framework
RSA	Regional Social Assessment
SIWRR	Southern Institute of Water Resource Research
WB	The World Bank

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1. Introduction

The Government of Vietnam (GoV) through the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Natural Resources and Environment (MONRE) has been preparing an investment project, namely the Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project (MD-ICRSL or the Project), with an aim *to enhance tools for climate-smart planning, and improve climate resilience of land and/or water management practices in selected provinces of the Mekong Delta in Vietnam*. The project activities will comprise different types of water infrastructure investments as well as non-structural measures (including livelihood models) and technical assistance, which will be implemented through 5 components, viz. (1): Enhancing Monitoring, Analytics, and Information Systems, (2) Managing Floods in the Upper Delta, (3) Adapting to Salinity Transitions in the Delta Estuary, (4) Protecting Coastal Areas in the Delta Peninsula; and (5) Project Management and Implementation Support. The Project is being proposed for financing by the World Bank (WB) over a period of 6 years (FY2017-FY2022) with financing of US\$ 376 million (\$300 million from IDA; \$76 million from GoV).

This report is an executive summary of the environmental and social impact assessments of the Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods (MD-ICRSL) Project. It highlights the main findings and conclusions of the Regional Environmental Assessment, and the Regional Social Assessment. It also summarizes the Environmental and Social Impact Assessments (ESIAs), Resettlement Action Plans (RAPs) and Ethnic Minority Development Plans (EMDPs) related to the first phase sub-projects; and the related frameworks for subprojects in the second phase viz. Environmental and Social Management Framework (ESMF), Resettlement Policy Framework (RPF), and Ethnic Minority Policy Framework (EMPF) of the project. It also lists the indicative subprojects for the second phase.

2. Context

The Mekong Delta is densely populated. It is home to 22 percent of Vietnam's population, most of which live in coastal rural areas and are highly dependent upon rice or shrimp farming for livelihoods. These Delta households are 'near poor' and are still vulnerable to external shocks that can push them back under the poverty line. In recent decades, the push to increase agricultural and aquaculture production, greater liberalization and diversification of rural markets, and urban development in the Delta have improved opportunities for poor people. Yet, the new economic processes also highlight many environmental and social problems facing vulnerable groups.

Growing investments within the delta are placing development pressures on the resources, and resulting in implications on floods, salinity and tidal influxes. From an environmental perspective, the Mekong Delta and its wetlands play an important role in water regulation (hydrological flows) and groundwater recharge/discharge. It also allows dispersion of sediments and nutrients over a very wide area contributing to the fertility and agricultural productivity. Temporary storage of flood waters in floodplains and wetlands provides significant regulation of floodwaters and protection against high floods, and provide strong local influence on the basin's climate. Dry season exposure of in-channel wetland areas provides increased primary productivity and sink capacity for greenhouse gas emissions. Changes in the hydrological cycles due to increased and fragmented infrastructure investments poses risks to the existing ecological functions.

Upstream developments in the Mekong Basin are impacting water resources, as well as sediment flows and fish migration. Hydropower development in the mainstream and tributaries upstream of the

Delta provide additional water storage which should increase dry season flows. These reservoirs, however, may capture and store sediments reducing the flow of nutrient rich sediments to the Mekong Delta and into coastal water, and potentially increase river bank and coastal erosion. Hydropower development, particularly on the mainstream, may also block important fish migratory routes resulting in decreased capture fisheries and loss of biodiversity. Upstream irrigation projects may also reduce dry season flows into the Delta.

The Mekong Delta has been identified as one of the most vulnerable to the impacts of climate change. Agriculture and aquaculture are increasingly affected by changes in freshwater supply due to salinity intrusion, flooding, increasing tropical cyclone intensity, and increasing temperatures. Domestic freshwater supply is expected to become less reliable due to erratic rainfall and salinity intrusion into groundwater resources. Marine fisheries, particularly coral reef fisheries, are expected to be impacted by sea-level rise, warmer oceans, and ocean acidification associated with rising atmospheric and ocean CO₂ concentrations. Coastal infrastructures are exposed to increased tropical storm intensity, long-term sea-level rise, and sudden-onset fluvial and coastal flooding.

The Government of Vietnam recognizes the threats and has started to develop a more holistic and spatially integrated vision to manage the current and future risks and opportunities in the Delta. In 2013, a Mekong Delta Plan was developed, with the support of the Netherlands government, which evaluated a number of different development strategies including considerations of climate change. Delta level scientific databases and climate change impact assessments are also ongoing; however, to date these projects remain at a theoretical level and are not integrated into the planning process. The impacts of alternate development options on various sectors in a highly complex delta environment, and the efficacy of different investments in the face of climate change and dynamic upstream development remain poorly understood.

3. Project Overview

The project development objective (PDO) is *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 Vietnam*. This objective would be achieved through the provision of capital investments, technical assistance and capacity building for farmers (agriculture and aquaculture) in selected provinces of the Mekong Delta in Vietnam, and for government institutions at national and sub-national levels.

The Project activities will be implemented through the following five components:

Component 1: Enhancing Monitoring, Analytics, and Information Systems (*Est. US\$ 52.2 million, of which US\$ 47.5 million will be financed by IDA*). Proposed activities/investments under Component 1 are as follows:

Sub-component 1.1. Monitoring Systems to Enhance Mekong Delta Knowledge Base: This subcomponent support upgrades and expansion of MONRE's monitoring systems for groundwater, and surface water; and enhancing remote sensing technology to better monitor coastal and river morphology. Specialized studies will be undertaken to fill critical information gaps on land subsidence, groundwater, and land use suitability –which in turn will help make climate-smart decisions on investments in the delta provinces. These investments are critical for the Mekong Delta. Surface water in the Mekong Delta is under increasing pressure from pollution, salinity intrusion and limited wastewater treatment. Excessive groundwater abstraction for agricultural and domestic

purposes is leading to land subsidence, with hotspots centred on the Ca Mau peninsula and the central floodplain areas of Can Tho, Vinh Long, and Kien Giang. Land subsidence in combination with reduced sediment influx from upstream and sea level rise are contributing to coastal erosion of the seven coastal provinces of the Mekong Delta.

Subcomponent 1.2. Enhancing Information Systems, Modelling Tools and Planning in the Mekong Delta. This sub-component provides an integrated information systems framework to improve the ability of various organizations to access, analyze, and present information related to the Mekong Delta. The sub-component will finance the establishment of the *Mekong Delta Center*, which will serve as a hub for Delta-wide information, including water, land use, environmental and climate change information, education and outreach, and provide support (including a decision support system) to specialized studies and research projects that inform decisions and investments in the Mekong Delta. The subcomponent will also finance the formulation of a *Mekong Delta Climate Resilience Assessment* which help guide the next round of Vietnam government planning (2021-2015), including i) the Mekong Delta Economic and Social Plan prepared by MPI, ii) sector master plans prepared by MARD and other ministries; and iii) and land use development plans developed by provincial governments. The subcomponent will also support the development of modelling tools, data bases, and graphical interfaces that will help inform the planning process.

Component 2: Managing Floods in the Upper Delta (*Est. US\$ 101 million, of which US\$ 79.1 million will be financed by IDA*)

The Upper Delta area is characterized by natural occurring deep floods in the wet season. The development of an extensive agricultural flood control system has shifted the flood waters to other areas in the Delta and also reduced the beneficial effects of flooding including replenishing soil fertility, groundwater recharge, and sustaining aquatic ecosystems.

The primary objective of this component is to protect and/or reclaim the benefits of controlled flooding (flood retention) measures while increasing rural incomes and protecting high value assets in An Giang and Dong Thap provinces. This will potentially consist of: i) modifying water and agricultural infrastructure to allow for more beneficial flooding (expanding flood retention capacity) in rural areas and offer new agricultural/aquaculture cropping alternatives; ii) providing livelihoods support measures to farmers so they have alternatives to the wet season rice crop, including aquaculture; iii) constructing/upgrading infrastructures for protecting select high value assets; and iv) facilitating agricultural water use efficiency in the dry season.

Sub-projects selected to be financed under this component include infrastructure schemes aimed at increasing water retention, irrigation and upgrading of reservoirs, livelihoods improvement (i.e. demonstration and agriculture extension support for transition from triple rice to alternative cropping), and ecosystem restoration.

Component 3: Adapting to Salinity Transitions in the Delta Estuary (*Est. US\$ 109.1 million, of which US\$ 82 million will be financed by IDA*)

The Mekong River divides into 9 distributaries which flow into the East Sea through the Estuary zone. This area is naturally characterized by low flows during the dry season which allow saline water to extend far inland. Over the past twenty years, closed freshwater systems designed for rice production have been developed in this area consisting of large polders ringed by dikes and with sluice gates to control saline water intrusion. The long-term sustainability of this strategy is questionable due to

reduced dry season water availability and sea-level rise. In addition, coastal farmers are rapidly converting to more profitable shrimp farms, often accompanied by destruction of mangrove forests.

This component aims to address the challenges related to salinity intrusion, coastal erosion, sustainable aquaculture and improved livelihoods for communities living in the coastal areas of Ben Tre, Tra Vinh, and Soc Trang provinces. This will potentially consist of: i) construction of coastal defenses consisting of combinations of compacted earth embankments and coastal mangrove belts; ii) modification of water and agricultural infrastructure along the coastal zone to allow flexibility for sustainable aquaculture activities and adapt to changing salinity levels; iii) support to farmers to transition (where suitable) to more sustainable brackish water activities such as mangrove-shrimp, rice-shrimp, and other aquaculture activities; and iv) supporting climate smart agriculture by facilitating water use efficiency in the dry season.

Sub-projects to be financed under this component will include restoration of mangroves along the provincial coastline, construction/upgrades of river and coastal embankments, and sluice gates to improve water quality, efficiency and sustainability of aquaculture in the brackish water zone, and supporting a gradual transition from rice and other freshwater crops in the saline intruded zone to a brackish water economy including aquaculture through demonstration and aquaculture extension together with necessary adjustments to land-use plans in a longer term.

Component 4: Protecting Coastal Areas in the Delta Peninsula (Est. US\$ 101.4 million, of which US\$82.2 million will be financed by IDA)

In contrast to the adjacent estuary zone, there are no distributaries of the Mekong River flowing through the peninsula and historically the peninsula was covered by dense mangroves sustained by localized rainfall. In recent decades, there has been an explosion of shrimp farming along the coast which relies heavily on groundwater abstraction to maintain the proper salinity level. The over-abstraction of groundwater has resulted in significant land subsidence. The natural mangrove forest has been significantly reduced, although there are still significant protected mangrove zones. An extensive canal network has also been developed to bring freshwater from the Mekong River into the peninsula to allow rice production.

This component aims to address the challenges related to coastal erosion, groundwater management, sustainable aquaculture, and improved livelihoods for communities living in the coastal and river mouth areas of Ca Mau and Kien Giang. This will potentially consist of: i) restoration of coastal mangrove belts and construction/ rehabilitation of coastal dikes in erosion areas; ii) modification of water control infrastructure along the coastal zone to allow flexibility for sustainable aquaculture activities; iv) control of groundwater abstraction for agricultural/aquaculture and development of freshwater supplies for domestic use; v) support to farmers to practice more sustainable brackish water activities such as mangrove-shrimp and other aquaculture activities; and vi) supporting climate smart agriculture by facilitating water use efficiency.

Sub-projects to be financed under this subcomponent include restoration of mangroves to enhance coastal defense, transition of shrimp farming into integrated mangrove-shrimp, construction/upgrades of river and coastal embankments, and sluice gates to manage water conditions and demonstration and aquaculture extension to improve efficiency and sustainability of brackish water aquaculture.

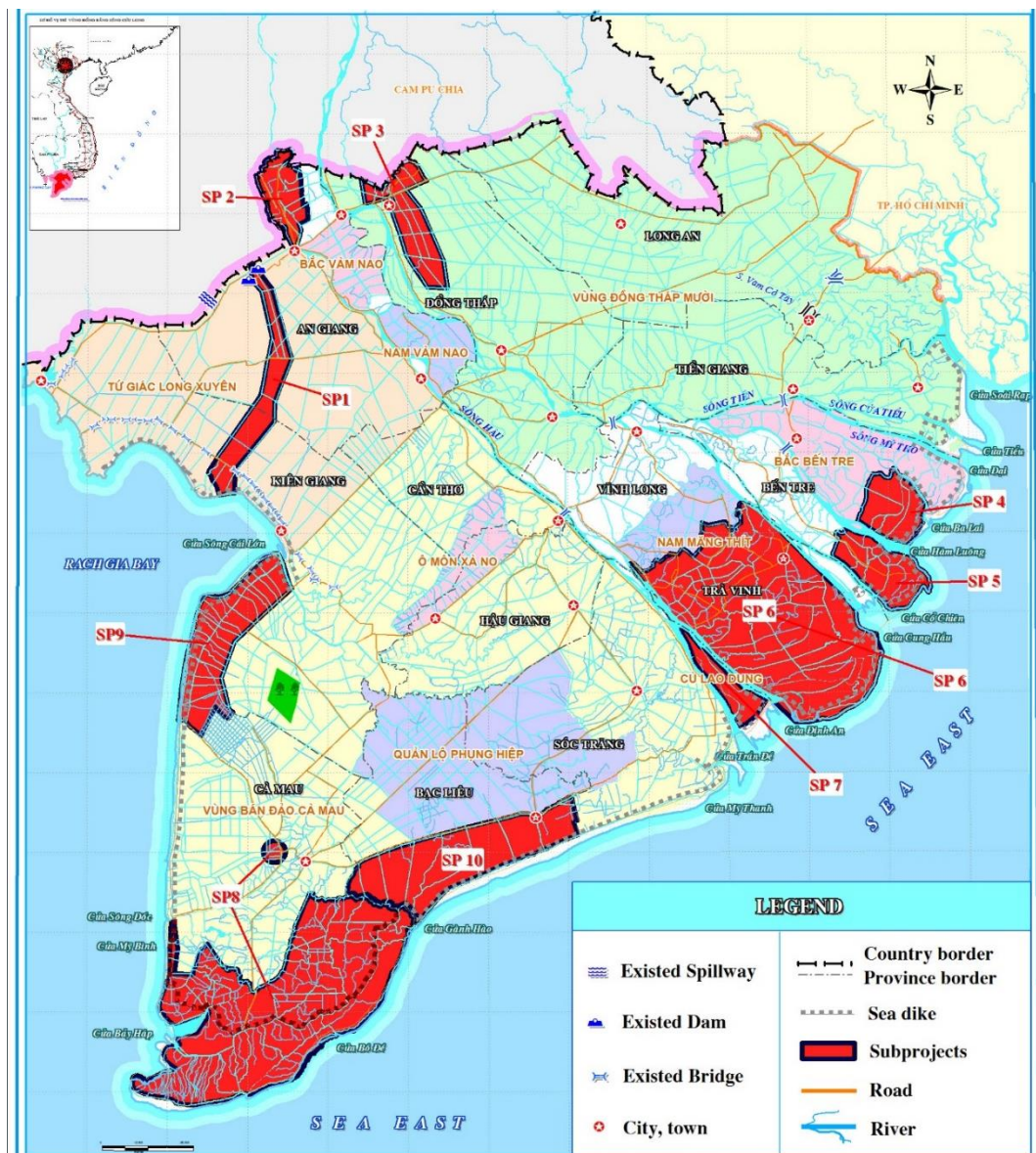
Component 5: Project Management and Implementation Support (Est. US\$ 12.1 million, of which US\$9.2 million will be financed by IDA)

This component will be split into project management support and capacity building for Ministry of Natural Resources and Environment (MONRE) and Ministry of Agriculture and Rural Development (MARD). This component is expected to provide incremental running costs and consultant and advisory services for overall project management, financial management, procurement, safeguards and monitoring and evaluation.

4. Project Area and Proposed Sub-Projects

The project will be implemented in 9 of the 13 provinces of Vietnam's Mekong Delta and includes 10 subprojects under Components 2, 3, 4, and other activities under Component 1. The locations of the subproject areas (indicated as SP1 through SP10) are presented in Figure 1.

Figure 1. MDICRSL project in the Mekong Delta and its subproject locations



Subproject Investment Types

Component 1 focuses on (i) upgrading and expanding monitoring systems for groundwater and surface water, and enhancing remote sensing technology; (ii) establishing a Mekong Delta Center to serve as a hub for Delta-wide information, and development of accompanying modelling tools; and (iii) financing the formulation of a *Mekong Delta Climate Resilience Assessment* which help guide the next round of Vietnam government planning. Small civil works in construction of water resources monitoring stations and the delta center is anticipated.

Components 2, 3, and 4 of the project will support investments for (i) improving water resources management and flood retention; (ii) supporting adaptive and resilient agricultural/aquacultures systems; (iii) mangrove restoration and coastal protection; and (iv) improving coastal livelihoods. A typical subproject may involve two or more of the following small to medium scale investments:

- Upgrading of provincial and community and rural roads for community resilience
- Rehabilitation and reinforcement of low dikes in the floodplain, upgrading sea and river dikes to create sediment areas for mangroves or for flood/salt intrusion regulation and control, and embankments to protect against storm surges
- Construction of infield sluice gates and culverts through the sea dykes to regulate salinity levels that support appropriate livelihood models
- Construction of weighbridge and flood spillways for enhancing flood drainage capacity
- Construction and rehabilitation of specific irrigation systems including dredging canals for water regulation and water quality improvement
- Construction of a reservoir for freshwater water supply
- Mangrove planting, restoration, and protection
- Development of climate-resilient livelihoods models in each of the three zones targeted by the Project, including floating rice, conversion of rice to other high economic value crops, extensive aquaculture, and rice-shrimp and mangrove forest-shrimp models
- Sustainable agriculture/ aquaculture systems which includes appropriate climate-resilient land use/zoning and water resources management
- Capacity building (including training) for specific livelihood activities

Components 2, 3, and 4 will comprise 10 subprojects. The first phase subprojects (4) been identified as indicated in

Table 1, and detail investment activities/items of these subproject is summarized in Section 10, Summary of First Year Subprojects.

Table 1: Summary of Subprojects (with 4 first year subprojects)

No.	Name of subproject	District	Province	Remarks
Component 1: Enhancing Monitoring, Analytics, and Information Systems				
Component 2: Managing Floods in the Upper Delta				
SP1	Enhancing the ability of flood drainage and climate change adaptation for the Long Xuyen Quadrangle		An Giang, Kien Giang	
SP2	Enhancing the ability of adaptation and water management for the upper part of Bassac River in An Phu district An Giang province	An Phu	An Giang	First year Subproject
SP3	Improving the ability of flood drainage and developing stable livelihoods, climate change adaptation in the Plain of Reed (the northern districts of Dong Thap province)		Dong Thap	
No.	Name of subproject	District	Province	Remarks
Component 3: Adapting to Salinity Transitions in the Delta Estuary				
SP4	Infrastructure to develop stable livelihoods for people in the coastal area in Ba Tri, Ben Tre to adapt to climate change	Ba Tri	Ben Tre	First year Subproject
SP5	Infrastructure to improve livelihoods for people to adapt to climate change in the North Thanh Phu district, Ben Tre province	Thanh Phu	Ben Tre	
SP6	Infrastructure to control spring tide and salinity to support agricultural activities and adapting to climate change in district of Cau Ke (Tra Vinh province), Tra On and Vung Liem (Vinh Long province)	Cau Ke Tra On Vung Liem	Tra Vinh. Vinh Long	First year Subproject
SP7	Infrastructure for production transition in accordance with ecological conditions, improving livelihoods, adaptation to climate change in Dung island		Soc Trang	
Component 4: Protecting Coastal Areas in the Delta Peninsula				
SP8	Infrastructure to prevent coastal erosion, supply fresh water and for production of shrimp - forest model to improve livelihoods and adapting to climate change in the coastal area of Ca Mau Province		Ca Mau	
SP9	Infrastructure to prevent coastal erosion and to support aquaculture production in An Minh and An Bien districts, Kien Giang province	An Minh An Bien	Kien Giang	First year Subproject
SP10	Infrastructure for ecological forest protection and development, livelihood improvement, and climate change adaptation in Hoa Binh, Dong Hai, Phuoc Long, and Hong Dan districts		Bac Lieu	
Component 5: Project Management and Implementation Support				

5. Environmental Assessment Process and Legal Framework

According to Government Decree No. 18/2015/ND-CP dated 14 February 2015 regarding regulation on Strategic environmental assessment (SEA), environmental impact assessment (EIA), environmental protection plan (EPP), the project is required to prepare four ESIA's for the subprojects SP2, SP4, SP6, and SP9 for the first year of implementation.

The MD-ICRSLP triggers the following nine WB safeguard policies: (i) Environmental Assessment (OP/BP 4.01); (ii) Natural Habitats (OP/BP 4.04); (iii) Pest Management (OP/BP 4.09); (iv) Forests (OP/BP 4.36); (v) Dam Safety (OP/BP 4.37); (vi) Indigenous Peoples (OP/BP 4.10); (vii) Physical Cultural Resources (OP/BP 4.11); (viii) Involuntary Resettlement (OP/BP 4.12); and (ix) Projects on International Waterways (OP/BP 7.50).

Although most subprojects are expected to have moderate adverse impacts on the environment, the project is proposed as Category A for environmental assessment, given the potential construction and operation of a water reservoir for water supply and fire prevention (in Cau Mau subproject scheduled for second phase) which would be located adjacent to U Minh Ha National Park in Ca Mau province, and thus may have significant impacts on natural habitats and biodiversity of the national park. The complicity of water resources issues and the significant impacts of land acquisition due to project activities are also anticipated, as well as potential future induced impacts when pilots are scaled up.

Summary of the actions taken to address the applicable safeguards policies is given in Table 2.

Table 2. Summary of safeguards policy actions taken and will be undertaken under the project.

Safeguard Policy	Actions
Environmental Assessment OP/BP 4.01	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - Category A project - Environmental Assessment Executive Summary prepared - REA, RSA, ESMF, RPF, EMPF prepared for the project - Four first year subprojects were screened and categorized as Category B subprojects, and their ESIA's, RAPs, EMDPs were prepared. - Preparation of ESIA's, RAPs, and EMDPs of second phase subprojects during implementation will follow the ESMF, RPF, and EMPF
Natural Habitats OP/BP 4.04	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - The project will not impact any protected area nor will it affect important/endangered flora or fauna species or biodiversity areas of high value. However, construction and operation of water infrastructures such as sluices gates have small potential impacts on natural habitats of the rivers, canals, and estuaries. Impacts and mitigation measures were identified and will be included in the relevant subproject ESIA's.
Forests OP/BP 4.36	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - Coastal protection/restoration aims to restore coastal landscapes to enhance resilience of inland farming systems, reduce vulnerability to the impacts of sea-level rise and coastal erosion. Forest Management Plans will be prepared for mangrove reforestation undertaken as part of Project.
Pest Management OP 4.09	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - Potential increased use of pesticides, and pollution and disease from shrimp farming. A Pest Management Framework is appended to the ESMF.

Safeguard Policy	Actions
Physical Cultural Resources OP/BP 4.11	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - The project is not expected to have potential impacts on important PCRs such as cultural, historic, or religious monuments. There will be relocation of graves which are considered PCRs in Vietnam. In case of finding of important PCRs, a PCR Management Plan will be prepared in consultation with local stakeholders and religious/cultural authorities. As the project includes dredging/excavation activities, chance find procedures will be included in ESMPs, civil work contracts.
Indigenous Peoples OP/BP 4.10	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - EMPF and two first phase subproject EMDPs were prepared - Preparation of subproject EMDPs during implementation will follow guidance under the EMPF
Involuntary Resettlement OP/BP 4.12	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - Project RPF and three first phase subproject RAPs were prepared - Preparation of subproject RAPs during implementation will follow guidance under the RPF
Safety of Dams OP/BP 4.37	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - The project may fund the construction of a water reservoir for water supply and fire prevention. No structure will be higher than 10 meters, and the dam and reservoir are not anticipated to pose any hazards. In line with OP/BP 4.37, the ESMF has provisions for meeting the requirements of the policy, including ensuring the involvement of qualified engineers.
Projects on International Waterways OP/BP 7.50	<p>This policy is triggered.</p> <ul style="list-style-type: none"> - The project activities fall under the exceptions to the riparian notification requirements set out in paragraph 7(a) of OP 7.50
Projects in Disputed Areas OP/BP 7.60	<p>This policy is not triggered</p> <ul style="list-style-type: none"> - None of the proposed project sites are in a Disputed Area.

6. Summary of Potential Impacts and Mitigation Measures

Environmental and social impacts have been identified and assessed in detail –both at the regional level as well at the project-specific levels. These impacts are reflected in the various safeguards instruments including the REA, RSA, four ESIAs, three RAPs, and two EMDPs. Appropriate management and mitigation measures at both the regional and project-specific levels have been proposed following standard good practices. This section summarizes the likely main environmental impacts associated with each of the 4 first year subprojects. The predicted impacts and recommended mitigation measures are detailed in the relevant sub-project ESIAs, RAPs, and EMDPs.

6.1 Regional level impacts

Regional Environmental Assessment (REA). Given the types and locations of the proposed subprojects and the nature of social conditions and water resources management in the lower part of Mekong Delta, a Regional Environmental Assessment (REA) was conducted to provide strategic recommendations to guide the Project design.

Regional Social Assessment (RSA). The overall objective of the RSA is to better understand the impacted communities so as to improve community engagement in long-term delta investment planning processes and to ensure long-term sustainability and client ownership of the proposed investments. The assessment engaged with subproject communities to better understand current climate change adaptation practices and identify potential social impacts that may result from the proposed World Bank livelihood adaptation models.

The findings suggest that the construction of proposed works might cause long term impacts on current livelihood models which may have to change to adapt to the impacts of the proposed investments (dyke reinforcement, sluice gates etc.), to the new environmental situation and to the impacts on climate change. With the shift to new livelihood models that are more climate resilient and sustainable, farmers are expected to diversify their production and consequently increase their income. Some HH may be more reluctant to change (i.e. elderly, ethnic minority households, poor and landless or land poor households) and may need specific support to help them transition to more climate resilient livelihoods.

The REA recommended that the project should implement measures to monitor and manage the regional/sub-regional impacts by: (a) enhancing monitoring of surface water, groundwater and fisheries in project areas during construction and operation of water control infrastructure, supported by groundwater use studies; (b) monitoring of riverbank and coastal changes to determine the effectiveness of investments in coastal protection; (c) establishing zones and flexible management for freshwater and brackish aquaculture considering participatory approach for determining operating schedules of water control infrastructure; (d) step-by-step implementation of livelihood models including agricultural extension and market services; (e) involve MONRE and other agencies to use the modeling developed for the project for coastal erosion, salinity intrusion and the transport of sediments and nutrients to the upper delta floodplains; (f) incorporating lessons learned from ongoing WB projects in the Mekong Delta; and (g) apply the lessons from the implementation of the three first-year subprojects into the design and operation of subprojects in Phase II.

Key follow-up activities may involve Project area environmental and social surveys; GIS mapping of any problem areas or hotspots; hydrological modeling to determine changes in flow in the upper delta, estuary, and peninsula; hydraulic modeling to determine effectiveness of sluices, canals and water control infrastructure; reviewing yield (t/ha), price and farm-based income for alternative cropping; and enhance flood and drought early warning systems in relation to agriculture and aquaculture in the three hydro-ecological zones

6.2 Project-level impacts

Project-level positive environmental and social impacts

The project is expected to bring about significant positive changes to the Mekong Delta region in terms of (i) enhanced capacity of the region to adapt to climate change impacts due to development of sustainable climate resilience livelihood models; (ii) increase in agricultural productivity (and related benefits of poverty reduction and economic development) due to appropriate fresh water-

salinity regulation and flood control; (iii) improved water quality due to reduced use of fertilizers, pesticides, and chemicals used in agriculture and aquaculture; and (iv) increased mangrove cover for enhancing ecological restoration and reducing coastal erosion.

Project-level negative social and environmental impacts

Key generic and site-specific impacts are highlighted in the following paragraphs, while more detailed specific impacts and mitigation measures for each subproject are addressed in Section 8. The main social impacts/risks due to construction of civil works and implementation of livelihoods models would include: (i) loss of crops, trees, livelihoods, and other properties due to permanent and temporary land acquisition and relocation of households; (ii) farmers' reluctance/resistance to changes in livelihood models; (iii) low preparedness of farmers in implementing the livelihood models; (iv) disproportionate impacts/benefits from project activities on the more vulnerable such as poor, elderly, and ethnic groups; and (v) relocation of graves.

Ethnic minority people (Khmer and Cham) are present in the project area and they are not affected by the land acquisition associated with the first year subprojects. The Khmer are the poorest and most vulnerable group and make up a large proportion of the poor and landless. They often work as hired laborers on the rice and aquaculture farms as well as collect natural aquatic resources to sell to aquaculture farmers as feed stock for shrimp. With the proposed investments, EM households may have to adapt or change their current livelihood models to more climate resilient ones. The project sites do not include physical cultural resources; however, during implementation of subprojects, relocation of graves is likely to be necessary. These impacts are considered moderate, long term, unavoidable, and could be mitigated through effective consultation and adequate compensation.

Typical and site-specific environmental adverse impacts during pre-construction, construction, and preparation of the water infrastructures (including sluice gates) and implementation of livelihoods models include: (i) safety risk due to UXOs; (ii) increased nuisance from dust and noise; (iii) water and land pollution due to waste generation; (iv) interference with local agricultural and aquaculture activities; (v) sedimentation and water pollution on agricultural land and in aquaculture ponds; (vi) exposure of acid sulfate soil from excavation activities; (vii) interruption in irrigation and/or domestic water supply; (viii) risks to health and safety of local people and construction workers; (ix) disturbance of local road and waterway traffic; (x) temporary blockage of fish passes to the rivers and canals; and (xi) water use conflict among rice farming, aquaculture, and salt production water users.

Some of these site-specific impacts are detailed below.

Sedimentation and temporary and permanent drainage. Surface erosion, and erosion of materials, soil piles and sediment carried in surface run-off from work sites can cause small to moderate adverse impacts on agriculture, aquaculture land, and water bodies close to these sites.

Acid sulfate soil (ASS) and hazardous soil. Excavation associated with the construction of sluice gates and dredging of canals may expose acid sulfate soils and release hazardous substances resulting in contaminated sediment. However, acid from ASS and hazardous substances may not be a serious problem along the project alignment as recorded in the field surveys.

Interruption in irrigation and aquaculture water supply. Water supply interruption is likely during construction. This impact occurs due to constructions of sluice gates, spillways, embankments. Most of the residents live in rural areas and depend on agricultural and aquaculture livelihoods. The interruption of water supply for rice cultivation and aquaculture ponds may result in lower incomes.

Impacts from the increased use of agrochemicals. Some upstream project areas may have more freshwater for rice irrigation, which may lead to an increase in the use of agrochemicals –resulting in impacts on water quality and aquatic life in the subproject and downstream areas.

Increase of water use conflict due to improper sluice gate system management. If the operation of the sluice gate systems is not appropriately managed, it may result in increased water use conflicts.

Potential impacts and risks of aquaculture models. Implementation of aquaculture models may have potential impacts from the use of antibiotics, improper disposal of sludge from shrimp or fish farms, and risks from fish and shrimp disease, causing water pollution and losses in income.

Temporary blockage of fish passages to the rivers and canals. Operation of the sluice gates may temporarily block fish passages to in-field rivers and canals, affecting their route for migration, food, and breeding.

Induced impacts. The ESIA's recognized that during project implementation a limited number of sustainable livelihood models will be piloted, with no anticipated significant negative impacts on the environment. However, in the longer term (beyond the Project life), scaling up of some of these models if not properly managed may result in changes in land use, and increased pollution on a wider scale which may significantly affect the environment and biodiversity in the region.

Long term impacts. The construction of proposed works will have long term impacts on current livelihood models which may have to change to adapt to changing environmental conditions and climate change impacts. The shift to new and more sustainable, climate-resilient livelihoods is expected to help farmers diversify production and increase incomes. All farmers will receive support such as training and transfer of knowledge from pilot livelihood demonstrations models, or by using farmer cooperatives or collective groups to implement livelihood adaptation models in order to reduce the risks for farmers. Some HH may be more reluctant to change (i.e. elderly, ethnic minority households, poor and landless or land poor households) and will need specific support in order for them to adapt their livelihood. Change in the institutional arrangement in agriculture in the Mekong Delta is expected by using farmer cooperatives or collective groups to implement the livelihood adaptations. Forming new cooperatives, or implementing through existing cooperatives, will help to instill farmer confidence through collective risk sharing, particularly with risk-averse farmers that may be unwilling to adopt the new adaptation models.

6.3 Management/Mitigation of Regional Impacts

The REA assessed regional/ sub-regional positive and negative impacts of Components 2, 3 and 4 related to the following activities: Upgrading and constructing new infrastructure; Dredging; Installing water/flood control structures in the upper delta; New livelihood models in the upper delta; Installing water/salinity control structures in the estuary and peninsula; New livelihood models in the estuary and peninsula; Expanding aquaculture and shrimp farming; and Protecting mangrove forests in coastal areas; and Reservoir and water and sanitation facilities.

The REA found no major adverse regional negative impacts resulting from the proposed project and that the regional adverse impacts can be mitigated through implementation of the subproject ESMPs. Summary of regional impacts for Components 2, 3 & 4 and measures for their management are presented in Table 3. To enhance government capacity for taking regional impacts into account, Component 1 has specifically included activities to improve monitoring systems, strengthen planning tools for mainstreaming climate resilience, and creating decision support systems and a Mekong Delta Climate Resilience Assessment to feed into provincial and delta-wide plans and investments.

Table 3: Summary of Regional Impacts for Components 2, 3 & 4

Activity	Demand on natural resources	Significant impacts <i>Intensity/Extent/Duration</i>	Impact Rating	Management measures
Upgrading and constructing new infrastructure	Physical conversion of land for embankments, dikes, sluices and associated infrastructure.	• Change in landform <i>M/Lo/Lt</i>	Moderate	• Subproject ESIA and ESMP, community, district and provincial authorities, MARD to monitor.
		• Loss of vegetation covers, agricultural land and habitat <i>W/Lo/Lt</i>	Minor	• Subproject ESIA and ESMP, community, district and provincial authorities monitor.
		• Increased dust, noise, vibration, wastes, and possible social issues such as graveyard relocation <i>M/Lo/Lt</i>	Moderate	• Subproject ESIA and ESMP, contractors, community, district and provincial authorities to monitor.
		• Local traffic disturbed during construction <i>W/Lo/Lt</i>	Minor	• Subproject ESIA and ESMP, contractors, community, district and provincial authorities to monitor.
Dredging	Dredging of approximately 150-200km of land (ha).	• Loss of vegetation covers, agricultural land and habitat <i>W/Lo/Lt</i>	Minor	• Subproject ESIA and ESMP, community, district and provincial authorities monitor.
		• Increase in suspended solids in water due to disturbances of bottom sediment <i>W/Lo/St</i>	Minor	• Subproject ESIA and ESMP, contractors, community, district and provincial authorities to monitor.
		• Contamination of land and water from disposal of dredged material (volume) <i>M/Lo/St</i>	Moderate	• Subproject ESIA and ESMP, contractors, community, district and provincial authorities to monitor.
Installing water/flood control structures in the upper delta	Increased flood retention in project area. Changes in hydrological flow and land use.	• Surface water quality issues from conversion to aquaculture and freshwater shrimp <i>M/Sr/Mt</i>	Moderate	• Subproject ESIA and ESMP, contractors, community, district and provincial authorities to monitor.
		• Increased flood retention in the upper Delta <i>H/R/Mt</i>	Moderate	• Modelling and flood forecasting to determine areas flooded and non-flooded in wet, average and dry years.
		• Increased nutrients and sediments during flood season <i>M/Lo/Mt</i>	Moderate	• Climate smart farming to reduce fertilizer and pesticide use
		• Reduced flood risk to downstream provinces <i>H/R/MT</i>	Moderate	• Hydraulic modelling to determine extent of flooding in wet, average and dry years
		• Protection of high value agriculture (fruit trees) <i>M/Lo/Mt</i>	Moderate	• Modelling to determine impacts of flooding in wet, average and dry years
		• Conflict over water use <i>M/Lo/St</i>	Moderate	• Livelihood programs to support transition and management of operations
		• Improved ecosystem connectivity from changes in hydrological flow <i>M/Sr/Mt</i>	Moderate	• Monitoring of freshwater fish and aquatic species

Activity	Demand on natural resources	Significant impacts <i>Intensity/Extent/Duration</i>	Impact Rating	Management measures
New livelihood models in the upper delta	Pilot areas of land (ha) for alternative farming.	<ul style="list-style-type: none"> Increased income from converting from triple rice to rice + aquaculture <i>M/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Ensure livelihood programs included access to market and agricultural extension for new crops
		<ul style="list-style-type: none"> Increased surface water pollution from freshwater shrimp and aquaculture <i>M/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> Integrated Pest Management (IPM) and sustainable agricultural practices
		<ul style="list-style-type: none"> Increased fertilizer and pesticide use for new vegetable crops <i>M/Sr/St</i> 	Moderate	<ul style="list-style-type: none"> Climate smart farming and sustainable agricultural practices implemented
Installing water/salinity control structures in the delta estuary and peninsula	Changes hydrological flow and land use.	<ul style="list-style-type: none"> Salinity intrusion affects existing freshwater agriculture areas <i>M/Sr/Lt</i> 	Moderate	<ul style="list-style-type: none"> Transition supported by livelihood programs. Determine zones for freshwater and brackish farming.
		<ul style="list-style-type: none"> Barrier to fish migration and ecosystem connectivity <i>H/R/Lt</i> 	Minor	<ul style="list-style-type: none"> Fish ladders installed on sluice gates, fish and biomonitoring in project areas
		<ul style="list-style-type: none"> Conflict between freshwater and aquaculture water uses <i>M/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> Transition supported by livelihood programs. Determine zones for freshwater, brackish and saline farming.
		<ul style="list-style-type: none"> Surface water quality impacts when opening sluice gates <i>M/Lo/St</i> 	Minor	<ul style="list-style-type: none"> Climate smart farming and sustainable agricultural practices implemented
		<ul style="list-style-type: none"> Groundwater aquifers impacted by salinity intrusion <i>M/Sr/Lt</i> 	Moderate	<ul style="list-style-type: none"> Ensure groundwater monitoring and groundwater use studies are conducted in project areas.
		<ul style="list-style-type: none"> Reduced coastal erosion <i>H/R/Lt</i> 	Moderate	<ul style="list-style-type: none"> Remote sensing technology to monitor changes in coastal erosion.
		<ul style="list-style-type: none"> Reduced damage from storm surges and sea level rise <i>M/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> Monitor sea dikes and embankments following storm surges and flooding.
		<ul style="list-style-type: none"> Improved resilience of farmers <i>H/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Transition supported by livelihood programs. Monitoring to determine boundaries for freshwater and brackish farming.
Development of livelihood models in delta estuary and peninsula	Pilot areas of land (ha) for brackish aquaculture.	<ul style="list-style-type: none"> Increased income from high value aquaculture <i>M/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Ensure livelihood programs included access to market, agricultural extension and capacity building for new crops
		<ul style="list-style-type: none"> Livelihood programs not provided to Khmer, other ethnic minorities and women <i>M/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Ensure livelihood models are communicated to all communities in pilot and surrounding areas
		<ul style="list-style-type: none"> Surface water quality issues of aquaculture and shrimp farming <i>M/Sr/St</i> 	Moderate	<ul style="list-style-type: none"> Integrated Pest Management (IPM) and sustainable agricultural practices

Activity	Demand on natural resources	Significant impacts <i>Intensity/Extent/Duration</i>	Impact Rating	Management measures
Expanding aquaculture and shrimp farming	Conversion of land for sustainable shrimp farming.	<ul style="list-style-type: none"> Reduced income for intensive shrimp farmers <i>M/Lo/St</i> 	Moderate	<ul style="list-style-type: none"> Transition supported by livelihood programs.
		<ul style="list-style-type: none"> Conflict between fresh and brackish water uses <i>M/Lo/St</i> 	Minor	<ul style="list-style-type: none"> Transition supported by livelihood programs. Monitoring to determine land use changes in the project area.
		<ul style="list-style-type: none"> Improved surface water quality from reduced intensive shrimp <i>M/Sr/Lt</i> 	Moderate	<ul style="list-style-type: none"> VietGap standard to develop operational guidelines for water management systems
		<ul style="list-style-type: none"> Reduced use of groundwater <i>M/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> Groundwater use studies and monitoring implemented in project areas.
Protecting mangrove forests in coastal areas	Increased area of mangroves in coastal areas.	<ul style="list-style-type: none"> Increased mangrove forest areas and biodiversity <i>H/Sr/Mt</i> 	Major	<ul style="list-style-type: none"> Implement coastal fisheries management and Forest Management Plan
		<ul style="list-style-type: none"> Increased protection from coastal erosion and sea level <i>H/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> MARD/MONRE to monitor sites of mangrove restoration zone and establish area for protection.
		<ul style="list-style-type: none"> Establish mangrove-clam farming systems <i>M/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Reduces need for intensive shrimp farming, and promotes sustainable use of resources.
Reservoir and water and sanitation facilities	Physical conversion of land for water storage (ML) and flood control.	<ul style="list-style-type: none"> Surface water pollution during collecting of wastewater <i>M/Lo/St</i> 	Minor	<ul style="list-style-type: none"> Water quality monitoring programs during construction and operation.
		<ul style="list-style-type: none"> Improved access to water and sanitation <i>M/Lo/Mt</i> 	Moderate	<ul style="list-style-type: none"> Infrastructure development supported by water and sanitation livelihood programs.
		<ul style="list-style-type: none"> Increased freshwater for agricultural and domestic use in dry season <i>M/Sr/Lt</i> 	Major	<ul style="list-style-type: none"> Implemented with climate smart agriculture and water conservation measures
		<ul style="list-style-type: none"> Reduced groundwater abstraction in dry season <i>M/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> Groundwater use studies and monitoring implemented in project areas.
		<ul style="list-style-type: none"> Dam safety risks to surrounding communities <i>H/Sr/Mt</i> 	Moderate	<ul style="list-style-type: none"> EA and dam safety assessment for subproject

Note:

- **Impact intensity** is evaluated as high (H), medium (M), or weak (W)
- **Spatial extent** is evaluated as regional (R), subregional (Sr), or local (Lo)
- **Duration** is evaluated as long-term (Lt), medium term (Mt), or short term (St)
- **Color codes:** Blue for positive cumulative impacts; Grey for negative cumulative impacts

6.4 Management/Mitigation of Project-Specific Impacts

This section summarizes the management and mitigation measures associated with the project-specific sites. Since most of the impacts are construction-related and contractors will be generally the ones in control of the construction site, contractors are required to prepare their own Contractor's Environmental and Occupational Health and Safety Plan (CEOHSP) which incorporates all construction-related measures in the ESMP and the World Bank Group Environment, Health and Safety Guidelines (EHS guidelines) and good practices, including good housekeeping at construction site, waste management, provision of adequate water and sanitation facilities, provision of safety corridors/passageways, installation of barrier fences around dangerous areas and wearing of PPEs. The CEOHSP will be reviewed and approved by the CPO before construction can commence in the site. Detailed the mitigation measures for social and environmental impacts identified in the first year subprojects are included in four ESIA's (including accompanying Environmental and Social Management Plans), three RAPs, and two EMDPs. The table below provides common impacts, mitigation measures and instrument of implementation.

Table 4: Common impacts, mitigation measures and instrument of implementation

Common Impacts	Typical Mitigation Measures	Instrument
Increased nuisance from dust	<ul style="list-style-type: none"> - Regular watering of affected areas during dry days. - Imposition of vehicular speed limits in residential areas. 	ESMP CEOHSP
Increased nuisance from noise	<ul style="list-style-type: none"> - Avoid construction activities at night. - Ensure all equipment are in good condition. 	ESMP CEOHSP
Temporary increase in sedimentation of receiving water channels and increased turbidity of surface water	<ul style="list-style-type: none"> - Reuse of non-hazardous construction spoils and disposal of construction spoils and excess soils into designated sites. - Stockpiling excavated materials from water channels and runoff. - Provision of perimeter canals around stockpiled materials. - Regular clearing of canals and drainage. - Practice of good construction site housekeeping. 	ESMP CEOHSP
Increased health and safety risks for the local residents and workers due to exposure of hazards from construction activities, non-resident population and traffic	<ul style="list-style-type: none"> - Provision of barriers/fences and warning signs at dangerous areas. - Imposition of speed limits in residential areas. - Medical screening of workers by the contractors. - Provision of adequate water and sanitation facilities at campsite. - Wearing of personal protected equipment (PPE). - Provision of temporary safe passageways for residents. - Proper waste disposal and good housekeeping. 	ESMP CEOHSP
Interruption in irrigation and aquaculture water supply	<ul style="list-style-type: none"> - Proper scheduling and timing of affecting repair activities. - Consultation with farmers/users of water. - Prevent emptying of reservoir such as by using a cofferdam around portions to be repaired/constructed. - Keeping the old inlet operational. - Provision of alternative sources. 	ESMP

Common Impacts	Typical Mitigation Measures	Instrument
Damage to existing infrastructure due to construction traffic especially the hauling of embankment materials	<ul style="list-style-type: none"> - Contractor to undertake regular repairs of construction routes. - Construction of temporary detours to avoid weak bridges. 	ESMP CEOHSP
Loss of crops, trees and other properties due to permanent and temporary land use by the subproject.	<ul style="list-style-type: none"> - Conduction consultations with the affected households for an agreed compensation plan. - Implement the agreed compensation plan. 	RAP
Possible land and soil degradation in the construction sites and vicinities include lands used for temporary easements and quarries due to compaction, litters, improper disposal of construction wastes and spoils.	<ul style="list-style-type: none"> - Contractor to practice good construction site housekeeping. - Avoidance of spillages of fuel, oil and grease. - Disposal of construction spoils into the designated landfill only. - Clearing and restoration of construction sites after completion. - Practice proper waste collection and disposal system. 	ESMP CEOHSP
Loss of land (land use rights) of some households due to permanent land use by the subprojects	<ul style="list-style-type: none"> - Undertake consultation with the affected households and agree a resettlement/compensation plan which is compliant with the World Bank OP/BP 4.12. - Undertake the process of land clearance. - Implement the resettlement plan. 	RAP
Possible chance finds of archaeological sites, artefacts	<ul style="list-style-type: none"> - Adopt a Change Find Procedure. 	Chance Find Procedure
Possible encounter of unexploded ordnance (UXO)	<ul style="list-style-type: none"> - Immediately stop activities, secure the site and contact authorities. Contact details of the authorities should be available. - Follow UXO procedure. 	UXO Procedure
Lack of means for lodging complaints or claims for compensation of damage during construction	<ul style="list-style-type: none"> - Set up a Grievance Redress Mechanism for the sub-project 	Grievance Redress Procedure in ESMP

Management of dredged materials. A sampling survey suggested that dredged materials from excavation during construction of sluice gates and dredging of canals are mainly silt and clay with high organic content and low levels of heavy metals. Therefore, the materials could be used for dikes, roads, construction of houses. However, other areas may contain acid sulfate soil and /or heavy metals and toxic chemicals and could be an issue. During detailed design PPMU will prepare a Dredge Materials Disposal Plan (DMDP) containing: (a) detailed estimate of the nature and quantity of dredged materials; (b) chemical analysis of the dredged materials; (c) indicative lands for disposal; (d) communication plan for local residents informing the quality of the dredges and any restriction on the use for housing construction and gardening in case the materials found to be unsuitable; and (e) inventory of planned road and dikes to transport the dredged materials.

Management of the use of pesticides and agrochemicals. GoV has been promoting a number of integrated pest management (IPM) practices to reduce the use of pesticides and agrochemicals both for rice, fruit, vegetable, and shrimp farming. Promotion of the IPM practices will be continued and the project will support necessary training and scale up of the activities found to be effective in the Mekong Delta. A Pest Management Framework (PMF) has been prepared and included in the ESMF. It will be for preparation of Pest Management Plan for relevant subprojects and/or activities that promote the use of toxic agrochemicals to be implemented under Components 2, 3, and 4.

Management of water use conflict. To reduce potential water use conflicts, the size of the sluices has been calculated to assure not only effective management of irrigation system but also balance the water need of different water users. Optimum operation and maintenance of sluice gates will be developed taking into account close communication and consultation with upstream and downstream water users to ensure water need both in terms of quantity and quality to the key water users.

Management of aquaculture wastes and disease. The project will adopt biosafety approaches which do not use pesticides and insecticides nor antibiotics for rice-fish and forest-shrimp models. For addressing environmental impacts of wastes and diseases in extensive and intensive aquaculture models, the project will follow the Vietnam Good Aquaculture Guidelines (VietGAP) and the EHS Industry Specific Guideline on Aquaculture. Capacity building and water quality monitoring will also be a focus.

Temporary blockage of fish passages to the rivers and canals. The sluice gates are expected to be closed in a short time, specifically 4-5 hours in 2-3 days in March and April of the lunar calendar to control saline intrusion and in 4-5 days during November and December of the lunar calendar to prevent flooding for the area. Therefore, the impacts on fish passage and migration are expected to be minor and no mitigation measures are required.

Temporary interruption of waterway traffic. Short closure periods of sluice gates will minimise disruptive impacts on waterway transport. Closing of the sluice gates will be made in close consultation with the local community and an announcement will be made to the public at least 1 month before the closing date.

6.5 Monitoring Responsibilities

Monitoring will focus on compliance with the ESMP and CEOSHP. This will be done by the project owner on a daily basis as part of the ground supervision of construction. Environmental quality monitoring will also be conducted by the project owner as part of the standard requirements of the national legislation.

- *The Central Project Office (CPO)*, through its Central Project Management Unit (CPMU), takes responsibility for supervision overall progress of the sub-project, including the implementation of environmental protection measures proposed in ESMP.
- *The Subproject Owners*, the Provincial Department of Agriculture and Rural Development, through their PPMUs, has responsibility for ensuring that the ESIA is effectively implemented. The sub-project owner will carry out the task, but not limited to the following: (i) Assign a qualified staff to be responsible for taking actions related to environmental safeguard and ensuring effective and timely implementation of ESIA; (ii) Assign a Construction Supervision Consultant (CSC) and/or field engineer to be responsible for supervision of the contractor's safeguard performance as part of the construction contract; (iii) Include the subproject ESMP/ECOP, into

bidding and contract documents and ensure that contractors are aware of these obligations; and (iv) Prepare monitoring reports to submit to CPO/WB.

- *Contractor Responsibilities:* Contractor is responsible for carrying out civil works and informs Subproject owner, local authority and community about construction plan and risks associated with civil works. As such, contractor is responsible for implementing agreed measures to mitigate environmental risks associated with its civil works as indicated in the ESMP and contractual documents.

7. Environmental and Social Safeguards Instruments

7.1 Environmental and Social Management Plan

A total of four Environmental and Social Management Plans (ESMPs) were prepared as part of the subproject ESIAs for the first phase subprojects. The objectives of the ESMPs are to: i) ensure compliance with the applicable provincial, national, laws, regulations, standards, and guidelines; ii) ensure that there is sufficient allocation of resources on the project budget for implementation of ESMP-related activities; iii) ensure that environmental risks associated with a project property managed; iv) respond to emerging and unforeseen environmental issues not identified in the subproject ESIA; v) provide feedback for continual improvement in environmental performance.

The ESMPs consist of the set of good practice mitigation measures to address common construction related impacts which referred to as Environmental Codes of Practices (ECOP), site-specific environmental and social measures to deal with the impacts specific to the subproject areas and activities. The ESMPs also include monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. Each subproject ESMP includes a Compliance Framework which lays out the role and responsibilities of the contractor and a penalty system to address non-compliance cases of the contractor to the environmental management requirements of the subproject. Each subproject ESMP also includes a Grievance and Redress Mechanism (GRM) to provide the framework within which complaints about environmental and safety issues can be handled, grievances can be addressed and disputes can be settled quickly. The GRM will be in place before the subproject construction commences. Finally, the ESMPs include the budgets for their implementation including for capacity building in project environmental management.

The subproject owners, which are the provincial Departments of Agriculture and Rural Development, through its Provincial Project Management Unit (PPMU), will include content of the corresponding ESMPs into the standard tender documents to be used as a basis for contractors to implement environmental management during construction phase. The Central Project Management Unit (CPMU) will be responsible for overall supervision and monitoring of the subproject including implementation of the ESMPs and will provide safeguard training to the subproject staff. The CPMU will assign an Environmental Safeguard Coordinator (ESC) and the Social Safeguard Coordinator (SSC) to assist in the coordination, supervision, and monitoring of safeguard implementation activities. Implementation of the ESMPs on the ground will be supervised monitored by Construction Supervision Consultant, Environmental Control Officer of the PPMU, and the Independent Environmental Monitoring Consultant hired by the CPMU.

ESMP implementation budget. The cost for ESMP implementation of each subproject will include: i) Cost for implementation of RAP will be financed by the Government; ii) Cost for implementation

of mitigation measures during construction, including consultation with local communities and water users, water quality monitoring, sediment analysis, and compensation for damages (if any) will be part of the subproject construction cost; iii) Cost for supervision of contractor performance will be part of the subproject supervision cost; iv) Cost for implementation of IPM activities will be part of the IPM program of the project as per the agreed work plan and approval by CPMU; v) Cost for the monitoring program including water quality/ecology monitoring during the subproject implementation will be part of the environmental monitoring cost; and vi) Cost for safeguard training of staff will be part of the subproject and/or project management as appropriate.

Environmental Monitoring Program. It is essential to design the monitoring program and monitoring frequency appropriately to be able to demonstrate both the overall performance of the project works as well as the short- term impact due to peak construction activities. More specifically, as the integral and critical part of each subproject ESMP, the environment monitoring program has the following objectives: i) Determine the actual extent of the impacts; ii) Control impacts which are generated from construction process and mentioned in ESIA report; iii) Check environmental pollution standards applied to the project during construction; iv) Check and supervise implementation of environmental protection solutions during construction based on ESIA report; v) Suggest mitigation measures in case of unexpected impacts; vi) Suggest to the Client to coordinate with central and local environmental organizations to solve pending issues relating to environmental protection under the scope of the Project; vii) Assess the effect of mitigation measures in pre-construction, construction and operation stages; and viii) Confirm the impacts forecasted in the ESIA.

7.2 Resettlement Action Plan and Ethnic Minority Development Plan

Resettlement Action Plans. Three full RAPs, including An Giang, Kien Giang and Tra Vinh Vinh Long) have been prepared. RAP for Ben Tre subproject is not required as the land acquisition for the 5 proposed sluice gates have been completed in another Bank funded project closed in 2013 (Vietnam Natural Disaster Risk Management Project – P073361). Total permanent land acquisition is estimated at 1,249,974 m² (especially 132,240, 1,100,00, and 17,734 in Kien Giang, An Giang and Tra Vinh/Vinh Long sub-projects). Temporary land acquisition, for the purpose of work space during construction, is estimated at 274,253 m². It is estimated that the total number of household affected by these subprojects is 823 (respectively 58, 752, and 13 in Kien Giang, An Giang, and Tra Vinh/Vinh Long sub-projects), of which 70 HHs (respectively 58 and 12 in Kien Giang and Tra Vinh/Vinh Long sub-projects) will need to be relocated. Vulnerable groups (poor, women head of households, disabled head of households) are also present and will receive special assistance. Based on the above, social impacts are significant for the An Giang and Kien Giang sub-projects and not significant for sub-projects in Tra Vinh/Vinh Long. The total estimated cost of RAP implementation is 304 billion VND equivalent to 13,600,000 USD.

Ethnic Minority Development Plans. Of the 4 sub-projects selected for first year implementation, two (Kien Giang and Tra Vinh/Vinh Long) have EM peoples present in the subproject areas. Most of the EM households are Khmers, with some Hoa and Cham. Among the three groups, the Khmer is the poorest and most vulnerable group, followed by the Cham while the Chinese have an equal standing with the Kinh. Khmers make up a large proportion of the poor and landless, and often work as hired laborers on the rice and aquaculture farms as well as collecting natural aquatic resources to sell to aquaculture farmers as feed stock for shrimp. In both subprojects, no EM will be affected through land acquisition and no adverse impact is anticipated during subproject preparation. However, with the proposed investments EM households, similar to the Kinh, may have to adapt or

change their current livelihood models. Being more vulnerable than the Kinh, due to high rate of illiteracy and low skills, these groups (especially the Khmers) will need additional support. EMDPs have been prepared for the Tra Vinh-Vinh Long and Kien Giang subprojects on the basis of social assessment conducted for respective subprojects, on the basis of the Regional Social Assessment (RSA) prepared for all sub-projects and on the basis of free, prior, and informed consultation with the EM peoples from these subprojects. These EMDPs aim to offer development opportunities for EM peoples present in the subproject area. Indeed, these two subprojects, once completed, will improve livelihood for the EM peoples (reduced flooding, less salinity intrusion etc.). Given the potential benefit of the two subprojects, as mentioned above, there was a broad community support from the EM peoples for these subproject implementation. These two first-year EMDPs will be further updated once the detailed design of the subprojects is finalized during project implementation.

8. Public consultation and Disclosure of Information

Public consultation. Two rounds of public consultations were carried out in October 2015 and January 2016 in the early and final stages of preparation of the project ESIA and social safeguard instruments. The public consultation involved directly affected inhabitants and local authorities in various manners such as public meeting, questionnaires, interviews, panel discussions and so on. Important information such as ESIA, REA, RSA, ESMF, RPF, EMPF, RAPs, and TORs, the preparation status of the ESIA and the public consultation plan has been disclosed on January 27, 2016.

The results of the public consultation indicate that most of the affected people are supportive of the MDICRSL project and have a good understanding of the potential benefits of the sustainable climate resilience livelihoods models arising from the project. Most of them are concerned about the policies concerning land acquisition, relocation and house demolition and thus expect a reasonable compensation for the loss due to land acquisition. The affected people also voiced their concern on the impacts on the community during construction and operation such as local community health and safety during construction, temporary obstruction of waterway transport, conflict of water uses, and local inundation due to sluice gates operations. Some local people who are producing salt are not familiar with the new model of mangrove-shrimp farming, and thus capacity building should be a priority. Feedbacks and recommendations of the consultation have been well taken and incorporated in the project and subproject designs and relevant safeguard instruments of the project.

Disclosure. In compliance with EA process requirements of Vietnamese government and the World Bank, prior to project appraisal the draft Environmental Assessment Executive Summary, ESIA, REA, RSA, ESMF, RPF, EMPF, RAPs, EMDPs have been disclosed in Vietnamese on the website of the Ministry of Agriculture and Rural Development, CPO and at local level, particularly at the subproject sites such as the offices of PPMUs, district PCs, Ward/Commune PCs. The draft English versions of these safeguards instruments have also been disclosed at the World Bank's InfoShop. The final safeguard instruments in Vietnamese will be finally disclosed locally at the project and subproject sites, and their final English versions will be also disclosed at the World Bank InfoShop in Washington DC on January 26 and 27, 2016, respectively.

9. Summary of Four First Phase Subprojects

9.1 Subproject 2: Enhancing the ability of adaptation and water management for the upper part of Bassac River in An Phu district An Giang province

The owner for this subproject is An Giang DARD, and the An Giang Construction and Investment Project Management Unit will be responsible for planning and construction. After construction, An Giang Irrigation Works Operated Limited Company will be responsible for the operation and maintenance. The World Bank will finance the subproject and funding for the counterpart will be from the state budget.

The objective of the subproject is through infrastructure investment, livelihood models are maintained and developed to assure that the local people can gain sustainable income even under flooding conditions, stabilize production, improve their livelihood at the present and the future, and facilitate people to live with the flood, and bring about the harmony with the nature.

The subproject will invest in structural and non-structural measures as follows:

- Construction of works in 3 communes in the East of Hau River, including: (i) Upgrade 11 low dike (dike for early floods protection) sections to retain flood water and develop transport during off-flood season with a total length of 61km; (ii) Build 15 open culverts for drainage, waterway transport for production in the area.
- Development of livelihoods models for local people include 4 models for Zone 4a (area for double rice crop): (i) Model 1: Spring rice farming season (Biosafety with no use plant protection chemicals) + giant river prawn; (ii) Model 2: Winter-Spring rice + crap crop + natural fisheries; (iii) Model 3: Floating rice + freshwater aquaculture + cash crop; and (iv) Model 4: Mushrooms growing in the flood season and 1 model for Zone 4b (area for triple rice crop): (i) Model 5: Support transition from three rice crop to two rice crop in Zone 4b.
- Develop an integrated pesticide management (IPM) program for rice in An Phu district – An Giang; Capacity building for cooperatives and for subproject implementation management staff; and Branding and market development for the product.

The subproject location and intervention areas are indicated in Figure 2.

Subproject environmental and social screening

The environmental and social screening according to the criteria described in the Bank's policy on environmental assessment has been carried out, and the result shows that the WB policies on *Environmental Assessment (OP/BP 4.01)*, *Pest Management (OP/BP 4.09)*; *Physical Cultural Resources (OP/BP 4.11)*; and *Involuntary Resettlement (OP/BP 4.12)* are triggered for this subproject. The main adverse impacts of the subproject are those related to land acquisition, construction activities, and operation of livelihood models. However, these impacts are short term, localized, of small to moderate magnitudes, and readily to be mitigated by the mitigation measures developed to the subproject. Therefore, the subproject has been categorized for a Category B for environment. To meet the Bank and government requirements on environmental assessment, the Client has prepared the subproject ESIA and RAP.

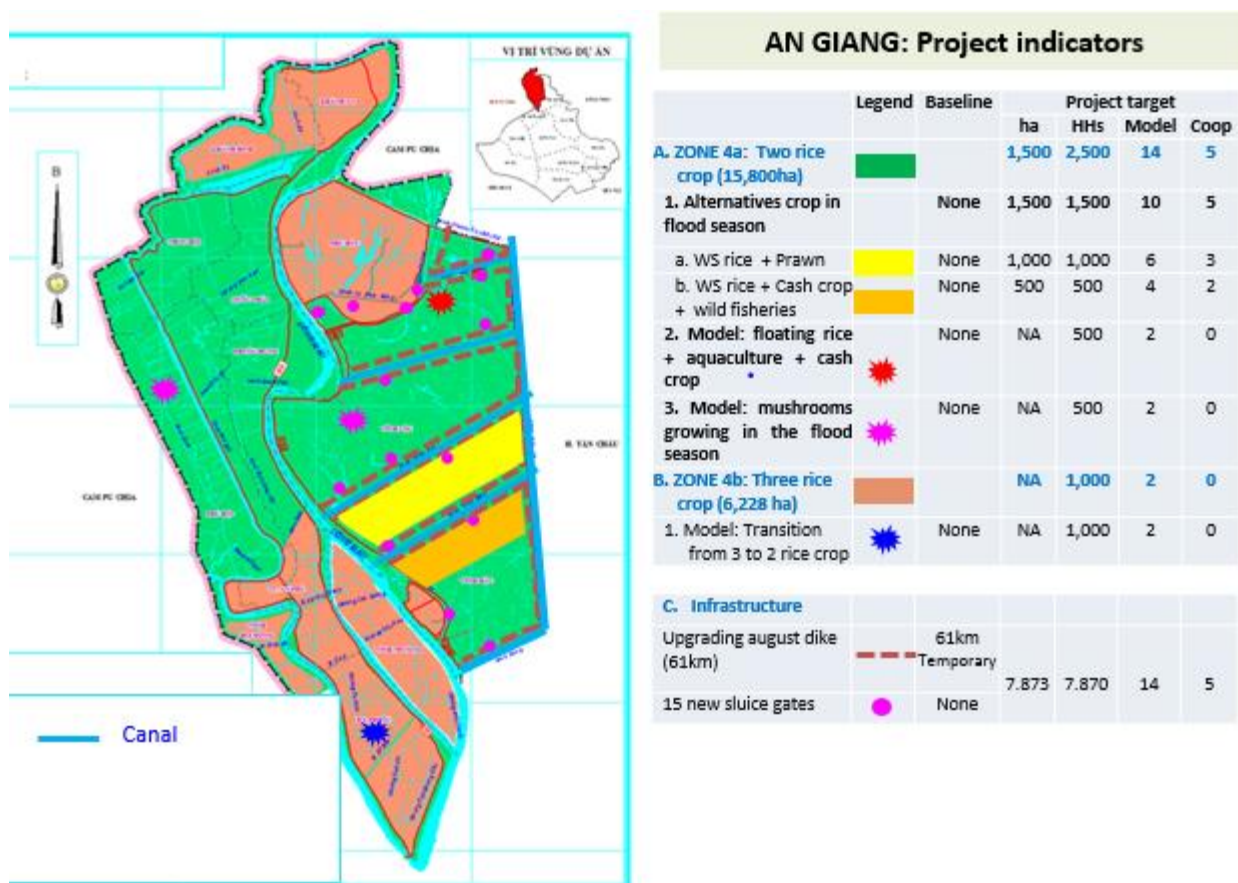


Figure 2. Subproject 2 locations and interventions

Subproject environmental and social baselines

An Phu district has a relatively flat topography; in the flood season (from August to December) under the natural condition, most of the district area is flooded with 2-3m deep of the water, seriously affecting the production and living conditions of the people. To mitigate the impact of flooding, many areas in the district (Vinh Truong, Da Phuoc, An Phu town, Vinh Hoi Dong, Khanh An, Khanh Binh and a part of Phu Huu commune) built complete flood protection dike, to maintain triple crop production. The remaining area does not have sufficient conditions for such flood protection dike construction; thus, the temporary flood protection embankments were built for double crop production (for Spring and Summer-Autumn seasons). Because these embankments are temporary, they are often damaged by the floods, and the local people have to spend billions of Vietnamese Dongs to repair annually. In some years, they are destroyed at the beginning of the flooding season, causing damage to the Summer-Autumn rice production.

In 2013, local people in the communes in the East of Hau River (Phu Huu, Vinh Loc, and Vinh Hau communes) developed a plan to build flood dikes in order to maintain triple crop rice farming. However, after considering the significant impacts of the construction that would substantially limit the flood discharge capacity and the large investment expenditures, the plan has not been implemented. If there is no solution for resilience with the flood, the local people will build their own flood protection embankments which will greatly affect the flood drainage of the area. Therefore, investment in necessary civil works to reasonably ensure production for the local people while still maintaining flood drainage capacity for this area needs to be fully considered.

Important natural habitats and nature conservation areas. An Giang houses a number of natural habitats and protected areas including four protected landscape areas under Decision No.1107/QĐ-BTNMT dated 12/5/2015 by the Ministry of Natural Resources and Environment, namely Sam mountain, Thoai Son, Tra Su, and Tuc Dup. Other critical natural habitats are Tram Chim forest, Cam, Tuong, Nuoc, Bay Nui, and Dai mountains, and Binh Thien lake. However, they are located within 10km-50km from the subproject area and would not be affected by the subproject activities.

Physical cultural resources. There are no important physical cultural resources within or in close proximity to the subproject areas, except the 23 graves that need to be relocated.

Ambient environmental quality. The result of environmental quality in the subproject area showed that water quality in the subproject area is relatively good, is not affected by organic pollution and acidity. Quality of Soil and sediment in the area is not seem affected by acidity and heavy metals. Air quality was very good.

Potential environmental and social impacts

Positive environmental and social impacts. The subproject is expected to bring about important positive changes to the local community in terms of (i) generation of higher income due to the proposed flood-related adaptation models that are designed to increase the flood retention area of the upper delta while at the same time ensuring more sustainable livelihoods by profiting from benefits of the floods; (ii) cost reduction for local people to maintain low dike systems after flood season and protection of shrimp farming activities; and (iii) improvement of water quality due to less soil erosion and sedimentation as a result of reinforced low dikes, and reduced use of fertilizers and plant protection agrichemicals of the livelihood models.

Negative environmental and social impacts during construction. The construction of 61 km of low dike and 15 sluice gates of the subproject will acquire permanently 110 ha of agriculture land and temporarily 15 ha of agriculture land in 3 communes of the subproject. There are 752 HHs affected through land acquisition, including 86 severely affected HHs (losing more of 20% of productive land or more than 10% for vulnerable HH) and 71 vulnerable HHs. No HH will be physically displaced and no ethnic minority people is affected. Other impacts are losses of crops (mainly rice), fruit trees and removal of 23 graves. Adverse impacts during pre-construction and construction also related to: i) risk of remaining UXOs after the war; ii) disruption of local road traffic on the dikes of Phu Huu, Vinh Loc, Vinh Loi, Vinh Hau, and Xang canals and waterway traffic safety; iii) pollution of the canals and agricultural land by construction spoils, domestic wastes and hazardous wastes; and iv) worker and community safety. However, these impacts are assessed as local, temporary, minor to moderate.

Risks associated with operation of livelihood models. The main adverse impacts as a result of implementing the livelihood models are the risks and threats to the local environment and people, including: (i) The development of large product outputs while not having a market may negatively impact the livelihood models of subproject; (ii) The locals have accustomed to rice production for many years so they have the technical expertise, and when shifting to new farming models, an inadequate technical guidance can lead to unsuccessful production, limiting the scaling up of the models on a broader scale; (iii) The conflicts over the use of water resources can arise if the boundaries between production models are not built appropriately.

Long term impacts. Farmers may also have to change their current livelihoods from 3 crops rice to 2 crops rice (winter-spring / summer-autumn) with wild fish capture. However, triple rice crop and

double-rice crop farmers, as well as floating rice farmers perceive the failure risks of flood-based livelihoods as relatively high and are reluctant to adopt risky aquaculture models in particular.

Mitigation Measures

Environmental and Social Management Plan (ESMP). Environmental codes of practices, a set of measures have been developed to mitigate common construction related impacts, site-specific impacts will be mitigated by site-specific mitigation measures such as: (i) Early announce households whose graves are relocated in order that they can arrange their embodiment in consistence with the spiritual practices of the people and compensate for the removal of graves will include the cost for buying of land for re-burial, excavation, relocation, reburial and other related costs which are necessary to satisfy customary religious requirements; (ii) embankment will be constructed in the dry season and completed before flooding. When the embankment is strong enough, the construction companies must reinforce its surface in order that it can withstand erosion during flood season. The construction companies must arrange working plan to ensure that the dike embankment is hardened when flood appears (before August); use field topsoil where the embankment pass to fill banks of local fields to separate them with the production area of people, to avoid water lost from the rice fields; at the locations where there are people's water pumps, when carrying out the construction, the construction companies must establish new water lines to ensure that the water supply for the rice fields inside ring dike is maintained. Both included in the subproject ESMP. These mitigation measures will be included in the civil work contractual documents and they will be implemented by the contractor, and enforced by the Construction Supervision Consultant (CSC) and the subproject owner. The cost for ESMP implementation is US\$200,000 (excluding costs to be included in the civil works contract, CSC contract).

Resettlement Action Plan (RAP). RAP has been prepared for to address the social impacts related to land acquisition and resettlement during project implementation. The household currently using the land will be compensated and supported sufficiently to comply with the World Bank's OP/BP 4.12 through the RAP/Compensation Plan. Total cost of compensation, support and resettlement for the sub-project 249,168,663,800 VND; equivalent to 11,098,827 USD.

Main site-specific mitigation measures. The risk of water use conflicts in the area among the three communes on the east side of the Hau River should be managed to avoid conflict emerging. It is unable to immediately transfer the whole production area in the region into the new model "1 rice crop and 1 fishery crop" which is highly expected by the subproject. This cannot be implemented completely within the next 10 years, meaning that in the coming time, once the subproject completes the model "2 rice crops and 1 rice crop + 1 fishery crop" it will still be in practice at the same time. Apparently, the use of the flood water for these 2 production models is different. The model 1 rice crop – 1 fishery crop needs water from the beginning till the end of the flood season while the model 2 rice crops needs to control/prevent the water from entering the field at the beginning of the flooding season to protect the summer-autumn crops soon to be harvested. Apparently the difference in using water sources leads to a need of having a clear cut boundary work between the two production areas strong enough to avoid a breakage of the low dikes when the floods arrive causing water overflows from the aquaculture zone into the rice production area. The incident causing embankment breakage for Model 5 and 6: Model 5 and 6 are developed in the 3 rice crops protection high dikes. This is a piloting model so there needs to have a dike to separate the piloting area with the remaining area. If the dike separating the remaining area with the piloting area is not strong enough, the risk of dike rupture is high, and impact from this incident will heavily affect the 3-crop production area. To build confidence for farmers who are reluctant to change of livelihood, pilot demonstrations should be

located in areas around the successful shrimp farming groups where it is more likely that farmer perceptions are more positive.

Consultation and information disclosure.

CPO and SIWRR organized and carried out 2 public consultation meetings in September, 2015 and January, 2016 in the subproject wards and communes. Final draft of the subproject ESIA report, the EMDP, and the RAP were sent to the World Bank for disclosure at the InfoShop in Washington DC in February, 2016. The Vietnamese versions of the reports were disclosed in CPMU office in Can Tho and DARDs Office in An Giang province and subproject sites accessible to locally-affected people.

9.2 Subproject 4: Infrastructure to develop sustainable livelihoods for people in the coastal area in Ba Tri, Ben Tre to adapt to climate change

The subproject owner is Ben Tre DARD, Ben Tre Agriculture and Rural Development Project Management Unit (PPMU) will be responsible in planning and construction, and Ben Tre provincial Department of Water Resources will be in charge of the subproject operation. The World Bank will finance the subproject and funding for the counterpart will be from the state budget.

The primary objective of the sub-project is to address the challenges related to salinity intrusion, sustainable and improved livelihoods for communities living in the 3 districts at the border of Ben Tre Province. The directly benefited area of the Subproject includes the 10 coastal communes of Tan Xuan, Bao Thanh, Bao Thuan, Tan Thuy, An Thuy, An Hoa Tay, Vinh Hoa, Vinh An, An Duc, Phu Ngai in Ba Tri district - Ben Tre Province. The subproject consists of the following activities:

ZONE 1: (2,484 ha): Restoring mangrove belt

- Additional mangrove planting in shrimp ponds (250 ha)/a.
- Certification of shrimp mangrove eco-farming.
- Training for 1,000 farmer households farmers.
- Certification of shrimp-mangrove eco farming for 1000ha.

ZONE 2: (7,940 ha): Improving sustainability of brackish water systems

- Building 5 sluice gates to reducing economic losses caused by high tides.
- Dredging/renovating 14 water canals to improve water quality for aquaculture.
- Improving biosecurity of shrimp aquaculture of 2500ha for 8 cooperatives including establishment of 8 farmer cooperatives, demonstration models for 1 site per cooperative, and training for 300 farmer households of 2500ha.

ZONE 3: (5,105 ha): Adaptation and mitigation for zone 3 (Saltwater intrusion)

- Demonstration model of rice - prawn culture training for 150 farmer households of 180ha.
- Farmer field school training for rice - prawn culture model.
- Raising Climate change awareness and supporting establishment of commune climate change response teams.

Other activities: Preparing and implementing commune action plans:

- Technical assistance (TA) assessments and planning for community action plans.
- Training for extension staff and farmers on GAP.
- Preparing and implementing commune action plans.

The subproject location and intervention areas are indicated in Figure 3.

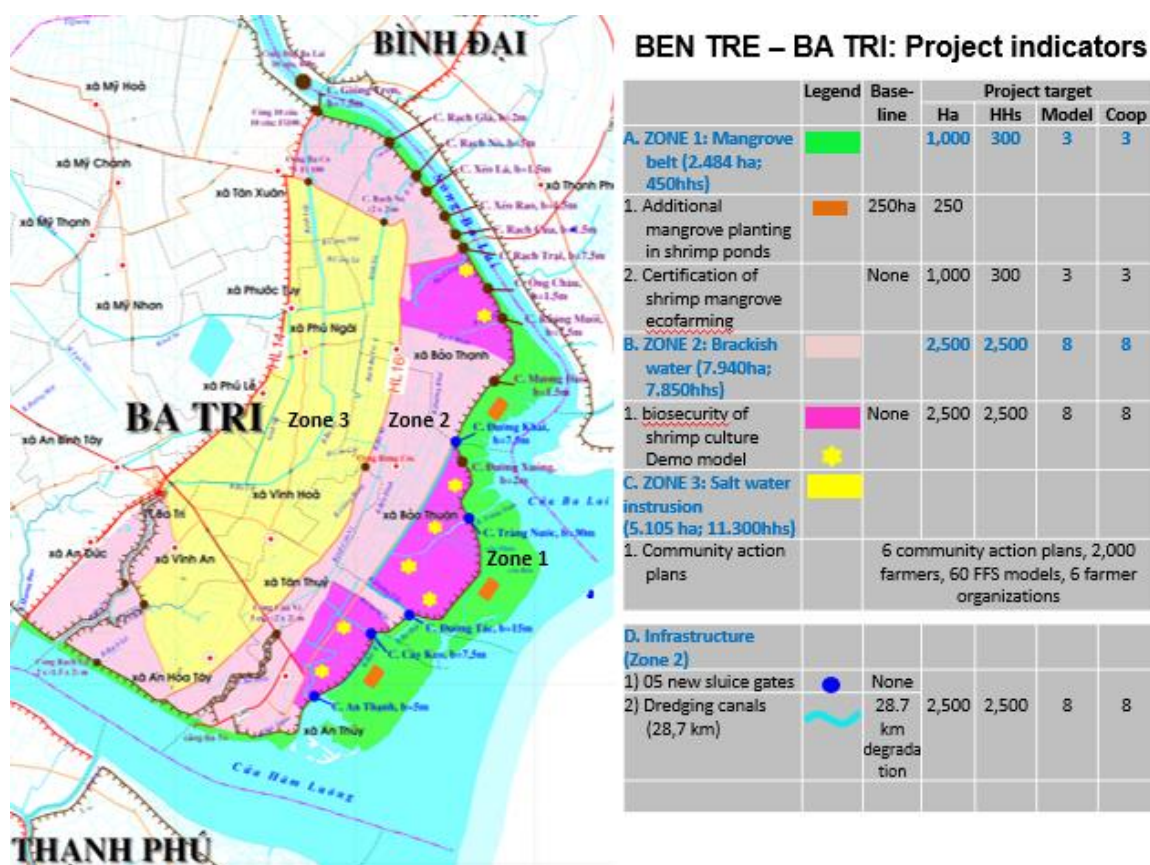


Figure 3. Subproject location and intervention areas

Subproject environmental and social screening

The environmental and social screening according to the criteria described in the Bank's policy on environmental assessment has been carried out, and the result shows that the WB policies on *Environmental Assessment (OP/BP 4.01)*, *Natural Habitats (OP/BP 4.04)*; *Forests (OP/BP 4.36)*; *Pest Management (OP/BP 4.09)* are triggered for this subproject. The main adverse impacts of the subproject are those related to land acquisition, construction and operation activities of the 5 sluice gates, and operation of livelihood models. However, these impacts are short term, localized, of small to moderate magnitudes, and readily to be mitigated by the mitigation measures developed to the subproject. Therefore, the subproject has been categorized for a Category B for environment. To meet the Bank and government requirements on environmental assessment, the Client has prepared the subproject ESIA.

Subproject environmental and social baselines

This subproject is located in Ba Tri district and in the South East of Ben Tre province. It faces the Eastern Sea, is located in between Ba Lai and Ham Luong river gates with 25 km length of coastline. There is a linked canals and rivers network which is strongly affected by the tides of Eastern sea and Ham Luong, Ba Lai rivers. The total directly impacted area of the sub-project is 15,529 ha for 98,000 people in the coastal communes of Tan Xuan, Bao Thanh, Bao Thuan, Tan Thuy, An Thuy, An Hoa Tay, Vinh Hoa, Vinh An, An Duc, Phu Ngai in Ba Tri district. *The lower elevation area (0.6 – 0.8m)* is located further inside the fields, therefore the drainage is not good when there are floods during rainy seasons. *The monthly average temperature* is rather high (26.8 – 27.3°C) and relatively stable in the year, the lowest temperature of the year is averagely 25.2 – 25.5°C in January and February.

The annual average rainfall is 1,250 – 1,500 mm. the storms frequency is rather low, but there are probable storms during November and December. *The area salinity* may rise up to 40‰. The salinity may increase gradually and reach to maximum level in April in Ham Luong river and February, March, April in My Tho river. The salinity decreases gradually to the rather low level in June and July. The salinity decreases gradually from river mouth inward and rapidly reduces when there is water from the upstream which bring water enough to dilute and push the salinity to the river mouth area. *Results of air quality analysis* shows the dust and noise levels are ranging within the acceptable limits according to the current regulations. *Water quality* in channels is quite clean and ranges within the standard limits. *The sediment* has a high salinity, heavy metal content is within the allowable limits. *The underground water* tested in the households well is highly polluted with TDS content exceeds 1 to 2.5 times of the standard, turbidity is 1.5 – 15 times higher than the standard, COD content is 10 -20 times higher, and coliform content is 1,000 times higher. *The average income* of the local citizen is around 28.70 million dong/year (equivalent to 1,300USD). The poor households rate in the sub-project area accounts for 20%. Most of the laborers are the farmers. All of them are Kinh ethnic. *The economy* of the region is diverse, including key areas of agriculture (rice, vegetable, horticulture in the residential land, seed & breeding, animal husbandry of buffalos, cows, pigs, goats, chickens, ducks...); fishery (shrimp farming, sea shrimp farming, clam feeding in the seashore, fish in the ponds, dams, salt marsh, garden canals, exploitation of internal fields and rivers, sea); forestry (protection afforestation, exploitation of wood, water coconut leaves); salt productions; industry (collecting, processing sea foods, fish ports) and handicraft services (small business, markets, small industrial handicraft: shrimp breeding farms, fish breeding, food for shrimp).

In the subproject area, there is 31km of Ba Tri sea dyke. There are 20 sluice structures under the dykes, but only 11 sluices have been constructed, 9 sluices are pending; therefore it is impossible to control the salinity in area 2 of the sub-project.

Road transportation network in the sub-project area is not developed. The road system is low and not evenly allocated, mainly developed near the national road areas. The road quality is bad; the technical structure of most of the road network is low; road pavement and surface is narrow. Most of the bridges in the communes and district's roads have low capacity, degraded and limited the transportation speed. The water way system in the area has 31 km coastline length, the river and canal networks are diversified, therefore the waterway develops highly serving the main local transportation means.

Important natural habitats and nature conservation areas. There are no critical natural habitats and protected areas in or in proximity to and can be affected by the subproject activities.

Physical cultural resources. There are no important physical cultural resources within or in close proximity to the subproject areas.

Potential environmental and social impacts

Positive environmental and social impacts. Implementation of the subproject present the following benign impacts to the environment and local communities: i) increase in economic value of local aquaculture products as a result of sustainable livelihoods ecological mangrove-shrimp, biosecurity shrimp aquaculture, and rice-shrimp models, contributing to poverty reduction in the subproject area and enhance community resilience to climate change; ii) improve water quality environment due to application of with good agriculture practices and reduced in aquaculture antibiotics used in the demonstration models.

Adverse environmental impacts. The main negative environmental impacts preconstruction and construction are related to safety risk of UXOs during site clearance, increased air pollution, noise and vibration, domestic wastes, and water pollution, worker and community health and safety, localized flooding due to the narrowing of the flow, and waterway traffic congestion and safety. However, these impacts are considered small to moderate, temporary and localized and can be mitigated through the effective implementation of the good construction management practices such as ECOP, construction supervision and quality supervision of the water/ecological environment quality. The specific impacts of the dredging process of 14 channels include waterway traffic congestion at the dredging sites, potential water pollution to the adjacent agricultural land, aquaculture ponds, salt production areas, and water quality in the canals due to dredging activities and disposal of dredged materials. However, the total dredged volume is only 431,133m³; the soil analyses indicates that the dredged materials are not contaminated with hazardous wastes or sulfate acid; this activities will be carried out on 28.7km of 14 canals; and the local households are located at least 200m from the dredging sites. Therefore, the impact of dredging would be small to moderate. Construction of the 5 sluice gates would also generate approximately 18-240m³ of spoils that can be managed through good construction management practices.

Adverse social impacts. No land acquisition is required as those activities have been completed in a Bank funded project (P073361). The concentration of workers may also lead to an instability in security at the local; increasing the risk of infectious diseases transmission.

The negative impact during the operation of the livelihood models mainly arise from: (i) The forest-shrimp model is aimed for good aquaculture practice (GAP) certification: the shrimp breeds are taken from the nature following in with the tides. The raising density of 1-3 fingerlings per m² is applied without additional feedstuff. The environmental impacts from this model are insignificant; (ii) The biological safety shrimp farming model: during the farming period, just adding a sufficient amount of feeding stuff, not using chemicals, only using environmental benign biological agents. The environmental impact is very small due to the compliance with the regulations and standards during the farming period. However, there are risks due to the uncontrolled situation of diseases on the shrimps; (iii) The rice – shrimp model: The impact level of this model on the environment is considered small; however due to the inability to control the breed source, the quality of water intake into the field, there are still risks associated with this model. Intensive rice growing farmers perceive the risks of intensive shrimp as relatively high in comparison to intensive rice and are reluctant to adopt risky aquaculture models.

The negative impacts of the operation of the sluice gates are those related to temporary closure of the sluice gates affecting waterway transportation, changing the water salinity and ecological conditions. However, the sluice gates are expected to be closed in a short time, specifically 4-5 hours in 2-3 days in March and April of the lunar calendar to control saline intrusion and in 4-5 days during November and December of the lunar calendar to prevent flooding for the area.

Mitigation measures

Environmental and Social Management Plan (ESMP). RAP for Ben Tre subproject is not required as the land acquisition for the 5 proposed sluice gates have been completed in another Bank funded project closed in 2013 (Vietnam Natural Disaster Risk Management Project – P073361). Environmental codes of practices, a set of measures, to mitigate common construction related impacts, and site-specific mitigation measures have been developed and included on the ESMP of the subproject. These mitigation measures will be incorporated in the civil work contractual documents

to be implemented by the contractor, and enforced by the Construction Supervision Consultant (CSC) and the subproject owner. The cost for ESMP implementation is US\$300,000 (excluding costs to be included in the civil works contract, and CSC contract).

Site-specific mitigation measures. To address impacts of the dredging, the construction will not be executed during the aquaculture and salt production water intake. However, to limit the unwanted impacts during executions, the construction units must closely coordinate with the local authorities and communities to exchange information through which solutions that would be best for water intake and construction activities, such as temporarily cease the execution work when the people need to take water. Regarding disposal of the dredging spoil, the demand for uses of these earth materials for backfilling in the area is extremely high at the same time the local government commits using these soils after being dried, for backfilling in the soil shortage area. Since the dredging materials are not contaminated with pollutants and the heavy metals they can be used as backfilling materials for the banks in the areas suffering from material scarcity. To mitigate this impact of sluice gate operation, the time for closing the sluice gates will be consulted closely with the local community and informed to the local people at least 1 week in advance. A detailed sluice gate operation schedule will be developed and distributed to the community. A monitoring program for water quality and ecology will be put in place for the first 2 years of the work operation to monitor the impacts (negative and positive) caused by the subproject. To build confidence for farmers who are reluctant to change of livelihood, pilot demonstrations should be located in areas around the successful shrimp farming groups where it is more likely that farmer perceptions are more positive.

Consultation and information disclosure.

CPO and SIWRR organized and carried out 2 public consultation meetings in September, 2015 and January, 2016 in the subproject wards and communes. Final draft of the subproject ESIA report was sent to the World Bank for disclosure at the InfoShop in Washington DC in February, 2016. The Vietnamese versions of the reports were disclosed in CPMU office in Can Tho and DARDs Office in Ben Tre province and subproject sites accessible to locally-affected people.

9.3 Subproject 6: Infrastructure to control spring tide and salinity to support agricultural activities and adapting to climate change in district of Cau Ke (Tra Vinh province), Tra On and Vung Liem (Vinh Long province)

The objective of the subproject is to address the challenges related to salinity intrusion, sustainable and improved livelihoods for communities living in the 3 districts at the border of Tra Vinh and Vinh Long provinces. The World Bank will finance the subproject and funding for the counterpart will be from the state budget.

The subproject includes investment items/activities in the three 3 zones of the project area as follows:

- *Zone 2: Brackish water aquaculture:* (i) Training for famers on Good Aquaculture Practices, climate resilience models; (ii) Establishment of 30 farmer organizations for 8,921ha area of aquaculture; and (iii) Additional planting mangrove trees of 728ha in shrimp ponds and support for obtaining certification of organically shrimp - mangrove eco-farming for 1921ha of 700 households in Long Vinh, Dong Hai communes, Duyen Hai district, Tra Vinh province.
- *Zone 3a: Salt water intrusion (lower area):* (i) Conducting campaign for raising local awareness of climate change impact; (ii) Supporting establishment of commune Climate Change response teams

for 20 communes; and (iii) Building capacity and necessary steps to allow smooth transition (a) from freshwater to brackish water system of 540ha by conducting 02 pilot demonstrations (1 pilot/cooperative) and field farming school for 500 households; and (b) raising aquaculture toward VietGap requirements for 2160ha by conducting 06 demonstration models (1 model/cooperative) and field farming school for 1800HHs.

- *Zone 3b: Saltwater intrusion (upper area):* (i) Conducting campaign for raising awareness of local people on climate change; (ii) Building 3 sluice gates to complete the South Mang Thit irrigation system as follows:
 - Tan Dinh sluice on Tan Dinh River: (i) two sluice gates (20m each); one transportation bridge (109.85m long and 6m wide); and (c) a management office of 120m²
 - Vung Liem sluice on Vung Lien River: (i) three sluice gates (20 m each); one transportation bridge (147.22m long and 6m wide) and (c) a management office of 120m².
 - Bong Bot sluice on Bong Lot Canal: (i) three sluice gates (20m each); one transportation bridge (147.22m long and 6m wide) and (c) a management office of 240m².
- *Other activities:* (i) Support for linking farmers to markets; (ii) Support for provincial organizations on establishing real-time water quality monitoring system to predict water quality in the canals supplying water for aquaculture; monitoring aquaculture seed quality; and monitoring aquatic animal (shrimp) disease.

The subproject location and intervention areas are indicated in Figure 4.

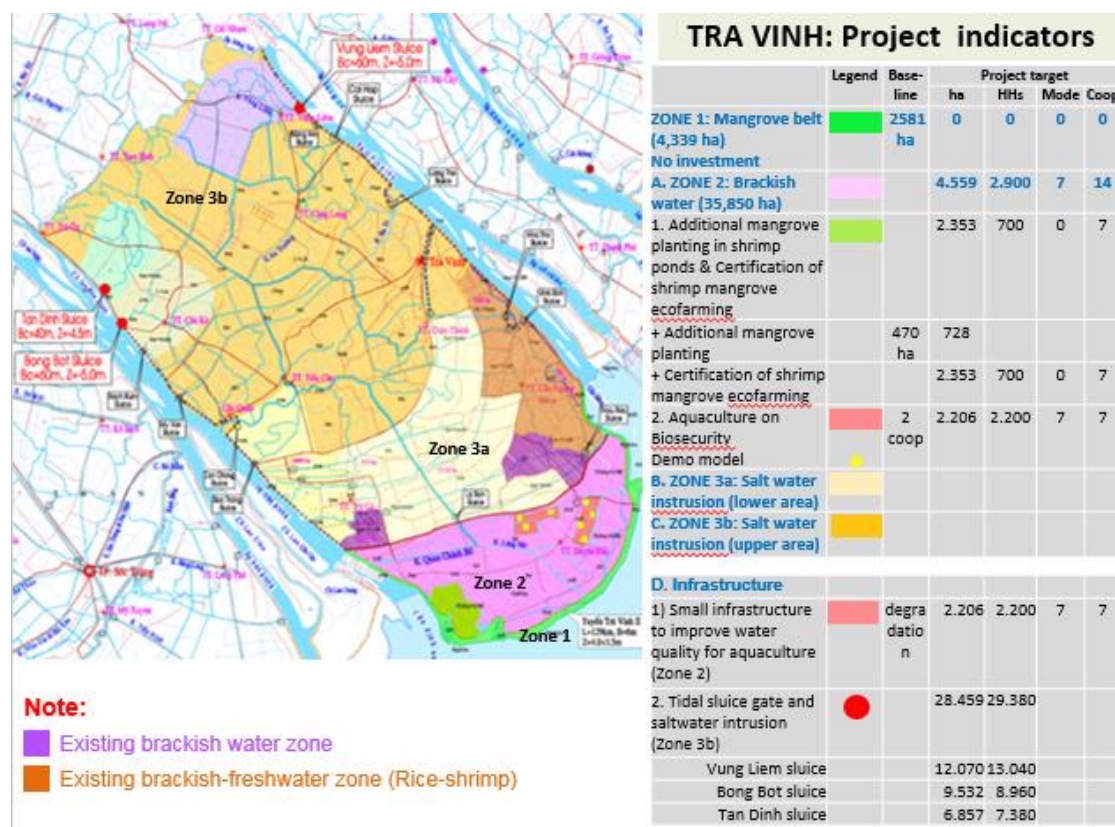


Figure 4. Subproject 6 locations and interventions

Subproject environmental and social screening

The subproject has been screened for environmental and social issues in accordance with OP 4.01, and the result of the screening shows that the subproject is not located within or near critical natural habitat and there are no rare or endangered species in the area. There are also no sites, structures or monuments with cultural, religious or historical significance within and in the vicinities of the construction site. There are significant ethnic minorities and they account for 23.6% of population in Cau Ke District (Tra Vinh Province). However, they generally do not live in cluster or communities but integrated with mainstream population, and impacts caused by the subproject will affect overall community, but not particularly to an ethnic group. There are no temples or any structure or sites with cultural, religious or historical significance in the subproject area, except for the 5 graves need to be relocated. The subproject is determined to triggers the Bank's operational policies on *Environmental Assessment* (OP/BP 4.01), *Natural Habitats* (OP/BP 4.04), *Forests* (OP/BP 4.36), *Pest Management* (OP/BP 4.09), *Indigenous Peoples* (OP/BP 4.10), and *Involuntary Resettlement* (OP/BP 4.12). The main adverse impacts of the subproject are those related to land acquisition, construction activities, and operation of the sluice gates and implementation of the livelihood models. However, these impacts are short term, localized, of small to moderate magnitudes, and readily to be mitigated by the mitigation measures developed to the subproject. Therefore, the subproject has been categorized for a Category B for environment. To meet the Bank and government requirements on environmental assessment, the Borrower has prepared ESIA, EMDP, and RAP for the subproject.

Subproject environmental and social baselines

The geographical scope of the subproject covers Vung Liem and Tra On district of Vinh Long province, and Tra Vinh province. The total area is approximately 265,931 hectares of natural land and 1.4 million people of influence. The boundaries of the subproject area (Figure 1.1) border Mang Thit River to the North-West, Co Chien River to the North, East Sea to the East and South - East, and Hau River to the South-West. It is the area with young alluvial soils affected by floods from the Mekong River, suitable for the development of agricultural production.

The impact of floods on the Hau River and Co Chien River deeply into the interior areas combined with high tides affect the water quality and crop cultivation. In the brackish water production (Zone 2), these areas are naturally characterized by low flows during the dry season which allow saline water to extend far inland. Over the past twenty years, closed freshwater systems designed for rice production have been developed in this area consisting of large polders ringed by dikes and with sluice gates to control saline water intrusion. The long-term sustainability of this strategy is questionable due to reduced dry season water availability and sea-level rise. In addition, farmers are rapidly converting to more profitable shrimp farms along the coast, often causing mangrove destruction, water pollution, shrimp diseases, and non-sustainability of shrimp farming. In the area of fresh water production (Zone 3b) and in the transition from freshwater to brackish water, after completion of construction in 2008, the South Mang Thit Irrigation System has been put into operation to serve for production and socio-economic development of Tra Vinh and Vinh Long province. However, in recent years, salinity of 4 g/l intrudes increasingly through the estuaries of Vung Liem river, Tan Dinh river and Bong Bot canal. In the dry season, the southern area of the irrigation system is lack of fresh water for production; environmental pollution increases; tidal erosion in some structures; salinity intrusion in some areas of the northern area of the subproject through the open gates.

Important natural habitats and reserves. In the Tra Vinh province, there are important protected areas such as Chua Hang bird sanctuary, Tra Cu bird sanctuary, Duyen Hai bird sanctuary, Long Khanh natural reserve, and Duyen Hai mangrove forest, and Ba Om lake. However, these sensitive receptors are located within 23km – 66km from the construction area and would not be affected by the subproject.

Physical cultural resources and recreational areas. The physical cultural structures in close to the subproject area include Hung Giao temple and An Tinh church which are about 300 m from Bong Bot sluice gate. The recreational beach of Ba Dong beach is located 66km from the construction area.

Ambient environmental quality. The results of environmental baseline analysis in the subproject area indicate that the air quality is quite good, the concentration of pollutants in the air such as sulfur dioxide (SO₂), nitrogen oxides (NO_x), dust are very low and meet the national technical regulation on ambient air quality. However, the noise in the area at certain times exceeds the regulation by the operation of boats and ship but the average noise is still within the permissible limits. Water quality in the shrimp farming areas is polluted. Soil and sediment are not affected by acidity and heavy metals.

Potential environmental and social impacts

Positive environmental and social impacts. The subproject will have significant environmental and social positive impacts including: i) increase in agricultural productivity and thus contributing to economic development due to optimum fresh water-salinity intrusion regulation and flood control; ii) increased growth and diversity of fresh water species and agricultural biodiversity due to adequate availability of fresh water sources; iii) improvement water quality due to reduced use of fertilizers, pesticides, and aquaculture chemicals; iv) enhanced capacity of the community to adapt to climate change adaptation due to implementation of sustainable climate resilience livelihoods models; v) better community health and social development due to provision of more freshwater, enhanced inland access to markets, basic services facilities such as schools and health care centers and cultural exchange in the region.

Adverse environmental and social impacts. The anticipated adverse environmental and social impacts are those related to (i) land acquisition and resettlement, loss of some vegetation cover at the construction sites; (ii) risk of unexploded ordnances (UXO) remained after the war; (iii) safety risks for workers and local community related to construction activities, operations of construction plants and vehicles; (iv) other common construction impacts such as dust, noise, vibration, solid waste, waste water and hazardous waste generation, temporary disturbances of aquatic natural habitats, and waterway safety. Most of these impacts will be minor to moderate, temporary and localized. The main concern during operation phase would be short obstruction of waterway transportation, increased water pollution near the sluice gate, and short period blockage of fish passages due to sluice operations, and increased traffic and consequent road safety issues. However, these impacts are assessed to be small.

The site-specific negative impacts of 3 sluice gates construction: (i) during preconstruction phase: removal of 5 graves and risk of unexploded ordnances (UXO) remained after the war; (ii) during construction phase: impact of vibration on Hung Giao and An Tinh temples located about 280m to Bong Bot sluice gate; impact of operation of 2 ferry at the construction sites of Bong Bot and Tan Dinh sluice gate; impact on waterway and fishery man at the in-river/canal construction sites due to narrow partly of cross -section of the Vung Liem and Tan Dinh river and Bong Bot canal; impact on aquatic life at the in-river/canal construction sites due to water pollution and canal bed disturbance; (iii) during operation: removal of the Bong Bot and Tan Dinh ferries; short obstruction of waterway

transportation, increased water pollution near the sluice gate (above 5% compare with “without subproject” in term of BOD₅ concentration); short period blockage of fish passes due to sluice operations, when closing the sluice gates, fish cannot pass from Hau river to Bong Bot canal and Tan Dinh river, Vung Liem river to Mang Thit river and vice versa; and increased traffic and consequent road safety issues. Most of these impacts will be minor to moderate, temporary and localized.

The site-specific negative impacts of livelihood models: (i) impacts on shrimp survival and biomass decreased significantly when the shrimp were cultured at the relatively higher concentrations of Rhizophora leaves and leachates; in contrast, moderate amounts of Rhizophora leaves or their leachates had positive effects on shrimps; impact on ethnic minorities: ethnic minorities (mainly Khmer) account for 23.6% of Cau Khe District (Tra Vinh Province). This represents 31,335 households. In the two districts located in Vinh Long Province, the number of EM household is very little. These EM households are potentially affected by the subproject due to the proposed livelihood improving models.

Long term impacts. Farmers may also have to change their current livelihoods (where suitable) to more sustainable brackish water activities such as mangrove-shrimp, rice-shrimp, and other aquaculture activities; and more water use efficiency in the dry season.

Mitigation Measures

In order to address the social impacts, a Resettlement Action Plan (RAP) and an Ethnic Minority Development Plan (EMDP) have been prepared and implemented during project implementation. To mitigate the adverse environmental impacts, an Environmental and Social Management Plan (ESMP) has been prepared as a part of the subproject ESIA. The common construction related impacts during construction phase would be mitigated by the contractor through the ECOP included in the ESMP and the civil works contract, and enforced by the Construction Supervision Consultant (CSC) and the subproject owner. The ESMP is estimated at US\$300,000, excluding costs to be included in the civil works contract, CSC contract and RAP.

Site-specific mitigation measures. During preconstruction: Early announce households whose graves are relocated in order that they can arrange their embodiment in consistence with the spiritual practices of the people and compensate for the removal of graves/ tombs will include the cost for buying of land for re-burial, excavation, relocation, reburial and other related costs which are necessary to satisfy customary religious requirement; clearance of the UXO remained at the construction areas; during construction: setting up new ferry terminals for Bong Bot and Tan Dinh ferries, arranging a speedboat to regulate, control, and guide waterway traffic for the ferry operation; pay attention to prevent dust, noise (if necessary, noise barriers will be installed) during construction, especially every 15th day, on the first day of the lunar month, and during festival days for An Tinh and Hung Giao temples; in-river construction activities of Tan Dinh sluice gate should be in steel sheet pile coffer dam to minimize the loss and disturbance of benthic habitats and organisms, and reduce suspended solids in the water column. To address the issues of obstruction of waterway transportation, water quality, temporary blockage of fish passes during operation, the sluice gates have been designed to ensure effective drainage and enable periodic/selective gate operation to accomodate water exchange. It is expected that the 3 sluice gates will be fully closed for approximately 4-5 hours on 2-3 days in March and April of the lunar calendar (during the highest tides in the dry season) to regulate salt water intrusion; and 4-5 days in November and December to control flooding during high tide for the subproject area. This operation will also minimise disruptive

impacts on waterway transport. Closing of the sluice gates will be made in close consultation with the local community and an announcement will be made to the public at least 1 month before the closing date. Water quality/ecology monitoring will be conducted for at least 2 years after construction to detect any unanticipated impacts. To address road safety issue, the subproject has been designed to minimize road safety hazards, and road regulations will be enforced by the local authority.

Resettlement Action plan. The construction of 3 sluices gates in the subproject will acquire permanently 17,734 m² of agriculture land and temporarily 16,243 m², (mainly garden land); 3,190 m² residential land will also be acquired permanently. Among the 13 affected, 12 HHs have to be relocated. There are 5 vulnerable HHs, and no HH of ethnic minorities is affected by land acquisition. Total cost of compensation, support and resettlement for the sub-project is 15,331,488,410 VND; equivalent to 682,917 USD.

Ethnic Minority Development Plan (EMDP). Ethnic minorities (mainly Khmer) account for 23.6% of Cau Khe District (Tra Vinh Province). This represents 31,335 households. In the two districts located in Vinh Long Province, the number of EM household is very little. No EM household is affected by land acquisition. These EM households are potentially affected by the Subproject due to the proposed livelihood improving models. The consultation with EM in the FPIC manner show that there is broad community support from EM peoples for the subproject implementation. Development activities have been proposed to maximize benefits for EM. These EM development activities include: i) Training to raise awareness of the community on husbandry and agricultural production; ii) Training to raise awareness of the community on climate change and adaption to changes in water resources, ecological and social. iii) Livelihood Development Training; iv) Develop livelihood models, with the participation of organizations, social organizations, coordinate the selection of models site, support technical guidance, implementation, monitoring and replicable results; Total budget for these Development activities is 2,969,250,000 VND (132,000 USD). EMDP will be further updated on the basis of the detailed design of the subproject.

Consultation and information disclosure

CPO and SIWRR organized and carried out 2 public consultation meetings in September, 2015 and January, 2016 in the subproject wards and communes. The participant included representative of Commune People's Committee, Fatherland Front Board, social organizations, the affected households and local people in project area. Environmental and Social impact assessment consultation. The affected households desire to get updated information on implementation progress of subproject. The affected households want to be compensated adequately according to the replacement cost for damaged assets and the market price for temporary affected farming products. Both male and female participate in local organizations and propose ideas relate to subproject; hence the gender issue has been ensured, 100% agree with the measures to minimize environmental pollution as presented in the report. Propose with project owner to apply appropriate regulations with commitment to minimize the adverse impacts as well as environmental quality management and supervision. In addition, a small consultation was held earlier. Final draft of the subproject ESIA report, the EMDP, and the RAP were sent to the World Bank for disclosure at the InfoShop in Washington DC in February, 2016. The Vietnamese versions of the reports were disclosed in CPMU office in Can Tho and DARDs Office in An Giang province and subproject sites accessible to locally-affected people.

9.4 Subproject 9: Infrastructure to prevent coastal erosion and to support aquaculture production in An Minh and An Bien districts, Kien Giang province

The Central Project Office (CPO) under Ministry of Agriculture and Rural Development (MARD) is responsible for project management of MD-ICRSL. The subproject owner is MARD, in which the representative of the owner is PPMU. The Kien Giang Provincial Project Management Unit (PPMU) will be responsible for planning and implementing while the Kien Giang Water Resources Department will be responsible for subproject operation. The World Bank will finance the subproject and funding for the counterpart will be from the state budget.

The subproject objective is to ensure protection people's lives, to prevent inundation due to spring tide, to regulate salinity and to ensure flood drainage for sustainable production and livelihood in An Minh and An Bien districts, Kien Giang province. The items/investment activities of the subproject will be implemented in the 2 regions and include: i) construction of 9 open-sluice gates on the western sea dike; ii) Construction of 10km wave breakers for protection of mangrove forest and prevent coastal erosion; iii) construction of soft embankment consisting of T-shape bamboo fences; and iv) implementing sustainable livelihoods demonstration models on raising *Andara granosa* under forest canopy, Mono culture shrimp 2 crops/year, polyculture of prawn (*Penaeus monodon*), community management shrimp-rice, and polyculture of prawn (*Penaeus monodon*) - rice integrated prawn (*Macrobrachium rosenbergii*). The locations of the activities and demonstration areas are presented in Figure 5.

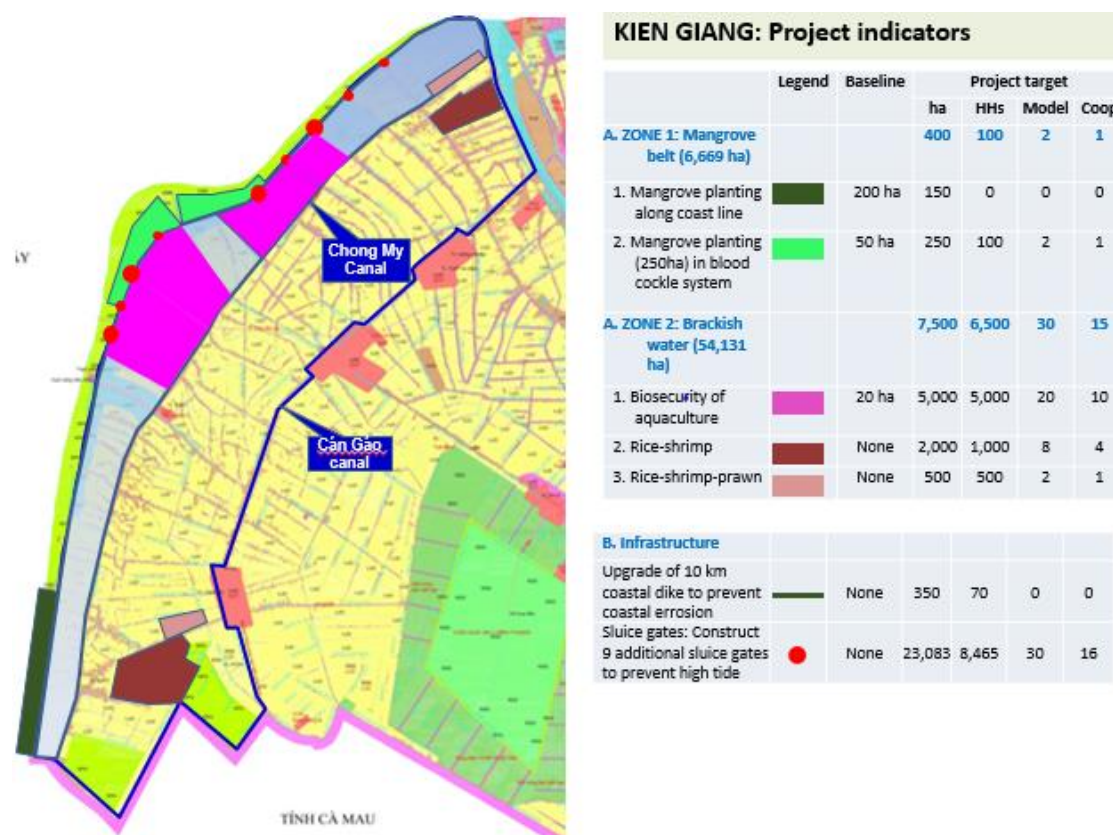


Figure 5. Subproject 9 locations and interventions

Subproject environmental and social screening

Environmental and social screening of the subproject was carried out in compliance with the Bank policy on Environmental Assessment (OP/BP 4.01), and the Bank safeguards policies on Environmental Assessment (OP/BP 4.01); Forests (OP/BP 4.36); Pest Management (OP/BP 4.09); Natural habitats (OP/BP 4.04); Indigenous Peoples (OP/BP 4.10); and Involuntary Resettlement (OP/BP 4.12) have been determined to be triggered for the subproject. The screening also indicates that the subproject would have potential adverse impacts that are minor to moderate, localized, temporary and can be mitigated. Therefore, the subproject has been categorized as a Category B subproject. The subproject Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), and Ethnic Minority Development Plan (EMDP) have been prepared in line with the government Environmental Assessment (EA) regulation and the Bank safeguards policies requirements.

Subproject environmental and social baselines

The subproject region locates in the following position: from 9°28' to 10°02' Northern latitude and from 104°51' to 105°06' Eastern longitude. The subproject has a natural area of approximately 60,899ha, located within the communes of Tay Yen, Tay Yen A, Nam Yen, Nam Thai, Nam Thai A, Dong Thai, and Thu Ba town - An Bien district; Thuan Hoa, Dong Hoa, Tan Thanh, Dong Hung, Dong Hung A, Dong Hung B, Van Khanh, Van Khanh Dongg, Van Khanh Tay communes and Muoi Mot town - An Minh district, Kiên Giang province. The subproject area suffers from saline intrusion frequently every year. According to the survey on the annual saline intrusion in the dry seasons for the years 2011-2012-2013 conducted by the Kien Giang Water Resources Department, it shows the salinity progressing as follows: the salinization starts from the beginning of January and ends by mid of May. The salinity level of 4g/l can intrude 8-30 km further inland. In the dry season, the salinity intrusion through the big rivers estuaries not yet having sluice gates as Cai Lon, Cai Be rivers, Can Gao channel comes in mainly with high tide, when the tide is low the salinity decreases. In recent years, the salinity intrusion has only happened at the big rivers and the branch channels connecting to the sea. In addition to some of the sluice gates having been constructed, the local government has annually invested hundreds of temporary embankments with an expenses of nearly 4 billion Dong/year aiming to help mitigate the salinity intrusion within the project region.

According to the ongoing measurements and assessment from the Southern Institute of Water Resources Research, the infield west of the Xeo Ro-Can Gao channels of the districts An Bien, An Minh, Tan Hiep has been salined with an average salinity of 18 % in many areas within the province in the dry season, whereas the highest record measured is 25%. Especially, from 16th to 21st February 2011, under the impact of the high tide, the salinity intrusion penetrated deeper into the new areas within the region impacting the irrigation water for production including the rice and non-rice crops. Particularly in the dry season, under long sunny drought, frequent salinity intrudes into Cái Lon, Cai Be rivers, through Xeo Ro-Can Gao channels, through Trem and Cai Tau rivers from Ca Mau, through Chu Chi, Vinh Phong, Cho Hoi channels from Bac Lieu, there were years when the project region seemed to be entirely salined. In addition, the inability to retain a fresh water source in the dry season also leads to water shortage for the summer-autumn crop causing delays in the farming schedule (due to the waiting for rains to produce),etc. tumbling the production plan and farming schedule of the Kien Giang agricultural sector.

Ambient environment quality. The results from the background environment analyses in the subproject area show that: i) The quality of air environment in the region is relatively good; ii) The

soil within the subproject region is not contaminated with heavy metals; iii) The water environment of the subproject is salinated with mild to moderate level of contamination, mostly with COD, BOD, nutrients and total Coliform, surface water has not been contaminated with toxic chemicals such as heavy metals and pesticides; and iv) The ecosystems in areas with high diversity mainly concentrate in the coastal mangrove forests with exploitation by people to make fish ponds, rice cultivation, non-rice crop.

Important natural habitats and reserves. In Kien Giang Province, there are some environmentally sensitive areas such as the natural wild seafood breeding area (clams, oysters, hairy cockles, etc.) in Rach Gia Bay area, U Minh Thuong National Park, coastal mangroves. However, these sensitive receptors are located within far from the construction area and subproject sites and would not be affected by the subproject.

Physical cultural resources and recreational areas. There are no important physical cultural structures within or in close proximity to the subproject area that can be affected by the subproject.

Potential environmental and social impacts

Overall, the subproject will bring about big socio-economic benefits: (i) Being proactive in managing the water sources for production, expanding farming area, limited risks, enhancing productivity and yields, land use efficiency, maximizing the potentiality and strengths of the region, creating agricultural production diversity, bringing about the plants, livestock with high economic values and stable markets into farming/production; (ii) Helping to improve the water supply sources, deacidification, desalination, retaining freshwater for the critical periods gradually improving the water quality for the people's water supply; (iii) Improving disaster preparedness, enhancing water and land transportation systems within the region, helping to promote services sector serving production as well as solving production outputs; (iv) Protecting ecosystem, being friendly and closely with human lives, proactively mitigating and preventing the pathogens; (v) Creating residential allocation, helping to adjust the population density, decreasing the mechanical population increase and its consequent social problems for the towns within the region. (vi) Creating income increase, improving livelihoods, lifestyles, cultures and spirits for the people, decreasing the number of poor households.

The construction of the 9 sluices along the sea dikes An Minh - An Bien will directly affect 58 households for land acquisition. An action plan for resettlement (RAP) has been prepared. There are 1,845 Khmer EM households potentially affected by the subproject, and thus an EMDP has also been prepared. Implementation and monitoring of execution of the RAP and EMDP will be carried out in accordance with safeguard policy of MD-ICRSL project. CPMU with the support of the Social Policy Coordination (SSC) and RAP and EMDP independent monitoring consultant (IMC) will monitor and report the compliance. Periodic consultation and information disclosure to the local community will be closely monitored.

Negative environmental impacts during the construction phase include:

- The sources of impact include transporting operations materials, excavation operation for site clearance preparation, construction activities for sluice foundations, formwork, construction and installation of sluices and bridges and activities of the workers. During this period, the maximum number of workers is 200 people/day, the total amount of wastewater generated is estimated 11.2m³/day, approximately 80 kilograms of garbage/day spreading over 10 construction sites

and will be treated, hence the waste collection activities of workers in this period is small and localized. The volume of soil and earth materials is around 53,391.66 m³ and approximately 33,978m³ from construction materials during transportation these might generate dust and exhaust gases into the environment. At the same time, dust is also generated during construction. However, this source of pollutants only affects at the areas of operation and downwind areas, directly impacting the employees working in the area and several neighboring households. At the same time, the total volume shipped during construction will increase the density of boats in-and-out on the channels/rivers however the water navigation in the area will not be affected much.

- In addition, the environment in the region is influenced by stormwater runoff, leading to wastes, sand and dust from the construction site down the canals/channels polluting the surrounding water environments, affecting the extensive shrimp ponds near the construction locations. Sluice construction process also affects the near surface groundwater.
- In addition, the gathering of workers (up to 200 people/day) would also affect general security, might create social abuse, and consume more available resources in the subproject region.

These above impacts are temporary, localized and can be mitigated through effectively implementing good construction management practices as describes in the Environment Code of Practices (ECOP) proposed for the subproject and monitoring water and ecological quality.

The negative impact of the operation: Once completed, the sluice gates will be operated for serving the production of 54,031 hectares of production land inside the dike, among which there are 18,100 hectares of land for aquaculture being converted from 2 rice-crop land and 2-rice-shrimp crop land, and 36,031ha of shrimp-rice land production being converted from 2-crop production land. The subproject area will develop in the direction of increasing aquaculture development, which will help increase the amount of waste water from fish ponds, especially the sludge from dredging operations of the pond causing water pollution, spreading disease and accumulating of the sediments in the channels. Then it is time to apply the Integrated Pesticide Management program. At the same time, once the bridges are completed, the road traffic in the region will develop causing risks in air pollution and traffic accident. To mitigate these impacts, the detailed design will include design and installation of traffic signals, street lights, signs being inconsistent with rules and regulations from the Government and international norms. During operation the local government will implement the safety regulations according to their responsibilities. Presently boats of various sizes move through the open dyke to access the coastal fisheries (both large scale and poor fishers), access the blood cockle raising mud flats, and to travel to other coastal locations. Depending on how the sluices will be built and operated, these canal users will be impacted during and after construction.

Mitigation measures

In order to address the social impacts, a Resettlement Action Plan (RAP) and an Ethnic Minority Development Plan (EMDP) have been prepared and implemented during project implementation. To mitigate the adverse environmental impacts, an Environmental and Social Management Plan (ESMP) has been prepared as a part of the subproject ESIA. The common construction related impacts during construction phase would be mitigated by the contractor through the ECOP included in the ESMP and the civil works contract, and enforced by the Construction Supervision Consultant (CSC) and the subproject owner. The ESMP is estimated at US\$300,000, excluding costs to be included in the civil works contract, CSC contract and RAP.

Resettlement action plan (RAP): The subproject will acquire permanently 132,240 m² of agriculture land, 6,882 m² of residential land and temporarily 108,000 m² of public land in 8 communes of the subproject. There are 58 HHs affected through land acquisition. All the 58 HH will need to relocate including 9 vulnerable HHs; no ethnic minority people is affected. All the 58 HH chose to self-relocate in the same commune. Other impacts are losses of crops, trees and structures. Total cost of compensation, support and resettlement for the sub-project is 39,393,725,680 VND; equivalent to 1,754,732 USD

The Ethnic Minority Development Plan (EMDP): There are 1,845 EM households (6,641 people) which are potentially affected by the Sub project due to the proposed livelihood improving models. No EM household is affected by land acquisition. The consultation with EM in the FPIC manner show that there is broad community support from EM peoples for the subproject implementation. Development activities have been proposed to maximize benefits for EM. These EM development activities include: i) Supporting development and replication of pig, chicken raising model, safe vegetable planting; ii) Training on agricultural production skill and non-agricultural job which can develop in the local such as sewing, embroidery, knitting...;iii) Supporting clean water system, toilets, road, rural bridge; iv) Enhancing cultural classes, disseminating laws and policies; v) Supporting communication activities; and vi) Capacity building and training for the project implementation units. Total budget for these Development activities is 1,413,250,000 VND (151,200 USD). EMDP will be further updated on the basis of the detailed design of the subproject.

There will need to be close consultation and communication with the community on sluice closures and operational schedules to reduce impacts on daily navigation by the local community.

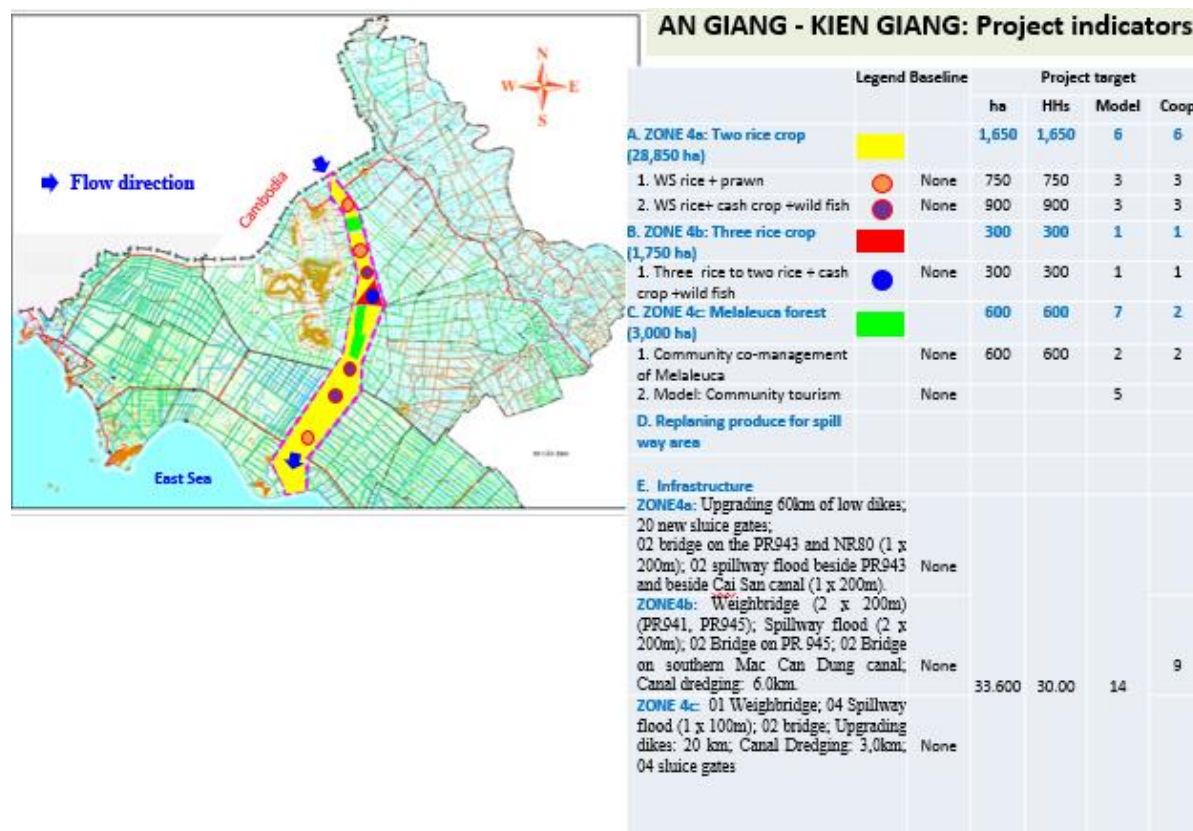
Public consultation and information disclosure

CPO and SIWRR organized and carried out 2 public consultation meetings in October 2015 and January 2016 in the subproject wards and communes. The draft subproject ESIA, EMDP, and the RAP in Vietnamese were locally disclosed at CPO, Kien Gian DARD and subproject district offices as well as at the subproject sites accessible to locally-affected people. Their English versions were also disclosed in January 2016 at the World Bank InfoShop. The final documents will be disclosed in February 2016.

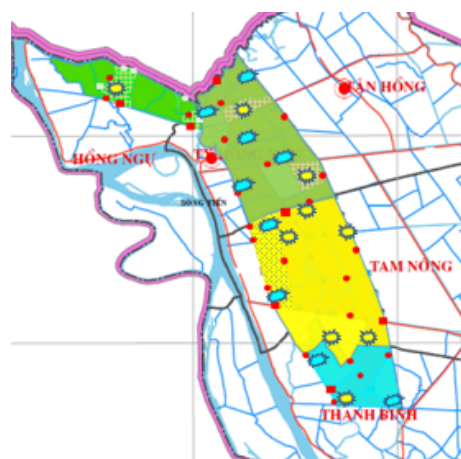
10. Indicative Second Phase Subprojects

The maps and tables below represent locations, potential intervention activities, and areas of the subprojects to be implemented in the second phase of project implementation.

Subproject 1: *Enhancing the ability of flood drainage and climate change adaptation for the Long Xuyen Quadrangle, An Giang and Kien Giang Province*



Subproject 3: Improving the ability of flood drainage and developing stable livelihoods, climate change adaptation in the Plain of Reed (the northern districts of Dong Thap province)



DONG THAP: Project indicators

	Legend	Baseline (Ha)	Project target			
			Ha	HHs	Model	Coop
A. ZONE 4a.1: Hong Ngu Dist (2,847ha)			1,800	2,500	7	7
1. Two rice + wild fish		335	1,500	1,500	6	6
2. Two rice + prawn culture		10	300	1,000	1	1
B. ZONE 4a.2: Hong Ngu town (7,347ha)			2,500	4,500	7	7
1. Two rice + prawn culture		120	500	1,500	2	2
2. Two rice + fish culture		20	2,000	3,000	5	5
C. ZONE 4a.3: Tam Nong Dist (2,764ha)			2,800	3,000	7	7
1. Two rice + prawn culture		608	2,000	2,000	5	5
2. Two rice + fish culture		350	800	1,000	2	2
D. ZONE 4a.4: Thanh Binh Dist (9,354ha)			900	1,400	3	3
1. Two rice + prawn culture		5	300	400	1	1
2. Two rice + fish culture		2	600	1,000	2	2

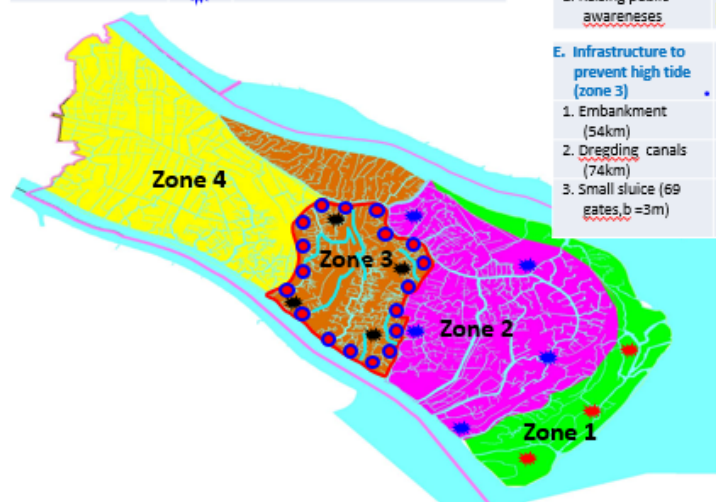
Upgrade Infrastructure:	Units	Baseline	Project target				Units	Baseline	Project target			
			Units	Ha	HHs				Units	Ha	HHs	
A. ZONE 4a.1: Hong Ngu Dist (2,847ha)				1,800	2,500		C. ZONE 4a.3: Tam Nong Dist (2,764ha)			2,800	3,000	
1. Low dikes (August dikes)	km	16.6	26.4	1,800	2,500		1. Low dikes (August dikes)	km	35.3	36.4	2,800	3,000
2. New sluice gates	sluice	4	8	1,800	2,500		2. New sluice gates	sluice	5	32	2,800	3,000
3. Dredging cannal	km	-	16.2	1,800	2,500		3. Pumping station	station	6	9	2,800	3,000
							4. Dredging cannal	km	9.5	28.2	2,800	3,000
B. ZONE 4a.2: Hong Ngu town (7,347ha)				2,500	4,500		D. ZONE 4a.4: Thanh Binh Dist (9,354ha)			900	1,400	
1. Low dikes (August dikes)	km	31.5	35.2	2,500	4,500		1. Low dikes (August dikes)	km	37.3	22.2	900	1,400
2. New sluice gates	sluice	11	16	2,500	4,500		2. New sluice gates	sluice	2	18	900	1,400
3. Pumping station	station	3	3	2,500	4,500		3. Pumping station	station	4	4	900	1,400
4. Dredging cannal	km	21.94	32.2	2,500	4,500		4. Dredging cannal	km	6.2	22.2	900	1,400

Subproject 5: Infrastructure to improve livelihoods for people to adapt to climate change in the North Thanh Phu district, Ben Tre province

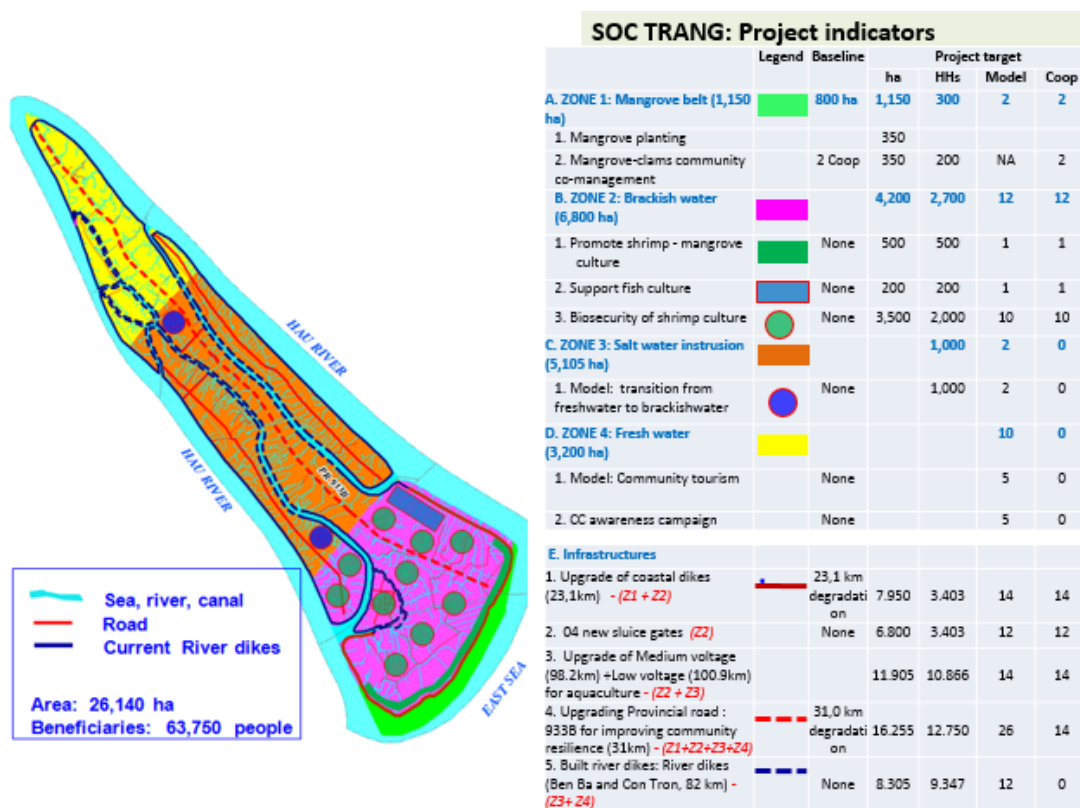
	Legend	Baseline	Project target			
			ha	HHs	Model	Coop
A. ZONE 1: Mangrove belt (4,000 ha)		none	1,000	500	3	3
1. Mangrove planting in shrimp ponds		none	350			
2. Certification of shrimp mangrove		3 Demonstration models	1,000	500	3	3
B. ZONE 2: Brackish water (14,000 ha)			1,500	600	5	5
1. biosecurity of shrimp culture		5 Demonstration models	1,500	600	5	5

BEN TRE – THANH PHU: Project indicators

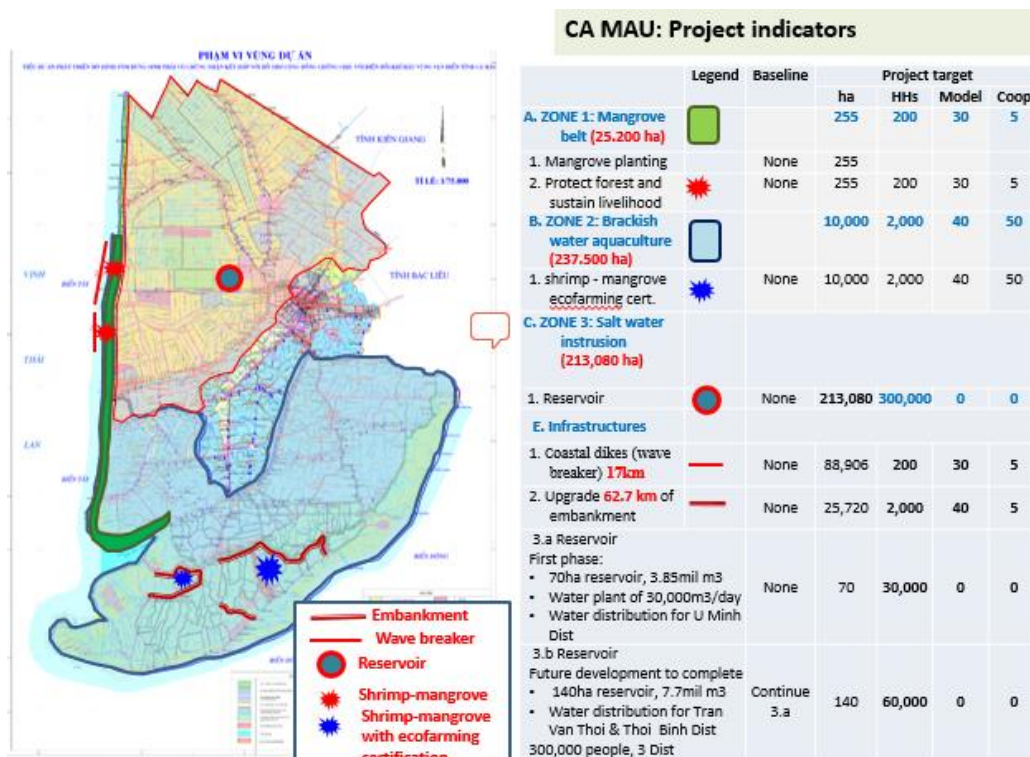
	Legend	Baseline	Project target			
			ha	HHs	Model	Coop
C. ZONE 3: Salt water intrusion (8,000 ha)			1,200	480	4	4
1. Rice + aquaculture (rice + shrimp, rice + prawn)		1,200	1,200	480	4	4
2. Demonstration models		4 Demonstration models				
D. ZONE 4: Fresh water (12,000 ha)						
1. Raising public awareness						
E. Infrastructure to prevent high tide (zone 3)						
1. Embankment (54km)		none				
2. Dredging canals (74km)		Temporary	4,640	25,758	4	4
3. Small sluice (69 gates, b=3m)		none				



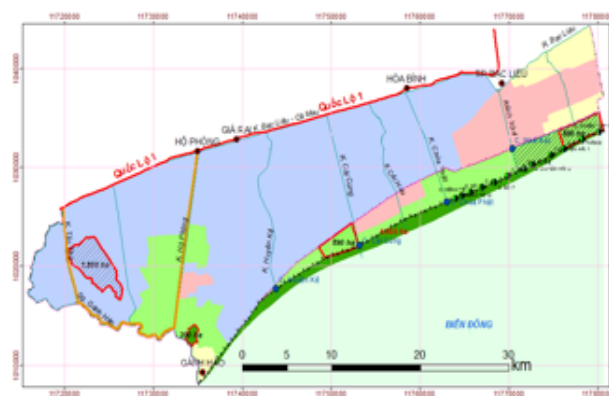
Subproject 7: Infrastructure for production transition in accordance with ecological conditions, improving livelihoods, adaptation to climate change in Dung island, Soc Trang province










Subproject 8: Infrastructure to prevent coastal erosion, supply fresh water and for production of shrimp - forest model to improve livelihoods and adapting to climate change in the coastal area of Ca Mau Province



Subproject 10: Infrastructure for ecological forest protection and development, livelihood improvement, and climate change adaptation in Hoa Binh, Dong Hai, Phuoc Long, and Hong Dan districts, Bac Lieu



BAC LIEU: Project indicators

	Legend	Baseline	ha	HHs	Model	Coop
A. ZONE 1: Mangrove belt (4,085 ha). No investment		3,950ha (95%)	0	0	0	0
B. ZONE 2: Brackish water (98,000 ha)		68,000ha	3,090	2,500	10	10
1. Plant mangrove in shrimp ponds (300 ha) & shrimp mangrove ecofarming		350ha (70%)	590	500	2	2
2. Low density biosecurity shrimp culture		1,200ha	1,500	1,500	5	5
3. High density biosecurity shrimp culture		560ha	800	800	3	3
4. High quality seed production (West Long Dien)		20ha	200	20 companies and 200 households		
C. Infrastructure						
1. Build 12 sluices under East Sea Dike		None	23,600	23,600	2	2
2. Build river dike in Gành Hào river length 37 km and 12 sluices combining bridges under under the dike		None	21,850	22,000	5	5