ADAPTATION FUND

REGIONAL PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme:	Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation
Countries:	Thailand and Vietnam
Thematic Focal Area:	Transboundary water management
Type of Implementing Entity:	Multilateral Implementing Entity
Implementing Entity:	United Nations Environment Programme (UN Environment)
Executing Entities:	UN Environment-International Ecosystem Management Partnership (UNEP-IEMP)[1]. Ministry of Natural Resources and Environment of Thailand. Ministry of Natural Resources and Environment of Vietnam.
Amount of Financing Requested:	**US$ 7,000,000**

[1] UNEP-IEMP is a collaborating centre of UN Environment and is hosted by the Institute of Geographic Sciences and Natural Resources Research (IGSNRR) in the Chinese Academy of Sciences. IGSNRR is a multidisciplinary research institute under the Chinese Academy of Sciences. The research conducted by the institute focusses on, amongst other topics, global change, water resources, ecosystem network observation and modelling, natural resources, human geography and regional development. IGSNRR is active in international and domestic cooperation and has established cooperative arrangements with academic institutions in more than 50 countries, including Thailand and Vietnam.

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Project Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve, including both the regional and the country perspective. Outline the economic social, development and environmental context in which the project would operate in those countries.

Project Overview

The natural ecosystems of the Greater Mekong Sub-region (GMS)[2] are of critical importance to the ~75 million people living within the region who rely upon natural resource-based livelihoods. Of the region's natural systems, the Mekong River[3,4] is arguably the most essential to supporting rural livelihoods and maintaining the functionality of associated ecosystems[5]. As the Mekong flows from its origin at the Lasagongma Spring in China through the GMS countries and into the South China Sea, it delivers numerous ecosystem goods and services[6] to some of South-East Asia's poorest people[7]. Although cultural, historical, socio-economic, geographic and environmental disparities exist among the GMS countries, the Mekong River serves as a transboundary resource and support system shared by millions of people across the region.

Despite their regional importance, the ecosystems of the GMS face a multitude of anthropogenic pressures that threaten their capacity to provide goods and services for local communities. For example, damming for hydropower generation and the extraction of water to irrigate ~10 million hectares[8] of rice paddies has led to substantial changes in the flow and ecosystem dynamics of the Mekong River and its tributaries[9]. Subsequently, sediment and nutrient transfer have been impeded, and the production of one of the world's largest and most diverse inland fisheries has decreased[10]. Additionally, the GMS has undergone extensive deforestation in past decades, which has reduced the supply of important ecosystem goods and services to poor communities. From 1973–2009, the GMS[11] lost approximately 33% of its forest cover, mainly because of extensive unsustainable logging and agricultural conversion[12]. Given anticipated increases in the demand for electricity, land and water in Asia, as well as the complexities associated with managing transboundary water resources, ecosystem degradation is expected to continue across the GMS into the future[13] to the detriment of the region's people.

The above-mentioned baseline problems in the GMS are exacerbated by a climate that has undergone considerable change in recent decades and is expected to continue changing throughout the 21st century. Since the 1960s, the mean annual temperature of South-East Asia

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[2] – consisting of the Yunnan Province and Guangxi Autonomous Region of China, Myanmar, Lao PDR, Thailand, Cambodia and Vietnam –

[3] , known as the Lancang river in China,

[4] and its tributaries

[5] like forests and mangroves

[6] including *inter alia*: i) food and nutrition; ii) fibre; iii) biomass; iv) medicines; v) fresh water; vi) regulation of air and water quality; vii) nutrient cycling; viii) regulation of natural hazards; and ix) recreation and tourism

[7] Approximately 20% of the 326 million people in the GMS live below the poverty line.

[8] According to the Mekong River Commission.

[9] Dugan, P., Barlow, C., Agostinho, A., Baran, E., Cada, G., Chen, D., Cowx, I., Ferguson, J., Jutagate, T., Mallen-Cooper, M., Marmulla, G., Nestler, J., Petrere, M., Welcomme, R., and Winemiller, K. (2010). Fish Migration, Dams, and Loss of Ecosystem Services in the Mekong Basin. AMBIO: A Journal of the Human Environment 39:344-348.

[10] Dugan, P., Barlow, C., Agostinho, A., Baran, E., Cada, G., Chen, D., Cowx, I., Ferguson, J., Jutagate, T., Mallen-Cooper, M., Marmulla, G., Nestler, J., Petrere, M., Welcomme, R., and Winemiller, K. (2010). Fish Migration, Dams, and Loss of Ecosystem Services in the Mekong Basin. AMBIO: A Journal of the Human Environment 39:344-348.

[11] excluding China

[12] WWF – 2013 – Ecosystems in the Greater Mekong: Past trends, current status, possible futures.

[13] WWF – 2013 – Ecosystems in the Greater Mekong: Past trends, current status, possible futures.

has risen by ~0.14–0.20°C per decade[14] and rainfall patterns have become increasingly erratic. These changes in climate have been associated with an increased intensity and incidence of both floods and droughts[15], leading to impacts on local communities such as: i) insufficient water for livelihoods activities; ii) reduced agricultural productivity; iii) soil erosion and landslides; iv) saltwater intrusion into agricultural lands; and v) the destruction of property and the loss of life. As temperature and rainfall patterns in South-East Asia continue to change in the future[16], the livelihoods of people in the region will come under enhanced stress. Although the effects of climate change may differ spatially and temporally across the GMS, it is likely that communities reliant on ecosystems for their livelihoods will experience similar challenges in adapting to climate change.

Without appropriate adaptation interventions, it is likely that a large proportion of the GMS's population will remain extremely vulnerable to the interacting effects of climate change and ecosystem degradation. National[17] and regional[18] institutions in the GMS are aware of this threat. Accordingly, several regional and national adaptation plans and frameworks have been developed or are under development. For instance, the *Mekong Adaptation Strategy and Action Plan* (MASAP) is a regional climate change adaptation plan developed by the Mekong River Commission (MRC) – one of the primary transboundary water management institutions in the region – for the section of the GMS covering Cambodia, Lao PDR, Thailand, Vietnam. Additionally, the Lancang-Mekong Cooperation (LMC) mechanism – a relatively new, China-based transboundary water management body in the GMS – is developing the *Lancang-Mekong Environmental Cooperation Strategic Framework* which will include a focus on climate change adaptation and ecosystem management across the GMS. At a national level, most GMS countries have existing climate change adaptation plans and strategies[19] and/or are in the process of developing National Adaptation Plans (NAPs)[20]. It is, therefore, apparent that the countries of the GMS are committed to enhancing the climate resilience of their people.

The implementation of regional and national adaptation plans, frameworks and strategies is, however, insufficient. There are few examples of on-the-ground adaptation interventions – particularly ecosystem-based adaptation (EbA) – in the GMS. Subsequently, many people in the region remain vulnerable to the effects of climate change and environmental degradation. Additionally, where concrete implementation does exist, there is inadequate dissemination of knowledge and lessons learned. This limited knowledge on how to implement climate change adaptation interventions, particularly EbA, and thereby put policies and plans into practice is a significant barrier to the further effective development and implementation of regional and national adaptation plans. Given the transboundary nature of many GMS natural ecosystems, as well as the common threat that climate change poses to a diverse group of people across the region, there is a need and opportunity for South-South cooperation among the countries of the GMS to share knowledge and technologies for adapting to climate change.

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[14] WGI AR5 Chapter 2 / WGI AR5 Section 14.8.12/ WGI AR5 Section 2.6.1.
[15] China National Climate Centre – Beijing - 2015 – unpublished data.
[16] IPCC. 2007. Climate Change 2007. Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
[17] For example, government institutions such as the Ministry of Natural Resources and Environment in Thailand and Ministry of Natural Resources and Environment in Vietnam
[18] such as the Lancang-Mekong Cooperation Mechanism, the Mekong River Commission and the Asian Development Bank Greater Mekong Sub-region
[19] For example, Vietnam has a National Climate Change Strategy and Mekong Delta Master Plan, and China has a National Adaptation Strategy.
[20] The final draft of Thailand's NAP is expected to be finalised and published in 2018 once the public consultation process has been completed.

The **proposed AF project** will implement innovative, on-the-ground adaptation technologies and share implementation lessons across the GMS. Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand) and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts. These adaptation technologies will incorporate learning from the past projects e.g. South South Capacity Building for Ecosystem Management in Greater Mekong Sub-region, Mekong ARCC and other past and ongoing projects mentioned in Annex IV as well as learning from this project will be documented to complement planned interventions taking place GSM.. The proposed project will increase the resilience of beneficiary communities to the effects of droughts and floods by implementing a suite of adaptation interventions[21] including *inter alia*: i) climate-resilient agriculture interventions ii) interventions to improve drought and flood management; and iii) additional, climate-resilient livelihood options. A monitoring programme established by the project will collect information on the cost-effectiveness of project interventions in different socio-ecological contexts in the GMS which will be shared with both local communities and regional stakeholders. Additionally, knowledge-sharing and awareness-raising in local communities surrounding project beneficiaries will be accomplished through *inter alia*: i) knowledge-sharing days; ii) local field visits; and iii) the dissemination of awareness-raising and training materials.

The knowledge generated at the country level will be shared regionally on ways to combat drought and flood risk – specifically EbA – across the GMS in the different ecosystems of the GMS. Scaling up such measures at a Basin scale could reduce the impacts of climate change in the Mekong River Basin. Discussions on a scaling up adaptation strategy will be promoted under Component 3 linking the project experience with the available scientific information on climate change risks and the political processes in the GMS. A cost-effectiveness assessment will be undertaken to inform future decisions on EbA to combat the impacts of droughts and floods in the GMS under different socioeconomic and environmental conditions. Additionally, relevant knowledge to EbA in the GMS will be collated to produce policy briefs to inform the development and implementation of future adaptation projects and strategies across the region. In addition, these knowledge products, as well as the results of monitoring and evaluation at implementation sites, will be made widely available through existing online information platforms related to the GMS and climate change adaptation[22]. Knowledge-sharing and project coordination across the GMS – including China, Cambodia, Lao PDR and Myanmar – will be achieved through participation in regional climate change adaptation forums. The knowledge gained through the proposed project will be used to strengthen regional coordination on climate change adaptation and incorporated into future versions of regional and national adaptation plans across the GMS[23] through: i) continuous sharing of information to national and regional stakeholders; ii) participation in regional training events; and iii) the provision of policy briefs and papers.

[21] Guided by regional and national adaptation and development plans.
[22] Including platforms operated by: i) the MRC; ii) ADB-GMS; iii) Lancang-Mekong Cooperation Mechanism; and iv) other regional projects, such as EbA South.
[23] Such as the MASAP and NAPs.

Background context

Geographical context

The Greater Mekong Sub-region (GMS) covers portions of southwest China – specifically the Yunnan and Guangxi provinces – and five countries of Southeast Asia, namely Cambodia, Lao PDR, Myanmar, Thailand and Vietnam (Figures 1 and 2). From its source in southwest China, the Mekong River flows south for ~4,800 km, dropping ~4,500 m to the Mekong Delta in Vietnam. With a mean annual discharge of 475 cubic kilometres, the Mekong ranks tenth among the world's rivers based on mean annual flow at the mouth[24] and drains a total catchment area of 795,000 km^2 into the South China Sea (Table 1). The GMS can be divided into two parts: i) the 'Upper Mekong Basin' in China – where the river is called Lancang Jiang – and Myanmar; and ii) the 'Lower Mekong Basin' from the border between Myanmar and Lao PDR to the South China Sea.

Figure 1: Map of the GMS[25].

Figure 2: Broad geographical regions of the GMS[26].

The Upper Basin makes up 24% of the total catchment area and contributes 15 – 20% of the water that flows into the Mekong River. The catchment in this region is steep and narrow, resulting in extensive soil erosion. Consequently, the Upper Basin is responsible for ~50% of the sediment that enters the river[27]. As the river flows into the subtropical Simao and Xishuangbanna Prefectures of Yunnan, China, the topography changes, opening out into wider floodplains and the flow rate of the river decreases. From this point, the Lower Basin continues southwards, fed

[24] Mekong River Commission. 2005. Overview of the Hydrology of the Mekong Basin. Mekong River Commission, Vientiane. Available at: http://www.mekonginfo.org/assets/midocs/0001968-inland-waters-overview-of-the-hydrology-of-the-mekong-basin.pdf

[25] Source:http://www.gms-eoc.org/uploads/map/archives/lores/GMS-Topography_28_Lo-Res_28.jpg

[26] Mekong River Commission. 2005. Overview of the Hydrology of the Mekong Basin. Mekong River Commission, Vientiane. Available at: http://www.mekonginfo.org/assets/midocs/0001968-inland-waters-overview-of-the-hydrology-of-the-mekong-basin.pdf

[27] Mekong River Commission. 2005. Overview of the Hydrology of the Mekong Basin. Mekong River Commission, Vientiane. Available at: http://www.mekonginfo.org/assets/midocs/0001968-inland-waters-overview-of-the-hydrology-of-the-mekong-basin.pdf

by several tributaries. These tributaries are separated into two groups, specifically: i) tributaries that drain the high rainfall regions of Lao PDR, contributing to major wet season flow; and ii) tributaries that drain the low relief regions of northeast Thailand. The final stretch of the river through Cambodia and Vietnam is relatively flat and water levels rather than flow volumes determine the direction of water flow across the landscape. Phnom Penh marks the beginning of the delta system of the Mekong River. In the delta, the main stream of the river breaks up into multiple branches that ultimately flow into the South China Sea. Agriculture in the delta is well developed and the population density is the highest found anywhere within the GMS.

Table 1: Area of the Greater Mekong Sub-region countries, and their contribution within the Mekong River Basin Catchment[28].

	Cambodia	China	Lao PDR	Myanmar	Thailand	Vietnam	Total
Area (km^2)	181,354	619,501	229,878	669,252	514,055	328,385	2,542,425
% of GMS Total Area	7	24	9	26	20	13	100
Catchment as a % of GMRB	20	21	25	3	23	8	100
Flow as % of GMRB	18	16	35	2	18	11	100

The GMS is characterised by highly variable climatic and topographical features, dividing it into six smaller sub-catchments classified as hydro-geographic zones (Figure 3) based on the hydrology, physiography, land use and vegetation in each zone. The diversity of landscapes is largely attributed to the monsoon climate, a complex biophysical environment with an elevational gradient >5,500 meters, and a long history of human interventions. This has led to the establishment of a highly diverse and heterogeneous patchwork of ecosystems and land-use mosaics, including: i) high-elevation pastures; ii) temperate and tropical forests; iii) rubber and oil palm plantations; iv) home gardens; v) diverse croplands; vi) mixed farming wetlands; vii) lakes; and viii) mangroves. Such diverse ecosystems, across a range of elevations, provide ecosystem goods and services that support the livelihoods of more than 75 million people.

[28] Mekong River Commission. 2005. Overview of the Hydrology of the Mekong Basin. Mekong River Commission, Vientiane. Available at: http://www.mekonginfo.org/assets/midocs/0001968-inland-waters-overview-of-the-hydrology-of-the-mekong-basin.pdf

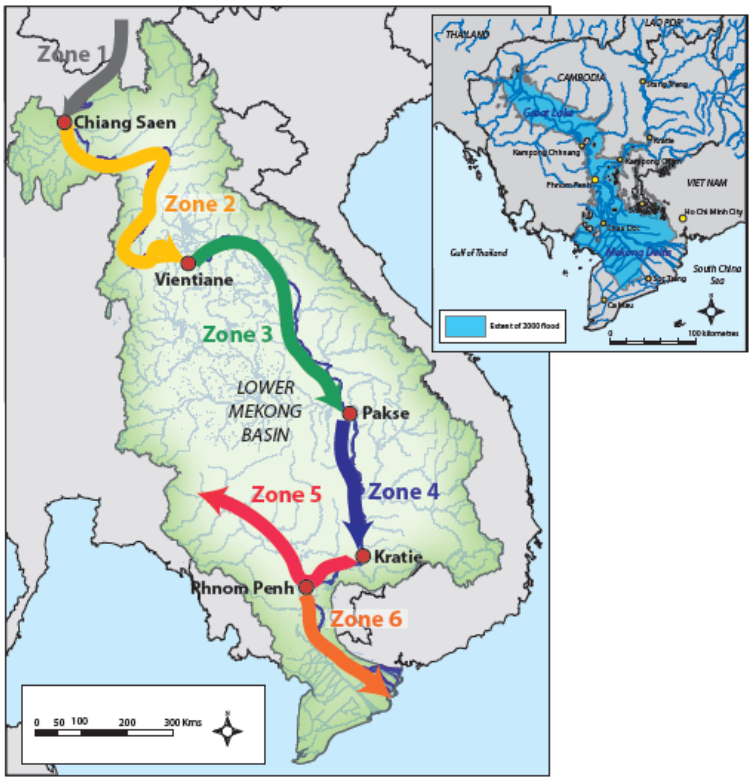

Figure 3: Major hydrogeographic zones of the Mekong River in the Lower Mekong Basin[29].

Socio-economic context

Some of Asia's poorest countries are located within the GMS, but the region has experienced rapid growth and development over the last few decades. The various national economies of the sub-region have been growing at fast rates, although there is substantial variation between countries and sectors. Rising living standards, together with rapid population growth, are creating new transboundary challenges to the sub-region in terms of water and river basin management, livelihood options and regional/sub-national migration flows. There are currently major initiatives being implemented and planned throughout the GMS to promote further regional economic growth and employment. Such initiatives include the development of more roads, railways, dams (mainly for hydropower) and other infrastructure, particularly in areas previously dominated by natural resource- and agriculture-based livelihoods[30].

Most of the GMS's rural population are dependent on subsistence agriculture for food and income generation. However, the agricultural sector in the sub-region is shifting from one that is traditionally subsistence-based to one that is more commercialised. Although such commercialisation is progressing at varying rates between the different countries of the GMS, the process is generally one of specialisation, intensification and increased agrochemical use because of mechanisation. As a result of commercialisation, agricultural production has steadily increased in all GMS countries over the past 20 years[31]. For example, the production of commodities, such as rice, oil crops (soybean, groundnut, sesame, and sunflower) and coarse

[29] Mekong River Commission. 2005. Overview of the Hydrology of the Mekong Basin. Mekong River Commission, Vientiane. Available at: http://www.mekonginfo.org/assets/midocs/0001968-inland-waters-overview-of-the-hydrology-of-the-mekong-basin.pdf

[30] Source: http://d2ouvy59p0dg6k.cloudfront.net/downloads/greater_mekong_ecosystems_report_020513.pdf

[31] R. M. Johnston et al. 2010. Rethinking Agriculture in the Greater Mekong Subregion. IWMI. Colombo, Sri Lanka.

grains (maize, millet, and sorghum), has more than doubled[32]. Such increases in agricultural production in the GMS – combined with economic growth, population growth and rapid urbanisation – have stimulated the demand for land, water, energy and food.

The effects of agricultural expansion, accompanied by the overexploitation of natural resources in the GMS, has led to: i) increased competition and costs for resources and land; and ii) a growing number of ecological constraints. Consequently, agricultural livelihoods and food security in the GMS, although currently on the rise, are expected to be threatened in the long-term[33]. Similarly, the amount of water required for food and energy production, as well as for domestic and industrial use, is increasing exponentially. The overexploitation and degradation of ground and surface water sources are, therefore, commonplace. Such transformations in the food-water-energy nexus create new and exacerbate old, livelihood challenges for agrarian communities throughout the GMS.

Subsistence livelihoods in the GMS are also threatened by environmental degradation resulting from regional development. Such degradation is negatively affecting terrestrial, freshwater, estuarine and marine ecosystems in the region. As a result, the supply of ecosystem goods and services to local communities reliant on them for livelihoods is being compromised. The primary ecosystem services on which rural communities throughout the GMS predominantly rely include:

- provisioning services (food, fibre, water);
- regulating services (carbon sequestration, waste decomposition, flood regulation, water supply and purification, sediment and nutrient retention, erosion control);
- supporting services (nutrient cycling, seed dispersal, biodiversity conservation, primary production); and
- cultural services (ecotourism, aesthetic value, recreation, education).

Major human-ecosystem interactions related to local livelihoods within the sub-region include:

- fisheries along the length of the Mekong River, especially downstream from China;
- aquaculture in the Mekong Delta;
- intensive rice production (paddy agriculture) in the lowlands;
- shifting cultivation in the uplands of the humid tropics;
- rice terraces and tea/coffee plantations in sub-tropics;
- rubber, cassava and palm oil plantations over large areas of the GMS; and
- agro-pastoral systems associated with the higher elevations of the upper basin.

Environmental context

Although rapid development within the GMS reflects political stabilisation and economic growth it is resulting in widespread environmental change. This environmental change negatively impacts people who rely on ecosystem goods and services for their livelihoods. The major types of environmental change in the GMS are detailed below.

- The international demand (particularly from China) for agricultural products (including sugar, rice, coffee, rubber, cassava and fruit) from the GMS is transforming the traditionally subsistence-based agricultural sector to one that is commercial and export-orientated[34]. Across the GMS, agricultural land is expected to expand over the next 30–50 years,

[32] R. M. Johnston et al. 2010. Rethinking Agriculture in the Greater Mekong Subregion. IWMI. Colombo, Sri Lanka.
[33] Rosegrant. et al. 2012. Water and Food Security in the Mekong Subregion: Outlook to 2030-2050. Proceedings of the International Conference on GMS 2020, Bangkok, Thailand, February.
[34] Source: http://d2ouvy59p0dg6k.cloudfront.net/downloads/greater_mekong_ecosystems_report_020513.pdf

predominantly replacing natural forest. The negative effects of this agricultural intensification and expansion include: i) land degradation; ii) deforestation; iii) biodiversity losses; iv) habitat losses; v) water quality and quantity declines; and vi) the deterioration of aquatic ecosystems.

- Rapid deforestation, attributable to agricultural and civil development, is reducing the supply of ecosystem services and non-timber forest products (NTFPs) to communities. Between 1973 and 2009, the total forest cover within the GMS (excluding China) has declined by ~32%, with losses of 22% in Cambodia, 24% in Lao PDR and Myanmar, and 43% in Thailand and Vietnam.
- Poor land management and agricultural practices across the GMS are resulting in: i) soil fertility declines; and ii) soil loss through erosion. As deforestation, and agricultural and urban expansion rates increase across the GMS, erosion of exposed soils caused by runoff will intensify. This will result in a rise in the amount of suspended sediment in the Mekong River, which will decrease water quality across the basin. Furthermore, increased erosion will continue to reduce the water carrying capacities of rivers and streams across the GMS, aggravating floods during the wet season and water shortages during the dry season[35].
- Large-scale hydropower development and irrigation are threatening freshwater ecosystems within the GMS and the livelihoods dependent on them. Over 875,000 tonnes of freshwater fish are harvested in the Mekong Basin annually. This accounts for up to 25% of the global freshwater fish catch and provides livelihoods for at least 60 million people[36] while providing valuable contributions to regional food security and economies. In addition to supporting livelihoods, the Mekong River is second only to the Amazon River in terms of freshwater biodiversity. At least 1,200 freshwater fish species are found in the GMS including the giant freshwater stingray and Mekong giant catfish[37]. The Mekong River is also home to some of the last remaining populations of the endangered Irrawaddy river dolphin[38].
- The MRB is a major transboundary basin with a complex hydrological regime driven by yearly rainfall events in its different catchment areas. Local floodplains play an important role in attenuating floods in the middle and lower parts of the basin. Changes in upstream characteristics, attributable to hydropower development for example, can result in the progressive loss of floodplain, increasing the intensity of and damage caused by floods[39].
- Extensive levels of hunting and poaching, over-exploitation of natural resources and habitat loss have resulted in only ~5% of natural habitats within the GMS remaining in a healthy condition[40]. Consequently, the biodiversity supported within the sub-region, which includes over: i) 430 mammal species; ii) 800 reptile and amphibian species; iii) 1,200 bird species; and iv) 20,000 species of plants, is among the most threatened globally.

Climate change context

Past and present climate change

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[35] Al-Soufi, R. 2004. Soil erosion and sediment transport in the Mekong Basin. In: Proceedings of 2nd APHW Conference, Singapore, pp 47-56.

[36] Source: http://www.worldwildlife.org/places/greater-mekong

[37] Source:http://www.mrcmekong.org/assets/Publications/report-management-develop/Mek-Dev-No2-Mek-River-Biodiversityfiisheries-in.pdf

[38] Minton, G., Smith, B.D., Braulik, G.T., Kreb, D., Sutaria, D. & Reeves, R. 2017. *Orcaella brevirostris.* The IUCN Red List of Threatened Species 2017: e.T15419A50367860. http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T15419A50367860.en

[39] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Flood Sector Key Findings Report: Flood Protection Structures and Floodplain Infrastructure.

[40] Conservation International. 2007. Biodiversity hotspots. Arlington, USA.

The GMS is amongst the most climate-vulnerable regions of the world, with a wide range of climate change effects already documented[41]. Climate change is expected to exacerbate the impacts of existing threats to the region's inhabitants and its various ecosystems. The effects of climate change on the GMS include increased: i) temperatures; ii) rainfall variability; iii) frequency of extreme weather events – such as droughts and floods; and iv) saltwater intrusion related to sea-level rise (SLR). These climate change-related effects are discussed further below.

Across the GMS, mean annual temperatures have been increasing at a rate of 0.14°C to 0.20°C per decade since the 1960s, with average temperatures rising by between 0.5°C and 1.5°C from 1951 to 2000[42]. Such climate change-related temperature increases have resulted in the sub-region's highest average daytime temperatures for the month of April being recorded in Thailand in 2016[43]. Furthermore, increases in maximum and minimum daytime temperatures have resulted in more hot days and warm nights being recorded across the GMS since 1950[44,45].

Although temperature increases attributable to climate change are consistent across the GMS, the observed effects on rainfall are more complicated. The effects of climate change on rainfall patterns across the sub-region are extremely variable because of the influence of the sub-region's numerous topographical and marine features. In general, the length of the sub-region's rainfall seasons has decreased. However, the intensity of and the amount of rain falling during rainfall events, have increased (particularly in the middle and lower sections of the GMS)[30]. For the sub-region overall, annual total wet-day rainfall has increased by 22 mm per decade since the 1950s[46,47]. An exception to this trend is the upper section of the GMS (Yunnan Province, China), which has experienced an 11 mm decrease in rainfall per decade, with high inter-annual rainfall variability and an increase in the frequency of prolonged droughts[48]. In terms of extreme rainfall events, while an increasing frequency has been reported in most of Southeast Asia, the opposite is true for the GMS. Between 1961 and 1998, the sub-region experienced a decrease in the number of extreme rainfall events per annum, however, the amount of rain falling during these events increased by 10 mm per decade during this period[49,50].

Conversely to extreme rainfall events, the frequency of other extreme weather events has increased. Such extreme weather events include heat waves[51], tropical cyclones[52] as well as unusually widespread monsoon floods, which have overwhelmed large areas of Thailand, Lao

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[41] IPCC. 2007. Climate Change 2007. Impacts, Adaptation and Vulnerability. M.L. Parry, et al. Working Group II: 4th AR IPCC. Cambridge: Cambridge University Press.
[42] WWF. 2009. The Greater Mekong and climate change: biodiversity, ecosystem services and development at risk.
[43] Thirumalai K, DiNezio PN, Okumura Y & Deser C. 2017. Extreme temperatures in Southeast Asia caused by El Nino and worsened by global warming. *Nature Communications*. 8: 15531. DOI: 10.1038/ncomms15531.
[44] WGI AR5 Chapter 2 / WGI AR5 Section 14.8.12/ WGI AR5 Section 2.6.1.
[45] Hijioka, Y., et al., 2014: Asia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom, pp. 1327-1370.
[46] Hijioka, Y., et al., 2014: Asia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom, pp. 1327-1370.
[47] WGI AR5 Chapter 14 / WGI AR5 Sections 14.4.12, 14.8.12
[48] China National Climate Center – Beijing - 2015 – unpublished data.
[49] Manton, M. J., et al. 2001. Trends in extreme daily rainfall and temperature in Southeast Asia and the South Pacific: 1961-1998. International Journal of Climatology 21:269-284.
[50] WGI AR5 Chapter 14 / WGI AR5 Sections 14.4.12, 14.8.12
[51] IPCC. 2007. Climate Change 2007. Impacts, Adaptation and Vulnerability. M.L. Parry, et al. Working Group II: 4th AR IPCC. Cambridge: Cambridge University Press.
[52] Rosegrant. et al. 2012. Water and Food Security in the Mekong Subregion: Outlook to 2030-2050. Proceedings of the International Conference on GMS 2020, Bangkok, Thailand, February.

PDR, Cambodia, and Vietnam including extensive areas of the Mekong Delta. Although flooding within the MRB is a frequently occurring natural process that provides ecosystems goods and services to the local people[53], it also results in the negative impacts of flood damage during extreme events[54].

In addition to the above-mentioned extreme weather events, climate change-related SLR and saltwater intrusion are threatening the sub-region's already climate-vulnerable coastal communities and ecosystems. SLR in the South China Sea was recorded at a rate of 5.5 mm per annum between 1993 and 2009[55], which is higher than the global rate of 3 mm per annum over the last decade[56]. The coastal extent of the Mekong Delta is particularly at risk to the negative effects of SLR and salt-water intrusion.

Past and current effects of climate change

Climate change continues to exacerbate the impacts of existing threats on the region's numerous communities and ecosystems. Among the most prevalent effects of climate change on the GMS is the rapid melting of glaciers and permafrost caused by increasing temperatures. This is undoubtedly strengthening the supply of water to the source and upper parts of the basin in the short-term but will have negative effects on the availability of water within the basin in the long-term as glaciers, in particular, recede[57]. Similarly, warmer winters caused by increasing temperatures are resulting in a shorter dormant period of many alpine plant species[58].

Droughts are also negatively affecting plant species which are endemic to the GMS through a decrease in water availability[59], leading to a decline in floral diversity. Water shortages related to droughts are resulting in decreased agricultural yields, which threaten food security through the sub-region. Furthermore, the income-generating capacity of water-dependant livelihood activities including freshwater fishing is reduced. Apart from declining incomes and livelihood options, decreased water availability in the GMS is detrimental to human and ecosystem health, leading to major humanitarian disasters in the region. An example of such a disaster in the GMS is the recent drought in 2016/2017, which resulted from reduced rainfall attributable to El Niño and was likely exacerbated by climate change. This drought compounded transboundary water shortages along the Mekong River, hampering agricultural production across the GMS, which threatened food security across the sub-region[60]. A decrease in the production of the region's main staple, rice, is particularly problematic and as a result, prices will rise, which will further impact the lives and livelihoods of the GMS's economically marginalised communities. Furthermore, economic growth in the sub-region, which is highly reliant on agriculture is declining. For example, economic growth in Vietnam dropped to 5.6% year-on-year (compared with 6.2% in 2015) because of the drought[61]. Apart from its effects on agricultural production in the sub-region, the 2016/2017

[53] These include fish and the deposition of nutrient rich sediment on agricultural lands.
[54] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Flood Sector Key Findings Report: Flood Protection Structures and Floodplain Infrastructure.
[55] Feng W, Zhong M & Xu H. 2012. Sea level variations in the South China Sea inferred from satellite gravity, altimetry, and oceanographic data. *Science China: Earth Sciences*. 55(10): 1696–1701.
[56]ADB. 2008. GMS: Climate Makers or Climate Takers? Understanding and Responding to the Challenges of Climate Change. Background Paper. GMS Development Dialogue. 21 May.
[57] WGI AR5 Chapter 14 / WGI AR5 Sections 14.4.12, 14.8.12
[58]Yu H, E. Luedeling, and JC. Xu. 2010. Winter and spring warming result in delayed spring phenology on the Tibetan Plateau. Proceedings of National Academy of Science 107: 22151-22156.
[59] Qiu, J. 2010. China drought highlights future climate threats. Nature 463: 142-143.
[60] Available at: https://internationalwateranalysis.wordpress.com/.
[61] Available at: https://www.forbes.com/sites/timdaiss/2016/05/25/why-vietnam-is-running-dry-worst-drought-in-nearly-

drought along with saltwater intrusion resulted in a lack of potable water, which has affected ~1 million people in central and southern Vietnam[62].

The 2016/2017 drought in the GMS contributed to the lowest recorded water levels in the lower Mekong River since 1926[63]. As a result, saltwater intrusion occurred earlier and more extensively than usual. To date, saltwater intrusion has been recorded as far as 90 km inland, destroying at least 159,000 ha of rice paddies in the Mekong Delta, with a further 500,000 ha still at risk.

Climate change-related SLR is also threatening agricultural production in the coastal areas of the GMS. Densely populated parts of the Thai and Vietnamese coastlines are especially vulnerable to the effects of SLR. Between 1993 and 2010, rapid rates of SLR were recorded in the western tropical Pacific[64]. During this period, sea levels increased by 6 mm per year in the Mekong Delta[65]. This SLR has resulted in an increase in the frequency and intensity of storm surges (especially during the typhoon season) leading to the inundation of coastal agricultural land, as well as loss of life and property. Such coastal surges were experienced during Typhoon Linda (Vietnam, 1997) and Cyclone Nargis (Myanmar, 2008)[66].

Another common climate change threat that is also associated with typhoons and cyclones in the GMS is flooding, which is attributable to an increase in the intensity of extreme rainfall events. Floods are responsible for soil erosion throughout the sub-region and landslides in the mountainous areas. Furthermore, floods are responsible for the loss of human life, the destruction of property and infrastructure, and crop losses. The impacts of floods together with those of other previously mentioned climate change-related threats, including droughts, are expected to increase in frequency and intensity according to future climate change scenarios[67]. Traditionally, flooding in the MRB is managed through the development of resilience and adapting to 'Live with Floods'. In the long-term, however, the combined effects of climate change, changing socio-economic conditions and infrastructural development will increase the requirements for strengthening the climate-resilience and adaptative capacity of the MRB's population[68].

Future climate change

Under future scenarios, climate change is expected to accelerate current warming trends, with the entire GMS becoming hotter under all current emission scenarios projected by the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCPs). Under 2040 scenarios[69], maximum temperature increases are expected to occur in the

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100-years/#64bc9ba174b3.

[62] Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/Vietnam%20Consolidated%20Report%20on%20Drought%202015-2016-Final_11%20Mar%202016.pdf.

[63] Available at: https://internationalwateranalysis.wordpress.com/.

[64] Rosegrant. et al. 2012. Water and Food Security in the Mekong Subregion: Outlook to 2030-2050. Proceedings of the International Conference on GMS 2020, Bangkok, Thailand, February.

[65] Ryvitski, J.P.M, et al. 2009. Sinking deltas due to human activities. Nature Geosciences. Published online: 20 September 2009, doi: 10.1038/ngeo629.

[66] ADB. 2012. GMS Atlas of the Environment 2nd Edition. Manila, Philippines.

[67] Hijioka, Y., et al., 2014: Asia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom, pp. 1327-1370.

[68] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Flood Sector Key Findings Report: Flood Protection Structures and Floodplain Infrastructure.

[69] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study

upper MRB – up to 3 °C (Figure 4). The projected 2040 average increase across the basin of 1.1 °C is well below the 2 °C limit agreed upon at the 2016 Paris summit. However, it is predicted that temperatures will continue to rise after 2040, even if emission targets have been met. Mean annual temperatures across the GMS are predicted to increase by between 1.6 and 2.5 °C by 2050[70,71], and by 2 to 4 °C by the end of the century[72,73].

Regarding average annual rainfall, climate change models generally project slight to moderate increases over most of the GMS of up to 13% by 2030 from the 1951–2000 average[74]. These increases will be predominantly attributable to an increase in the intensity of rainfall during the wet season, as well as during extreme rainfall events[75]. Such increases are expected in the upper sections of the sub-region, where average annual rainfall is predicted to rise by 5–25% over the next two decades and by up to 50% across the whole of the MRB by 2100. Such rainfall increases are expected to be exacerbated by the projected rise in extreme rainfall events associated with cyclones on the coasts of the South China Sea, Gulf of Thailand and the Andaman Sea. The Mekong Delta, however, is an exception to this, as it is expected to receive 15% less rainfall by the end of the century.

Together with the projected rainfall variability during the wet seasons across the GMS, other impacts of climate change are likely to include: i) earlier springs; ii) longer dry and shorter wet seasons; iii) an increased risk of prolonged drought in the Mekong Delta; iv) SLR of up to 0.7 m by 2100 in South East Asia, compared with those recorded in 1990[76]; and iv) the northward shifting of bioclimatic zones, particularly within the mountainous areas of the GMS[77]. Such climate change-related impacts are expected to negatively affect the countries in the GMS, which are already vulnerable to climate change.

Sectors.

[70] Available: https://www.ipcc.ch/report/ar5/

[71]Hijioka, Y., et al., 2014: Asia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom, pp. 1327-1370.

[72] WWF. 2009. The Greater Mekong and climate change: biodiversity, ecosystem services and development at risk.

[73]ADB. 2009. The Economics of Climate Change in Southeast Asia: A Regional Review. Manila..

[74] ADB. 2012. GMS Atlas of the Environment 2nd Edition. Manila, Philippines.

[75] ADB. 2012. GMS Atlas of the Environment 2nd Edition. Manila, Philippines.

[76]IPCC. 2007. Climate Change 2007. Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

[77]Zomer, R.J.; Trabucco, A.; Wang, M.; Xu, J.C., 2016. Projected Climate Change Impact on Hydrology, Bioclimatic Conditions, and Terrestrial Ecosystems in the Asian Highlands. ICRAF Working Paper 222. World Agroforestry Centre East and Central Asia, Kunming, China. 56 pp.

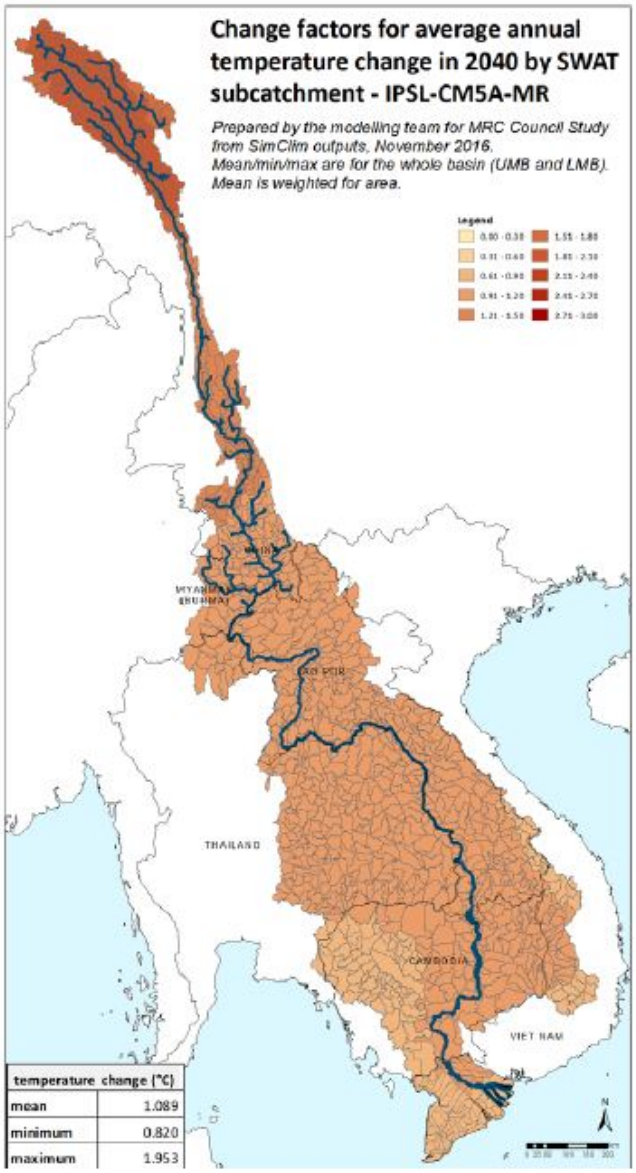

Figure 4: Projected changes in average annual temperatures across the MRB under 2040 scenarios[78].

Future effects of climate change

Worldwide, four of the 16 countries that are categorised as being 'extremely vulnerable' to climate change are found in the GMS (including Thailand and Vietnam)[79]. The predicted impacts of future climate change mentioned above will exacerbate the effects of existing threats resulting from *inter alia* land use change, habitat loss and environmental degradation on the region's numerous communities and ecosystems[80]. Additionally, the climate-resilience and adaptive capacity of the communities of the GMS dependent on local ecosystems for the supply of goods and services

[78] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.
[79] Maplecroft, Climate Change Vulnerability Index 2011. Available at: https://maplecroft.com/about/news/ccvi.html
[80] WWF. 2009. The Greater Mekong and Climate Change: Biodiversity, Ecosystem Services and Development at Risk. WWF Greaterer Mekong Programme.

will be negatively affected by climate change[81].

Future climate change is expected to have negative impacts on agriculture in the GMS. Such impacts will include *inter alia*: i) declining yields, as common crop varieties (particularly staples such as rice) will be pushed beyond their thermal limits; ii) crop losses resulting from droughts and flood damage; iii) the loss of arable land in low-lying areas because of SLR and saltwater intrusion; iv) decreasing soil water content as a result of increased potential evapotranspiration, which will decrease agricultural production; and v) the spoilage of stored agricultural products (such as rice), attributable to increased fungal growth and insect activity[82]. These impacts will severely affect agriculturally-based livelihoods, food security, economies, trade, as well as regional and national political stability in the GMS[83].

The gross domestic products (GDPs) of GMS countries are projected to be negatively affected under several future climate change scenarios (Table 2)[84]. Under a drier scenario (C3 dry) the GDP of Cambodia will be particularly impacted. Such impacts could seriously hinder the prospects of member countries obtaining/sustaining middle-income status[85].

Table 2: Projected reductions in GDP across the GMS by 2040 under climate change conditions[86].

Scenario	Cambodia	Lao PDR	Thailand	Vietnam
	Average reduction (%)			
M3CC	3	0	-2	1
C2 (Wet)	8	1	-1	4
C3 (Dry)	9	1	-1	5

Flooding, which is necessary in paddy fields for successful rice production (through the deposition of nutrient-rich sediment), is expected to increase in both frequency and intensity in the middle and upper GMS. This effect of climate change will, however, be detrimental rather than advantageous to rice production, as entire crops are expected to be lost in some severe events and infrastructure necessary to store produce and access markets is expected to be damaged[87]. Maize, another grain cultivated in the sub-region, is predicted to suffer losses in production of 3–12% by 2050 because of increases in mean annual rainfall and temperature[88]. The projected annual costs of damages floods under a moderate climate change scenario modelled to 2040

[81] R. Edward Grumbine and Jianchu Xu. 2011. Mekong Hydropower Development. Science 332: 178-179.
[82] Available at: http://www.extension.umn.edu/agriculture/small-grains/harvest/management-of-stored-grain-with-aeration/
[83] Sivakumar, M. V. K., H. P. Das, and O. Brunini. 2005. Impacts of present and future climate variability and change on agriculture and forestry in the arid and semi-arid tropics. Climatic Change 70: 31–72.
[84] Three scenarios to 2040. Each scenario has similar temperature increases, but differing changes in rainfall, which is where the main uncertainties for climate predictions lie in terms of water resources. These three scenarios were modelled to cover the likely range of climate changes within the GMS, assuming a medium level of GHG emissions (RCP4.5). The expected sea level rise is also included and is similar for each climate change scenario.
[85] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.
[86] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.
[87] TKK & SEA START RC. 2009. Water and Climate Change in the Lower Mekong Basin: Diagnosis and recommendations for adaptation. Water and Development Research Group, Helsinki University of Technology (TKK), and Southeast Asia START Regional Center (SEA START RC), Chulalongkorn University. Water & Development Publications, Helsinki University of Technology, Espoo, Finland.
[88] USAID. 2013. Mekong Adaptation and Resilience to Climate Change. Mekong ARCC Task 2 Synthesis Report. Bangkok, Thailand.

against baseline conditions (including socio-economic and water infrastructure development) are presented in Table 3. Also included in Table 3 are the projected costs of extreme flood events under both baseline and future climate change conditions for countries (Cambodia, Lao PDR, Thailand and Vietnam) of the MRB. These data show, that under continued socio-economic and water infrastructure development, as well as future climate change conditions in the MRB the costs of flood damage will increase considerably.

Table 3: Costs of flood damages in MRB countries under baseline and future development, and climate change conditions[89].

Country	Socio-economic development (year)	Water infrastructure (year)	Climate Change (year)	AAD[90] total (USD)[91]	Damage cost of extreme flood event (USD)
Cambodia	2010	2007	–	8.7 million	21.3 million
	2040	2040	2040	53.1 million	325 million
Lao PDR	2007	–	–	5.3 million	49.5 million
	2040	–	2040	45.5 million	144.1 million
Thailand	2007	–	–	9.6 million	82.6 million
	2040	–	2040	206 million	638.8 million
Vietnam	2010	2007	–	30.2 million	155 million
	2040	2040	2040	382.7 million	3.2 billion

In the lower parts of the sub-region, an increase in the frequency and duration of droughts are expected to result in major shortfalls in agricultural production, particularly paddy rice. Furthermore, water levels in the lower Mekong River are expected to continue decreasing as a result of the development of hydropower dams in the middle and upper sections and the continued extraction of water to irrigate ~10 million hectares of rice paddies[92]. This will lead to a loss of livelihoods reliant on the associated goods (such as fish) and services (including natural flooding of agricultural lands), as well as a decrease in potable and underground water supplies. Climate change is expected to limit increases in rice production over and above that which would occur because of development alone[93]. Additionally, the various terrestrial and aquatic ecosystems reliant on water to function optimally will be placed under immense stress because of future climate change-related droughts.

The productivity of low-lying agricultural land – predominantly rice paddies – on the coast of the GMS is predicted to decrease because of the combined climate change impacts of saltwater intrusion (related to SLR) and increasing temperatures (which will result in heat stress of rice plants)[94]. The loss of agricultural land caused by the impacts of climate change is expected to be particularly widespread in the Mekong Delta floodplain. Paddy rice production in Vietnam will be especially hard hit by such agricultural land losses in the future, which will force farmers to seek alternative livelihoods such as those reliant on goods supplied by local ecosystems, such as fish.

Climate change is also expected to affect the fisheries of the GMS. Fish migration routes,

[89] Adapted from: MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Flood Sector Key Findings Report: Flood Protection Structures and Floodplain Infrastructure.
[90] Average Annual Damage.
[91] Without investment in flood defences.
[92] Dugan, P., Barlow, C., Agostinho, A., Baran, E., Cada, G., Chen, D., Cowx, I., Ferguson, J., Jutagate, T., Mallen-Cooper, M., Marmulla, G., Nestler, J., Petrere, M., Welcomme, R., and Winemiller, K. (2010). Fish Migration, Dams, and Loss of Ecosystem Services in the Mekong Basin. AMBIO: A Journal of the Human Environment 39:344-348.
[93] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.
[94] Source: http://www.sciencemag.org/news/2016/04/mekong-mega-drought-erodes-food-security

spawning and feeding grounds, and fishing seasons are all likely to change, with impacts on fishing communities being uncertain. Rising seas, more severe storms and saltwater intrusion in the delta will negatively impact the GMS's fishing sector, which is reliant on species with limited saline tolerance, such as catfish[95]. A recent survey of the impacts of climate change on freshwater fisheries in 130 countries concluded that Cambodia and Vietnam are among the most vulnerable because of their heavy dependence on the fishing sector, high exposure to climate risks and limited adaptive capacity[96]. Under future climate change scenarios[97], the productivity of fisheries across the MRB is expected to decline by up to 43% by 2040[98]. This is over and above declines which are expected to occur as a result of socioeconomic development in the basin alone. While considerable socioeconomic development is expected to take place in the MRB by 2040 (including the large-scale migration of people to urban areas and improvements in the standard of living) the poor in the most vulnerable rural communities will remain dependent on natural resources for food and income generation. Consequently, strengthening the climate resilience of vulnerable rural communities, as well as the ecosystems that they are reliant on, is a priority.

Climate change is expected to severely impact the functioning of terrestrial ecosystems, which will include decreases in biodiversity and the supply of goods and services. Such impacts will predominantly result from the spatial shifting of bioclimatic conditions across the GMS by 2050, which will initiate a period of prolonged biophysical and biological perturbation[99]. Even the most conservative estimates indicate that by as early as 2050, most of the sub-region may experience novel climatic conditions attributable to climate change[100]. These climate change-related impacts are expected to directly influence biodiversity across the GMS by causing shifts in species distributions, which will have knock-on effects on ecosystem structure, composition and functioning[101,102]. Although some species will be able to adapt to the effects of climate change without dispersing, many will not, resulting in high rates of extinction, particularly of rare and endemic species that are specific to certain habitats[103,104,105]. Furthermore, these negative impacts will disrupt the viability and effectiveness of the many protected areas and conservation efforts across the GMS.

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[95] WWF. 2009. The Greater Mekong and climate change: biodiversity, ecosystem services and development at risk.
[96] Allison, E.H., A.L. Perry, M-C. Badjeck, W.N. Adger, K. Brown, D. Conway, A.S. Halls, G.M. Pilling, J.D. Reynolds, N.L. Andrew and N.K. Dulvy. 2009. Vulnerability of national economies to the impacts of climate change on fisheries. Fish and Fisheries. Blackwell Publishing Ltd. DOI: 10.1111/j. 1467-2979.2008.00310.x.
[97] Three scenarios to 2040. Each scenario has similar temperature increases, but differing changes in rainfall, which is where the main uncertainties for climate predictions lie in terms of water resources. These three scenarios were modelled to cover the likely range of climate changes within the GMS, assuming a medium level of GHG emissions (RCP4.5). The expected sea level rise is also included and is similar for each climate change scenario.
[98] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.
[99] Felkner, J., et al. 2009. Impact of Climate Change on Rice Production in Thailand. American Economic Review. 99. pp. 205-210.
[100] Mora C, et al. 2013. The projected timing of climate departure from recent variability. Nature 502(7470):183–187.
[101] Williams, J.W., S.T. Jackson, and J.E. Kutzbach, 2007: Projected distributions of novel and disappearing climates by 2100 AD. Proceedings of the National Academy of Sciences of the United States of America 104: 5738-5742.
[102]Zomer, R.J.; Trabucco, A.; Wang, M.; Xu, J.C., 2016. Projected Climate Change Impact on Hydrology, Bioclimatic Conditions, and Terrestrial Ecosystems in the Asian Highlands. ICRAF Working Paper 222. World Agroforestry Centre East and Central Asia, Kunming, China. 56 pp.
[103] Stork, N.E., J. Balston, G.D. Farquhar, P.J. Franks, J.A.M. Holtum, and M.J. Liddell. 2007. Tropical rainforest canopies and climate change. Austral Ecology. 32: 105–112.
[104] Malcolm, J.R. C. Liu, R.P. Neilson, L. Hansen, and L. Hannah. 2006. Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology*. 20: 538-548.
[105] Such species include *inter alia*: including the Asian elephant, tiger, douc langur, gaur, banteng, Eld's deer, serow, clouded leopard, pygmy loris, imperial pheasant and Edwards's pheasant.

Indicative results from MRC studies (such as MASAP) suggest that climate change will impact on all sectors and that adaptation needs to be integrated into development plans and policies across the GMS. The Mekong River Delta is especially vulnerable to the impacts of climate change, including extreme flood and drought events, and sea level rise. Conversely, an increase in rainfall under future climate change conditions – as projected by some models – may strengthen regional water supply potentially having positive outcomes for agriculture and hydropower production. However, it is more likely that an increase in rainfall (during a shorter rain season) will result in a rise in the number of people in the GMS that are affected by floods and droughts[106].

Project / Programme Objectives:

List the main objectives of the project/programme.

The overall objective of the proposed project is to strengthen awareness and action of governments and communities in the GMS to adapt to climate change using EbA.

This objective will be achieved through three complementary outcomes:

1. Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.
2. Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.
3. Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

[106] MRC. 2018. The Study on the Sustainable Management and Development of the Mekong River Basin, including Impacts of Mainstream Hydropower Projects. Climate Change Report: Climate Change Impacts for Council Study Sectors.

Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, outcomes, outputs and countries in which activities would be executed, and the corresponding budgets.

Project Components	Expected Outcomes	Expected Outputs	Countries	Amount (US$)
Component 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems.	**Outcome 1:** Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.	*Output 1.1:* A suite of climate change adaptation interventions, including EbA, implemented at Young River Basin in Thailand.	Thailand	2,100,000
		Output 1.2: A suite of climate change adaptation interventions, including EbA, implemented in communities living around Tram Chim National Park in Vietnam.	Vietnam	2,100,000
		Output 1.3: Monitoring programme established to collect information on the cost-effectiveness of project interventions in different socio-ecological contexts in the GMS.	Thailand and Vietnam	250,000
		Output 1.4: National level knowledge-sharing strategy implemented in Thailand and Vietnam.	Thailand and Vietnam	350,000
Component 1 Total				4,800,000
Component 2: Regional knowledge base on climate change adaptation expanded in the GMS.	**Outcome 2:** Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.	Output 2.1: GMS-specific cost-effectiveness analysis undertaken on climate change adaptation interventions that reduce the impact of floods and droughts.	GMS-wide	130,000
		Output 2.2: Policy briefs – and paper for the Lancang-Mekong Cooperation Outlook Report series – developed on: i) good practice in managing shared climate change impacts in the GMS; ii) integrating climate change adaptation into transboundary water management; and iii) cost-effectiveness of EbA for reducing vulnerability to climate change.	GMS-wide	88,709
		Output 2.3: Knowledge on EbA that has been generated and collated through the project shared on the main regional knowledge platforms, presented at regional adaptation forums and shared through different media.	GMS-wide	130,000
		Output 2.4: Guidelines for the design and implementation of EbA monitoring and evaluation systems, including simplified methods for collecting comparable information in different socio-ecological contexts.	GMS-wide	40,000
		Output 2.5: Regional training events on ecosystem-based adaptation conducted with technical government staff from all GMS countries.	GMS-wide	250,000
Component 2 Total				638,709

Component 3: Regional cooperation on climate change adaptation.	**Outcome 3:** Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.	Output 3.1: Recommendations for regional cooperation on the scaling up of climate change adaptation interventions – based on the results of the project – developed and presented at: i) Lancang-Mekong policy dialogues; ii) MRC regional stakeholder forums; iii) Thailand NAP stakeholder forum; and iv) Vietnam National Climate Change Strategy stakeholder forum.	GMS-wide	130,000
		Output 3.2: Regional cooperation and relationship building on climate change adaptation promoted through exchange of information, knowledge and site visits for practitioners, policy-makers and planners.	GMS-wide	270,000
Component 3 Total				400,000
6. Project Execution cost (9.5%)				612,903
7. Total Project Cost				6,451,612
8. Project Cycle Management Fee charged by the Implementing Entity (8.5%)				548,388
Amount of Financing Requested				7,000,000

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

Milestones	Expected Dates
Start of Project/Programme Implementation	March 2019
Mid-term Review (if planned)	July 2021
Project/Programme Closing	August 2023
Terminal Evaluation	March 2023

PART II: PROJECT/PROGRAMME JUSTIFICATION

A. Project Components

The proposed AF project will implement innovative, on-the-ground adaptation technologies and share implementation lessons across the GMS. Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand) and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts.

The theory of change for the proposed project is presented in Figure 5 below.

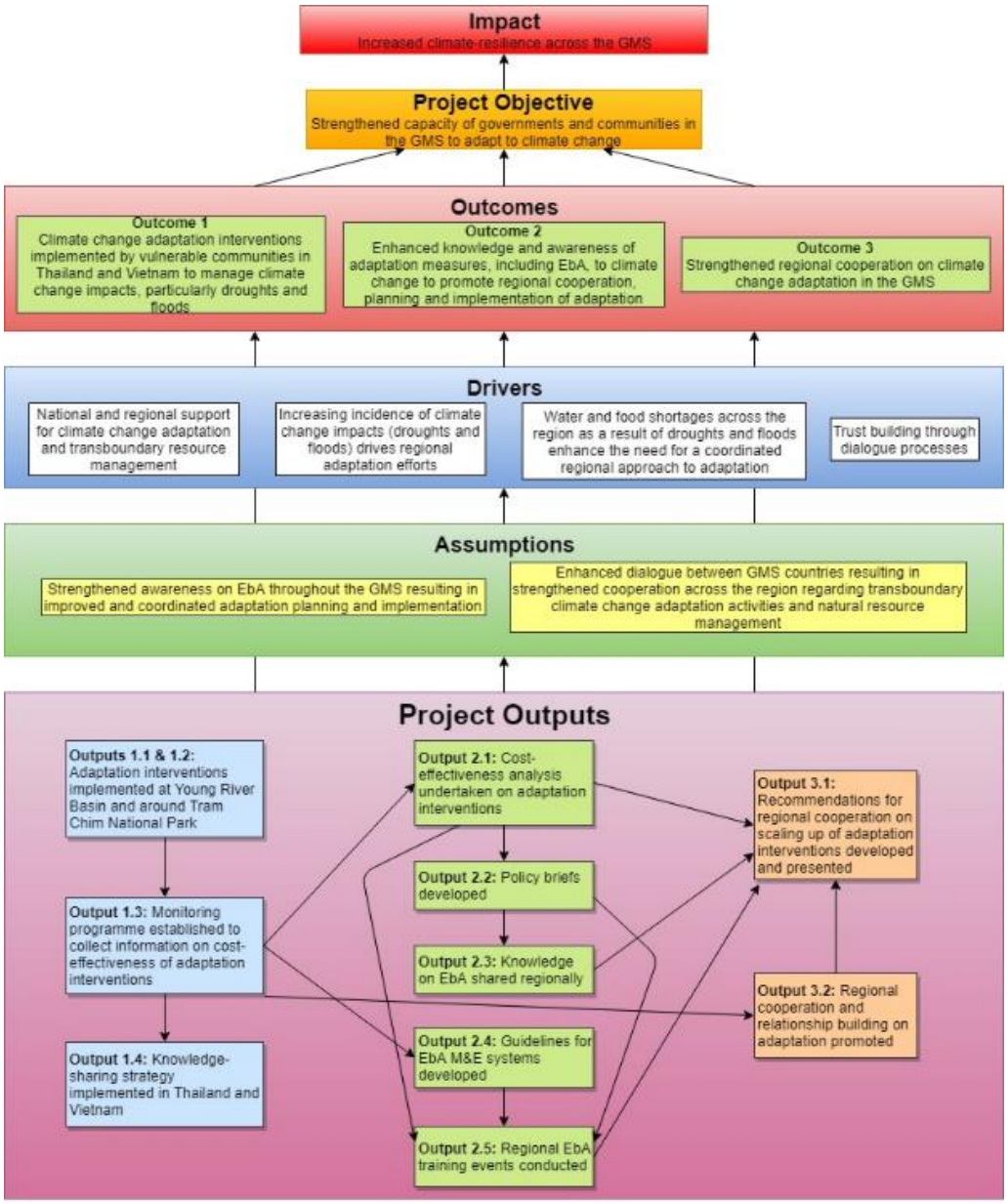

Figure 5: Theory of Change for the proposed project.

Component 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems.

Dependence on shared transboundary water resources can expose people from varied socio-ecological[107] contexts to a common set of climate change threats. In the GMS, people from different contexts who rely on the ecosystems of the GMS to support their livelihoods are united in their shared exposure to the region's primary climate threats: droughts and floods. However, the way these threats manifest to impact livelihoods differs according to the specific context of the affected communities, and therefore, a one-size-fits-all approach to climate change adaptation is unlikely to be effective. In such a scenario, context-specific adaptation measures are appropriate and could be used to demonstrate drought and flood adaptation strategies to people from similar socio-ecological contexts across the GMS.

The first component of the proposed project will increase the resilience of people vulnerable to droughts and/or floods in two areas in the GMS through the implementation of concrete climate change adaptation interventions. Monitoring programmes will be established to collect information on the cost-effectiveness of adaptation interventions in different socio-ecological contexts, and knowledge-sharing events to promote the upscaling of the climate change adaptation interventions will be conducted.

For the identification of on-the-ground adaptation interventions in both the countries, climate vulnerability and risk assessments were undertaken. The interventions proposed are based on local climate action plan to respond to immediate as well as long term climate change impacts. In both the countries, extensive consultation was undertaken with local communities and experts to ensure that adaptation initiatives proposed are suitable to the local context and have proven benefits to build the resilience of the communities from drought and flood impacts because of climate change.

The learning from these two countries will generate knowledge and evidences on cost effectiveness of these interventions that can be replicated throughout the region. Under Component 2, the proposed project will generate knowledge, collate and share them with other GMS countries, and bring them together for regional cooperation under Component 3.

Component 1 of the proposed project will be executed by Department of Water Resources (DWR), Ministry of Natural Resources and Environment (MoNRE) in Thailand, and Department of Legal Affairs (DLA), Ministry of Natural Resources and Environment (MoNRE) in Vietnam.

Outcome 1: Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.

Concrete adaptation interventions – with a focus on EbA – will be implemented in the middle (Thailand) and lower (Vietnam) reaches of the Mekong River. These adaptation technologies will incorporate learning from the past projects e.g. South South Capacity Building for Ecosystem Management in Greater Mekong Sub-region, Mekong ARCC and other past and ongoing projects mentioned in Annex IV as well as learning from this project will be documented to complement planned interventions taking place GSM.. These locations represent a diverse array of socio-ecological contexts but are united by the common climate change threats of floods and droughts.

The specific countries for the implementation of adaptation interventions were selected during the

[107] Including different economic, administrative, political and environmental contexts.

preparation phase of the project through extensive stakeholder consultation. Thailand and Vietnam were selected as they are both vulnerable to climate change impacts, particularly increasing frequency and intensity of floods and droughts. Furthermore, as non-Least Developed Countries they do not receive support for adaptation from the LDCF, as well as other major bilateral funding mechanisms. Thailand and Vietnam also have not yet implemented projects financed by the Adaptation Fund. Therefore, these countries will particularly benefit from a project demonstrating on-the-ground climate change adaptation interventions.

Specific sites have been chosen in each of the target countries through stakeholder consultation during the project development phase (see Part II:I for further information). The sites are: i) Young River Basin in Thailand; and ii) communities living around Tram Chim National Park in Vietnam. The criteria used to select these sites were as follows:

- representativeness of critical vulnerable ecosystems in the GMS;
- evidence of climate change impacts on people's livelihoods;
- evidence of climate change impacts on biodiversity, including endangered species;
- potential linkages to the transboundary context; and
- presence of good practices harmonising biodiversity conservation and livelihoods.

A description of each site is presented below.

Young River Basin (Thailand)

The Young River Basin demonstration site will extend over the whole basin, including the upper, middle and lower reaches. The whole river basin is selected to promote integrated water resources management, as floods and droughts threaten livelihoods throughout the basin.

Located in northeast Thailand, the Young River Basin is a sub-basin of Chi River Basin, which is one of the main basins of the LMB (Figure 6). It covers an area of ~415,000 ha which includes 23 districts in the Kalasin, Rio-Et, Mukdahan, Yasothon and Sakolnakorn provinces. The basin's 23 districts are home to ~540,000 people, ~55% of which are female. Most (~81%) of these inhabitants are farmers, with farmland per household averaging 3.1 ha. Monthly income per household is relatively low, averaging US$ 465, compared to the national average of US$ 788. The primary income source of Young River Basin inhabitants is agriculture.

The majority of the basin's land (69%) is used for agriculture[108]. Rainfed rice (~207,000 ha; 50% of agricultural land) and cassava (~72,000 ha; 17% of agricultural land) farming dominate agricultural activities in the Young River Basin[109]. In terms of rice production, farmers grow sticky rice for household consumption and jasmine rice for export. Average rice production per rai[110] of 350 kg is relatively low. This is mainly attributable to soil degradation across the basin related to poor agricultural and soil conservation practices and is being exacerbated by the effects of climate change (floods and droughts). Declining rice production has resulted in some farmers: i) preferring to grow cassava and sugarcane over rice; ii) practising integrated farming (a combination of crop and livestock farming); and iii) converting the remaining natural habitats to farmland. The conversion of most of the basin's land to cultivated areas resulted in considerable declines in its natural forests (mainly upstream), the coverage of which decreased from 37 to 23% between 2002 and 2015. Of the basin's remaining land, 2% is covered by wetlands and the rest by water storage infrastructure (such as ponds and reservoirs).

[108] Including the cultivation of rice, crocus, cassava, rubber, sugar cane and various fruits.
[109] Only 0.65% is under irrigation (including ~2,700 ha rice crops).
[110] 1 rai = 0.16 ha.

One main river, the Young, traverses the basin, receiving an annual run-off of 1,336 million m^3. Most fo this run-off, 308 million m^3 is received during the monsoon season in August and September, often resulting in flash floods. Maximum monthly rainfall, ~295 mm, is experienced in August, with annual rainfall across the basin averaging 1,384 mm. In recent years, especially since 2010, rainfall between the upper (Kalasin Province) and lower (Roi-Et Province) Young River Basin has varied considerably (Figure 7). The Young River Basin Committee (RBC) manages water resources within the basin[111]. Water resource development strategies formulated by the RBC include: i) restoring headwater forest; ii) conserving natural resources and soil quality; iii) monitoring water quality; and iv) improving watershed management. However, limited financial resources have resulted in these strategies being largely unimplemented, while links to climate change and vulnerability are weak.

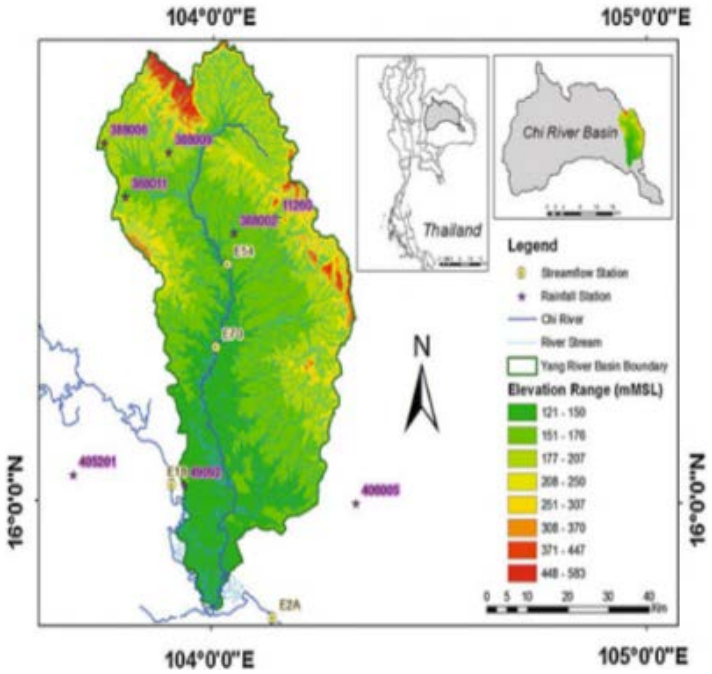

Figure 6: Location of the Young River Basin, north-eastern Thailand.

Current vulnerability

Main climate-related vulnerabilities identified across the Young River Basin include: i) water security; ii) food security; iii) income generation; and iv) farming systems[112]. More specifically, communities in the upper basin commonly face water shortages during the dry summer months, resulting in the limited availability of drinking water and a reduction in crop production (particularly rice). This adversely impacts income generation, ultimately leading to debt as farmers borrow money to buy food and cover monthly expenses. In the lower basin, communities are faced with severe floods during the monsoon season. These floods result in the inundation of agricultural land (especially rice), causing declines in production and income generation. Consequently, farmers are forced to purchase food and seek work in other parts of the country as migrant workers.

[111] Established in 2010 by the Government of Thailand's Department of Water Resources of the Ministry of Natural Resources and Environment (DWR-MoNRE).
[112] DWR-MoNRE. 2011. Climate Change Adaptation Initiative (CCAI).

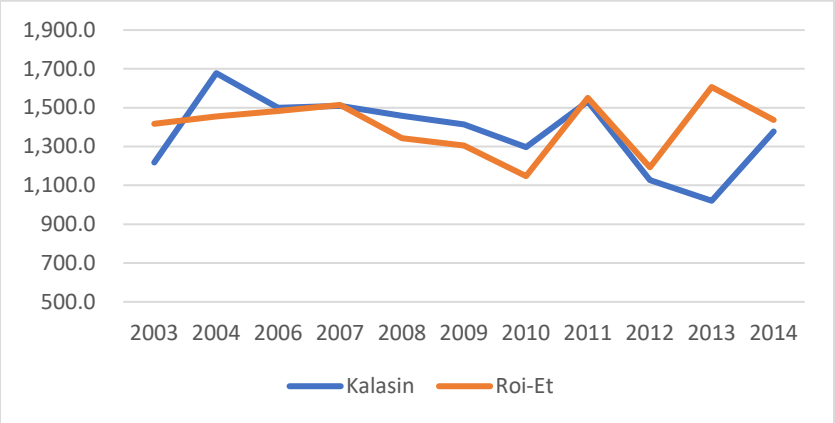

Figure 7: Annual rainfall (mm) variations between the upper (Kalasin Province) and, middle and lower (Roi-Et Province) Young River Basin during the period 2003 to 2014[113].

Climate change impacts

The Young River Basin is expected to experience temperature increases of up to 3.3°C by 2060 as well as a rise in the annual maximum number of consecutive dry days by 2099 (Figure 8). Similarly, annual maximum daily rainfall is projected to increase in variability and amount across the basin under both medium- (2040; Figure 9) and long-term scenarios (2099; Figure 10). Rainfall increases are predicted to be limited to the rain season, with less rain falling during the hot dry season[114]. These changes are expected to result in rises in both the intensity and frequency of droughts in summer and floods during the monsoon period. These impacts will negatively affect the mostly agriculture-based livelihoods of local communities. Yields for the main crops – rice and cassava – will decline, with rice production in particular expected to severely impacted by floods and droughts.

Climate change simulation studies on jasmine rice yields in northeast Thailand (including Roi-et Province, middle and lower Young River Basin) project significant declines over time[115]. These include declines of up to 18, 28 and 24% by the 2020s, 2050s and 2080s, respectively. Water demand for the production of jasmine rice under future climate scenarios was also modelled, projecting increases of up 92 and 77% under the RCP 4.5 and 8.5 scenarios, respectively[116]. These results exemplify the need for the implementation of climate change adaptation measures to strengthen the resilience and productivity of agricultural production across the Young River Basin in the long-term.

[113] Thailand Department of Meteorology. 2018.
[114] Chinvanno, S. and Kerdsuk, V. 2013. Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand, Adaptation Knowledge Platform, Partner Report Series No. 5. Stockholm Environment Institute, Bangkok.
[115] Babel, M.S., Agarwal, A., Swain, D.K., Herath, S., 2011, Evaluation of climate change impacts and adaptation measures for rice cultivation in Northeast Thailand, Climate Research, 46 (137–146).
[116] Shrestha, S., Chapagain, R., Mukand S. and Babel, M.S., 2017, Quantifying the impact of climate change on crop yield and water footprint of rice in the Nam Oon Irrigation Project, Thailand, Science of the Total Environment (599–600): 689–699.

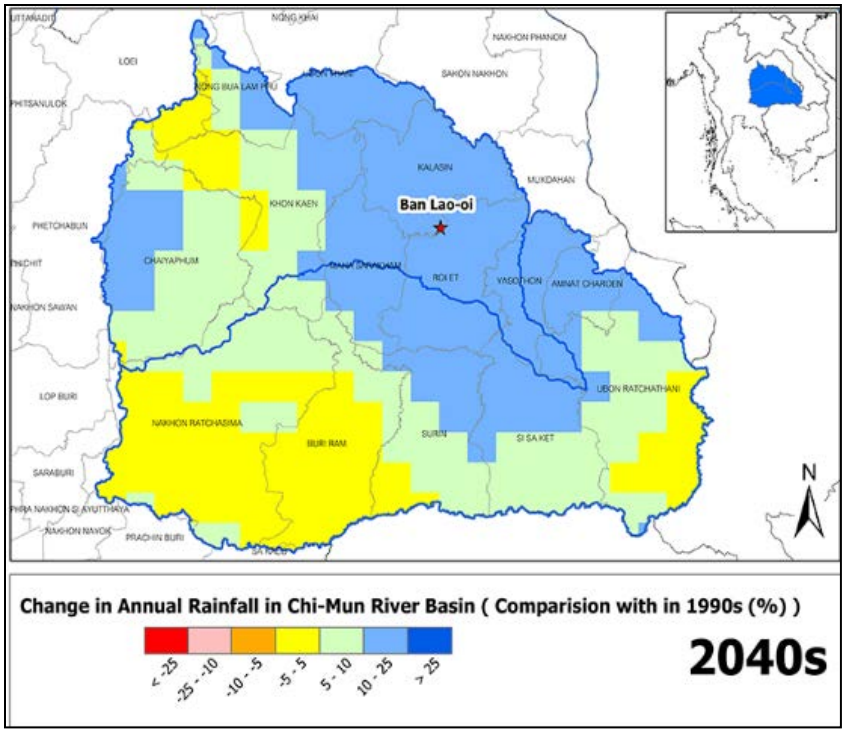

Figure 8: Project increase in annual rainfall (relative to 1990) of the Chi River Basin by 2040[117]. The Kalasin (upper Young River Basin) and Roi-Et (middle and lower Young River Basin) Provinces are expected to experience an increase of 10 to 25% in annual rainfall.

Drought vulnerability and risk classifications for the Young River Basin are moderate to severe (Figures 11 and 12). In terms of floods, the vulnerability of the Young River Basin is projected to rise under future climate change scenarios (Figure 13). By 2060, it is predicted that the extent of the Chi River Basin (of which the Young River Basin is a sub-basin) that is impacted by floods will increase by ~7% (141,000 ha) and ~17% (365,000 ha) under moderate and extreme climate change scenarios, respectively.

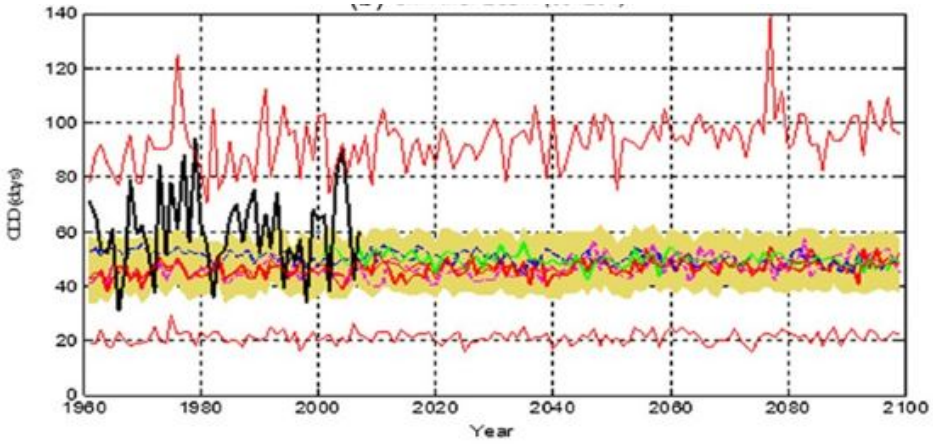

Figure 9: Project annual maximum number of consecutive dry days for the Chi River Basin, of which the Young River Basin is a sub-basin.

[117] Chinvanno, S. and Kerdsuk, V. 2013. Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand, Adaptation Knowledge Platform, Partner Report Series No. 5. Stockholm Environment Institute, Bangkok.

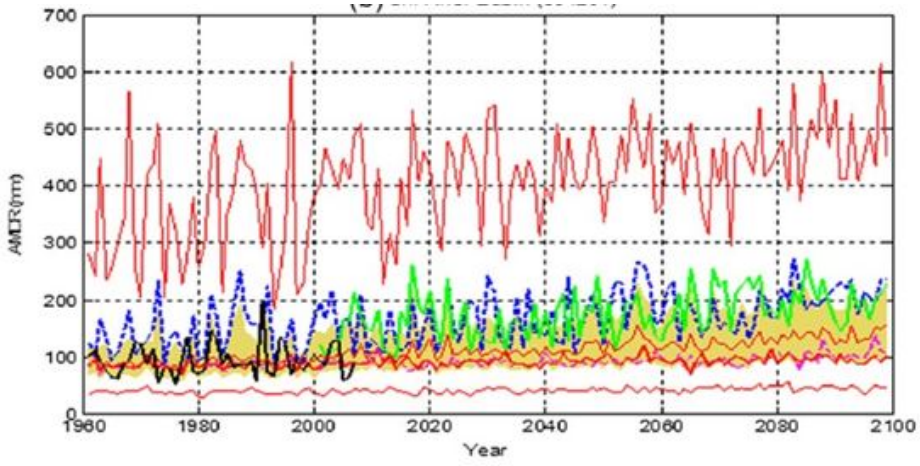

Figure 10: Projected annual maximum daily rainfall for the Chi River Basin, of which the Young River Basin is a sub-basin.

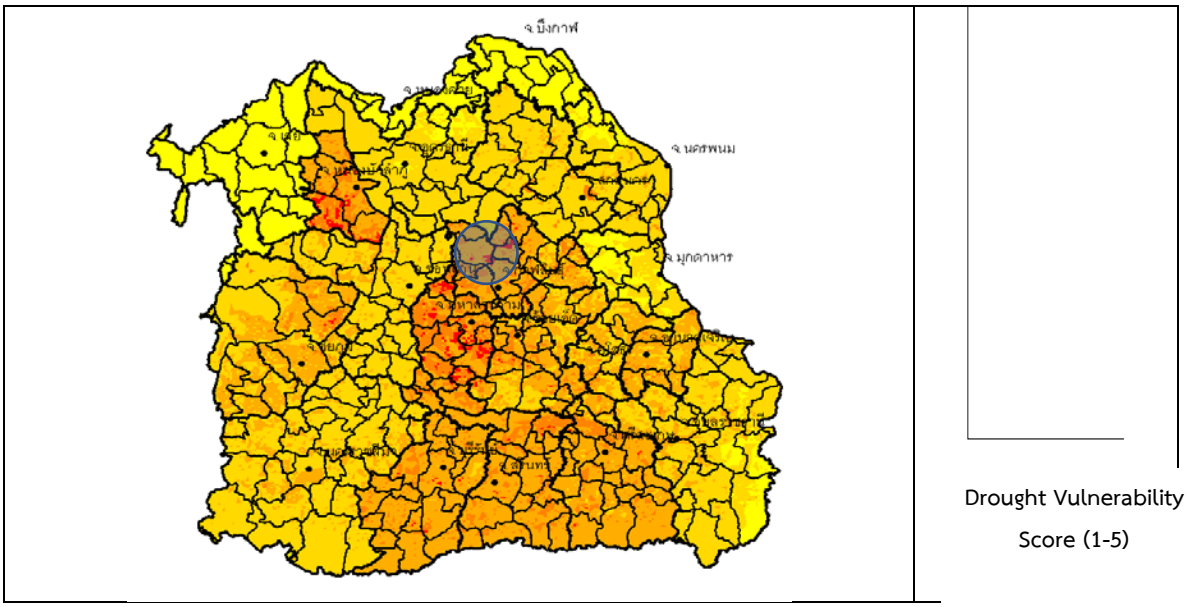

Figure 11: Drought vulnerability map of northeastern Thailand (the circle highlights the Young River Basin)[118].

[118] MRC. 2017. Drought Management Strategy for the Lower Mekong Basin 2019-2023, December 2017.

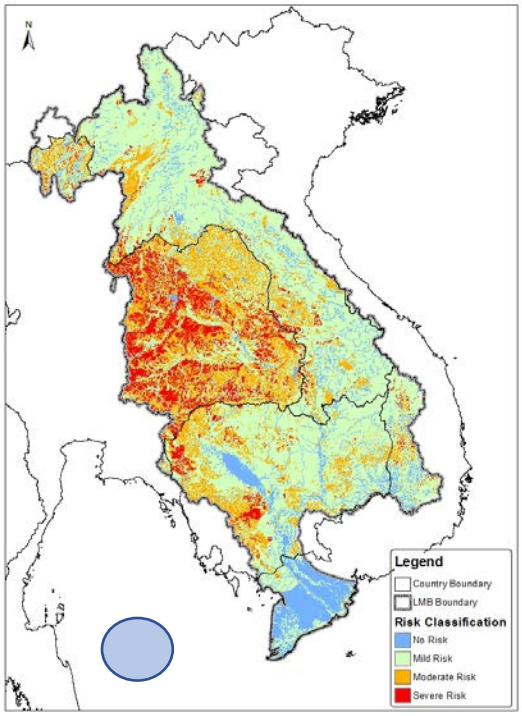

Figure 12: Drought risk map of the Lower Mekong River Basin (LMB; the Young River Basin is highlighted by the circle).

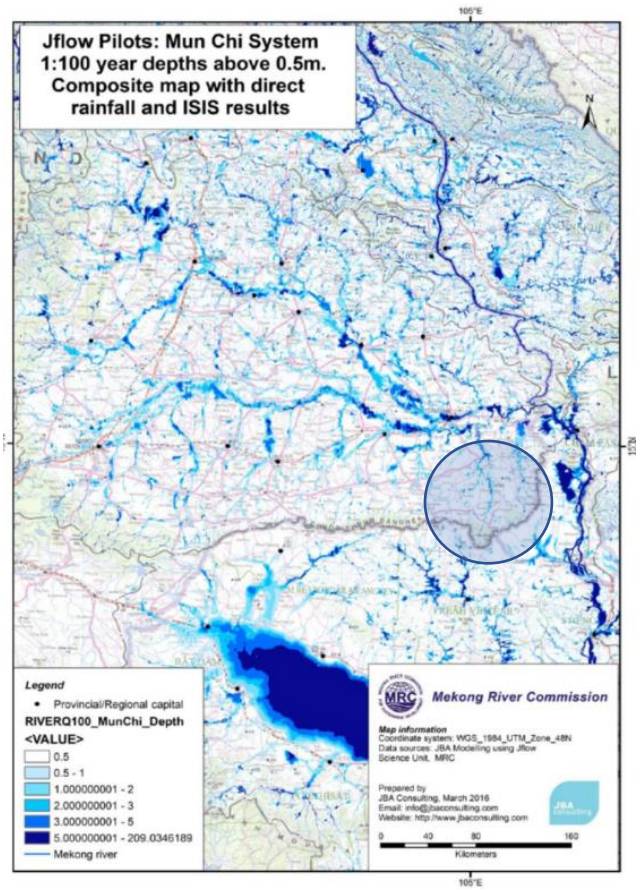

Figure 13: Map of projected flooding for the Mun Chi river basin (part of the LMB; the Young River Basin is highlighted by the circle).

Upper Young River Basin

The upper Young River Basin (up to 500 MASL[119]) is mainly made up of headwaters, with the landscapes dominated by natural forests natural forests (Figure 14). Climate change adaptation demonstration sites of the proposed project in the upper Young River Basin are located in the Kalasin province. Approximately 30% of Kalasin province's population live under the poverty line, with most households relying on agriculture-based livelihoods for food and income. Rain-fed rice production dominates agriculture in the province, while irrigated lands are uncommon (making up just 2.3% of agricultural land). Food and income generated from agriculture are often supplemented by natural resources supplied by local ecosystems, such as NTFPs collected in remnant forests and fish caught in freshwater sources (including rivers, reservoirs and ponds). The dependence of local households on natural resources to make ends meet has contributed to the degradation of the Kalasin province's ecosystems, most notably forests, rivers and wetlands. This degradation and consequent reduction in the availability of ecosystem goods and services have contributed to ~20% of the province's rural population migrating to urban areas for work. Ecosystem degradation in the Kalasin province is and will continue to be compounded by the impacts of climate change, which include a greater frequency and intensity of droughts and flash floods. This is expected to result in an increase in the number of people migrating out of rural areas in search of alternative income-generating activities.

Vulnerabilities related to current socio-economic conditions are and will continue to be exacerbated by the effects of climate change. During consultations in the Sai Na Wang sub-district of the Kalasin Province, communities identified several climate change impacts and associated vulnerabilities. These are listed below.

- The contrasting impacts of droughts and flood over recent years have limited agricultural productivity and forced the need for adjustments to traditional agricultural practices, often with little success.
- Heavy flooding and extended droughts have adversely impacted rice yields, reducing the income generating capacity of this crop type.
- Water shortages for both household and agricultural use are becoming more frequent.
- Communities lack the knowledge and experience required to adapt to the impacts of climate changes – particularly in terms of increasing the climate-resilience of agricultural practices.
- Policies and planning related to climate change adaptation are lacking at the provincial and district level.

A climate change case study of the Lao-oi sub-district, Kalasin Province, found that increases in the frequency and intensity of annual floods between 2003 and 2013 caused the destruction of ~40% (~3,200 ha) of land used for rice farming[120]. To make up for the resulting losses, community members were forced to cultivate rice during the dry season, often under drought conditions and the risk of damage attributable to crop pests. The lack of any climate adaptation or resilience policy for the area means that community members have to rely on the often-insufficient amount of compensation money received from government or travel to other parts of the country to work as migrant labourers[121].

[119] Metres above sea-level.

[120] Chinvanno, S. and Kerdsuk, V. 2013. Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand, Adaptation Knowledge Platform, Partner Report Series No. 5. Stockholm Environment Institute, Bangkok.

[121] Chinvanno, S. and Kerdsuk, V. 2013. Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand, Adaptation Knowledge Platform, Partner Report Series No. 5. Stockholm Environment Institute, Bangkok.

Other than a small pilot project implemented by DWR-MoNRE with support from the MRC, there have been no climate change adaptation projects in the Kalasin province. The DWR-MONRE project has supported vulnerable local communities in Young River Basin by establishing a working group on Climate Change Adaptation in March 2018. However, the project is yet to implement any adaptation interventions. Therefore, the adaptive capacity and climate-resilience of the sub-district's communities is underdeveloped. A primary reason behind DWR-MoNRE's decision to pilot an adaptation project in the province is the presence of active and responsive community groups. These groups, including the Sai Na Wang Sub-District Water Resource Management Committee[122] and Community Conservation Group, are important stakeholders in the upper Young River Basin and will be consulted during the implementation of the project's climate change adaptation interventions.

The Sai Na Wang Sub-District Water Resource Management Committee played the main role in the development of local water resource strategies. The objectives of these strategies are to: i) map local water resources; ii) explore various ways to conserve local water resources; iii) develop a plan for the mixed use of surface and groundwater; and iv) negotiate financial support from district, provincial and central authorities to support the development of a district water management plan. The activities related to the attainment of these objectives are still in the early stages of implementation. However, the continued implementation of these activities requires additional financial resources and technical support.

Middle and Lower Young River Basin

The middle and lower sections of the Young River Basin (Figure 14) are characterised by cultivated lowlands (as low as 130 MASL). Climate change demonstration sites of the proposed project in the middle and lower Young River Basin are located in Roi-Et province. Approximately 79% of the population of Roi-Et province is dependent on rice farming as a livelihood. Most rice farming in the province is rain-fed. As a result, this livelihood activity is threatened by local climate change conditions – namely droughts and flash floods. Floods also damage infrastructure and have resulted in the loss of life.

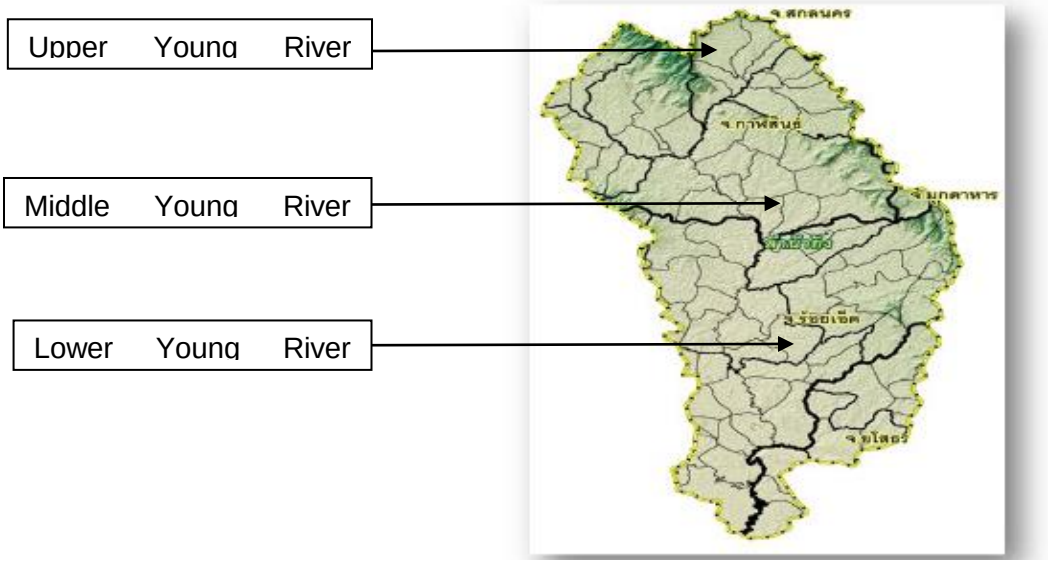

Figure 14: Map showing upper, middle and lower sections of Young River Basin.

[122] Established in 2012 by the Sai-Na Wang Sub-District Organisation, Kalasin province.

Vulnerabilities related to current socio-conomic conditions are and will continue to be exacerbated by the effects of climate change. During consultations and the conduction of a household survey in the Wang Luang sub-district of the Roi-et Province, communities identified several climate change impacts and associated vulnerabilities (more details are presented in Supplementary report I[123]). These are detailed below.

- Heavy flooding in the rainy season often destroys most of the rice crop. This has led some farmers to shift their cultivation to the dry season, where water shortages subsequently impact it.
- Water shortages, decreasing agricultural yields and a reduction in household incomes (and the associated reduction in living standards) were identified as the primary climate vulnerabilities.
- Approximately 87% of households have been affected by damages caused by floods (regarding agricultural production), with ~49% being affected biennially.
- At least 47% of farmers reported being affected by heavy crop losses (across most of their land) caused by flooding, while ~45% had experienced flood damage to at least half of their cultivated area.
- Debt caused by flood damage to farmland was moderate for ~39% of households and heavy for 37%. In addition, less than half (~47%) of the household survey participants received financial aid from the government to cover the costs of agricultural losses caused by flood damages.
- In terms of household responses to the negative impacts of floods on agriculture: i) ~65% of households waited for floodwaters to recede; ii) ~20% stopped growing rice in the wet season, shifting production to the dry season; and iii) ~5% attempted to pump excess floodwater out of their rice paddies.
- Drought negatively impacted the agricultural production of ~44% of respondents, while ~46% stated that droughts were occurring more frequently.
- Approximately 32% of households have been affected by heavy crop losses attributable to droughts, while ~49% reported losing at least half of their crop during previous drought periods.
- Financial debt resulting from droughts was high and moderate in ~22 and 39% of cases, respectively. About 60% of respondents received some form of drought relief aid from the government, with the rest not receiving any form of financial assistance.
- Drought responses amongst survey participants include: i) constructing a farm pond (~19% of participants); and ii) drilling for groundwater (~14% of participants).
- Approximately 61 and 44% of households that participated in the survey worry about the impacts of future floods and droughts, respectively.
- Regarding the impacts of climate change (including temperature rises, increased rainfall and flooding, prolonged drought periods and seasonal shifts), ~86% of respondents indicated being highly or moderately worried about negative effects of future conditions. Only ~3% of households are actively attempting to adapt to changing climatic conditions.
- Approximately 82% of survey participants identified the need for additional support from national and local government, and development agencies for climate change adaptation. The type of support needed by vulnerable households includes: i) assistance in developing adaptation plans and measures (almost 100% of participants); ii) improved access to knowledge and information (~64% of participants); and iii) access to adaptation training and skills development (~30% of participants).

To date, there have been no climate change adaptation initiatives implemented in the Roi-Et

[123] Supplementary report I: Thailand inception workshop report, CVA and validation report

province (middle and lower Young River Basin) other than a DWR-MoNRE investment to support the development of a vulnerability and adaptation strategy, which will be strengthened through the establishment of the DWR working group and enhanced as experiences with the project come to the fore. This strategy is still in the early stages of development. Consequently, the adaptive capacity and climate-resilience of the local communities remain limited.

Tram Chim National Park and surrounding communities (Vietnam)

Tram Chim National Park and its surrounding communities are located in the Tam Nong district of Vietnam's Đồng Tháp Province (Figure 15). The district is ~ 46,100 ha in size and is traversed by the Tien River. Communities surrounding the national park (situated in its buffer zone) are comprised of five communes[124] and one town[125] (Figure 16). These communities along with Tram Chim National Park cover an area of ~37,830 ha[126].

First established as a nature reserve in 1994[127], Tram Chim was officially recognised as a national park in 1998. The park supports one of the last remaining remnants of the 'Plain of Reeds' wetland ecosystem and covers an area of 7,588 ha in Tam Nong district, Dong Thap province in the Mekong Delta region of Vietnam. The park is located in 5 communes (including Phu Duc, Phu Hiep, Phu Thanh B, Phu Tho and Tan Cong Sinh) and Tram Chim town. In 2012, Tram Chim National Park was recognized as the World's 2000th Ramsar site and the 4th Ramsar site in Vietnam.

The park is divided into five management zones, A1, A2, A3, A4, A5 (Figure 16), and Zone C as an administrative area. These zones are traversed by canals with a total of 60 km in length. The Park consists of 2,808 ha of forested land (*Melaleuca cajiputi* stands mainly aging from 10 to 18 years, grown on sand and clay soils), 4,307 ha of grassland and 472 ha of other habitat types. The dominant flora species include *Eleocharis* spp. grass, *Panicum* spp., *Ischaemum* spp, grass, wild rice, and lotus. The site is inundated annually to a depth of 1 to 3 meters during the wet season (peak level occurring sometime between September and November).

The ecosystems of Tram Chim National Park support 231 bird species (resident and migratory), including 15 species that are either endangered, threatened or of special concern[128]. Of these bird species, the park is most well-known for the presence of the Eastern Sarus Crane, the primary reason for Tram Chim's original gazetting as a nature reserve. Even though the number of cranes has declined over the last two decades, the park remains an important site for their conservation. Other than bird species, the park's wetlands and canals provide food, spawning sites and migratory routes for 130 fish species, five of which are globally threatened.

[124] Phu Thanh B, Phu Tho, Phu Hiep, Phu Duc and Tan Cong Sing.

[125] Tram Chim town.

[126] 7,300 ha within the boundaries of the national park and 30,730 ha under the management of communities

[127] Decision No. 47/TTg, 2 February 1994, Prime Minister of Vietnam.

[128] Including the Comb Duck (*Sarkidiornis melanotos*), Grass Owl (*Tyto capensis*), Bengal Florican (*Houbaropsis bengalensis*), Eastern Sarus Crane (*Grus antigone sharpii*), Greater Spotted Eagle (*Aquila clanga*) and Oriental Darter (*Anhinga melanogaster*).

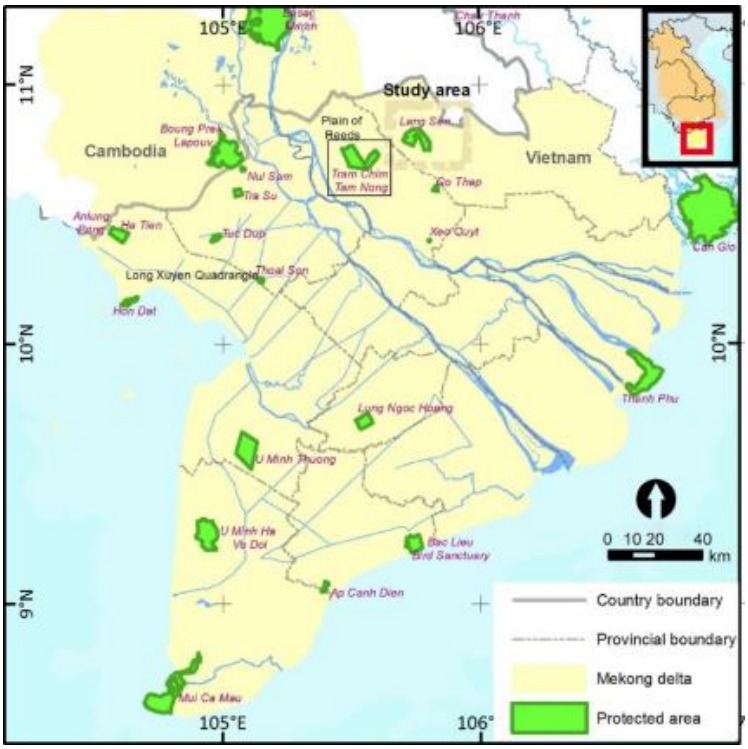

Figure 15: Location of Tram Chim National Park within Vietnam's Mekong Delta Region.

For the communities living around Tram Chim National Park, the protected area's fish are the most valuable and harvested resource (Table 4). Other goods harvested from the ecosystems of the park and its surroundings include terrapins, snakes and birds for meat, trees (*Melaleuca cajuputi)* for fuelwood and aquatic plants (such as lotus and water lily) for food. Wetland plants such as *Panicum repens* and *Eleocharis dulcis* are used as mulch by local vegetable farmers. Another common use of wetland plant species is in the production of handicrafts – an additional livelihood for local communities. Apart from ecosystem goods, the main service provided by local ecosystems is ecotourism, with Tram Chim National Park attracting more than 20,000 visitors per year.

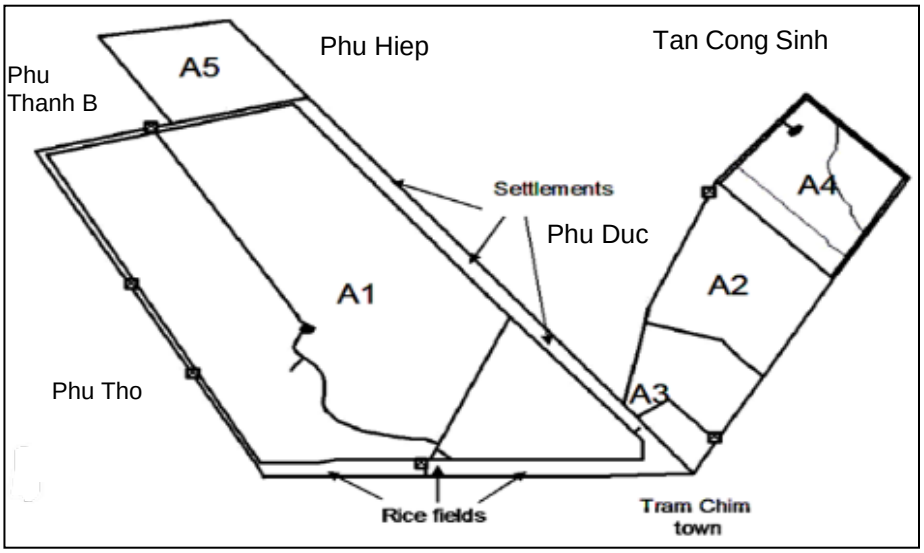

Figure 16: Schematic diagram of Tram Chim National Park and the surrounding communities.

Table 4: Goods and services provided by Tram Chim National Park.

Goods and services to local communities	Goods and services to the Delta
• Fish • Fuelwood • Grass/grazing • NTFPs (such as lotus and water lily) • Micro-climate regulation	• Ecotourism • History and culture • Groundwater recharge • Prevention of saline intrusion • Carbon sequestration • Scientific (site study) • Biodiversity conservation

The communities living in the communes and town surrounding the national park are reliant on the local ecosystems for food production and income generation to supplement that from their main livelihood source, agriculture (dominated by rice cultivation)[129]. Approximately 89% (~20,500 ha) of the land surrounding Tram Chim National Park is used for agriculture (dominated by crop production in the form of paddy rice)[130]. These areas are expected to expand as the local population grows, resulting in further degradation of natural areas and increased pressure on the ecosystems of Tram Chim National Park for goods and services. This has resulted in an increase in: i) illegal fishing activities where electricity and explosives (opposed to traditional methods) are used to maximise fish catches as fish stocks decrease[131]; and ii) encroachment onto parkland as the areas outside the park become overpopulated, and natural resource extraction intensifies. To protect the park's ecosystems from illegal resource harvesting and encroachment, low-income families from surrounding communities are allowed to access certain zones of the park from August to December to catch fish and harvest NTFPs[132]. This practice provides additional livelihood options for the beneficiary families and reduces the extent of illegal resource extraction within Tram Chim National Park.

In 2017 there were ~50,000 people living around Tram Chim National Park, ~5,500 more than in 2005. The insufficient capacity of local livelihood options (mainly agriculture) to support this growing population is reflected by ~20% of the local population living below the poverty line[133]. Poverty has been exacerbated by recent increases in the frequency and intensity of drought, and extreme out of season rainfall events, which have reduced agricultural productivity and therefore income for farmers (Table 5).

Table 5: Total population, number of households and poverty rate of communities living around Tram Chim National Park[134].

Village/commune	Population	Household	Poverty rate (%)	Gender	
				Female	Male
Phu Hiep	10212	2766	23.15	50.1	49.9
Phu Duc	8409	2230	20.68	49.6	50.4
Phu Thanh B	4627	1168	22.72	50.2	49.8
Tan Cong Sinh	6330	1636	26.96	50.3	49.7

[129] More than 80% of household depend on agriculture as their main source of income.
[130] The remaining 11% of land is covered by houses, infrastructure and natural areas.
[131] These methods often result in additional degradation to fresh water ecosystems and can cause wildfires.
[132] These include only approved resources, such as certain grasses, edible plants (e.g. water lily), dead trees and invasive species (including giant sensitive plant and golden snail).
[133] Less than US$ 44 per person per month.
[134] Tam Nong District. 2017. Statistical Data.

Tram Chim	11061	2899	17.55	49.8	50.2
Phu Tho	10946	2738	16.74	50.4	49.6
Total	**51585**	**13437**			

To address the effects of reduced food and income generation from farming activities around Tram Chim National Park, various alternative livelihood options have been introduced by initiatives supported by the World Wildlife Fund (WWF). Options include: i) mushroom farming; ii) tree planting (e.g. *Sesbania sesban*; Egyptian riverhemp) for the production of NTFPs; iii) beekeeping; iv) handicraft production from water hyacinth; and v) water lily production. These livelihood options have strengthened the climate-resilience of 160 people living around the park and have helped to alleviate the pressure on the park's natural resources. However, the demand for access to additional livelihood options amongst communities surrounding the park still needs to be met. Until this happens, degradation of the area's natural resources will continue to take place as communities struggle to adapt to a changing climate and the impacts of other existing threats intensify. The livelihood-related adaptation initiatives proposed in this project are based on the success of such initiatives as implemented by WWF to strengthen the climate resilience of surrounding communities.

Existing threats impacting Tram Chim National Park include: i) the presence of invasive species, such as giant sensitive plant (*Mimosa pigra*) and golden apple snail (*Pomacea canaliculate*), which negatively affect biodiversity and the supply of ecosystem goods and services; and ii) changes in river hydrology and sedimentation caused by upstream development in the GMS, especially hydropower. These threats will continue to be compounded by the impacts of climate changes in the MRB, such as droughts and floods, over the long-term.

An adverse effect of droughts in and around Tram Chim National Park is the frequent occurrence of wildfires because of an increase in dry vegetative biomass. The characteristics of the park's terrain, canals and its division into six zones makes the combating of fires and prevention of illegal burning by community members difficult. Between 2009 and 2013, 24 forest fires destroyed 427 ha of vegetation in the park (Figure 17)[135]. Apart from droughts and unpredictable out of season extreme rainfall events, climate change in the region has led to: i) increased temperatures, which have caused a rise in evaporation rates and reduction in the availability of fresh water; and ii) decreased flood peaks, which have negatively affected fish stocks and the distribution of sediment over agricultural land.

[135] Duong Van Ni & Le Anh Tuan, 2015. Review and revision of the existing water management strategy in Tram Chim National Park with a focus on climate change.

Figure 17: Wildfire in Tram Chim National Park (grassland) in 2010.

Climate change predictions

- Temperature

A SIMCLIM model was used to project temperature changes in Dong Thap province up to 2100 corresponding to the B1, B2 and A1FI scenarios. The medium temperature in Dong Thap area tends to increase through the years according to different considered scenarios (Table 6). Higher temperatures will be experienced in the northwest and descending to the southeast of Dong Thap province. All scenario results showed the highest temperature increase during the dry months, which will lead to increased water shortages and droughts.

Table 6: Medium, maximum and minimum temperature projections for Dong Thap Province in the short- to long-term under three climate change scenarios[136].

Scenario	Temperature	2020	2030	2050	2070
B1	Medium	28.0	28.1	28.4	28.5
	Maximum	31.7	31.9	32.3	32.7
	Minimum	24.3	24.5	24.9	25.5
B2	Medium	28.1	28.1	28.5	29.4
	Maximum	31.8	32.0	32.5	33.0
	Minimum	24.4	24.6	25.0	25.5
A1FI	Medium	28.0	28.1	29.4	30.3
	Maximum	31.8	32.1	33.0	34.1
	Minimum	24.3	24.6	25.5	26.6

- Rainfall

The SIMCLIM model was also applied to predict changes in rainfall in Dong Thap province up to year 2100 under B1, B2 and A1FI scenarios. Overall, average rainfall of Dong Thap area is

[136] Dong Thap DONRE, 2011. Dong Thap Province Climate Change Action Plan, 2011–2020.

predicted to increase (Table 7). However, this increase is not consistent throughout the year. The seasonal average rainfall in the wet period of July – August and September – November is predicted to increase compared to the base data, with the greatest predicted increase being 20.2% under A1FI scenario (2100). In contrast, the seasonal average rainfall in the dry period of December – February and March – May is predicted to decrease compared to the base data (1990), with the greatest predicted increase being 17.5% under A1FI scenario (2100).

Table 7: Predicted average rainfall in Dong Thap province under different scenarios.

Scenarios	2020	2030	2050	2070
B1	1483.4	1489.7	1503.3	1516.2
B2	1485.3	1492.8	1509.1	1527.0
A1FI	1484.6	1494.7	1527.6	1561.5

- Floods

The results from 3-D hydrodynamic modelling provides a basis for determining changes in the flood regime in the Mekong River delta. The model simulations show an increasing trend in the annual maximum water depth and flooded area during the average and driest water years (Figure 18). This clear trend is not visible in the wettest water years. These changes in flood regimes may have significant impact on both the agriculture and aquaculture[137].

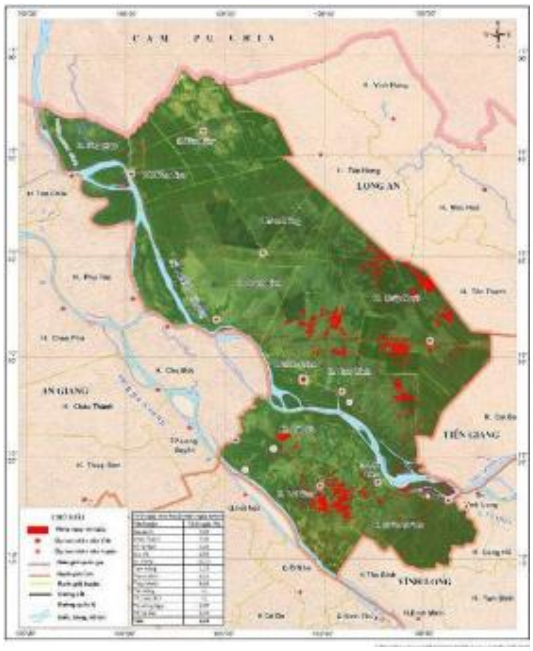

Figure 18. Flooding risk of Dong Thap province if the sea level rise by 100 cm[138]

- Sea-level rise

According to 1-dimension hydrodymic models, sea-level rise (SLR) in the South China sea[139] may result in a 30 cm increase in water levels in the rivers and canals of Dong Thap province by

[137] Tuan and Suppakorn, 2011. Climate Change in the Mekong River Delta and Key Concerns on Future Climate Threats

[138] According to Vietnam's Climate Change and Sea Level Rise Scenarios released in 2016

[139] Known as the East sea in Vietnam.

2050[140].

Climate change impacts

The predicted impacts of future climate change in and around Tram Chim National Park are detailed below.

- In the short-, medium- and long-term, temperatures are expected to increase by 1 to 2.6°C under the B1, B2 and A1F1 scenarios (Table 6)[141,142]. These temperature increases will exacerbate current water shortages and drought conditions, particularly in the dry season. This, in turn, is expected to result in a reduction in groundwater levels as local communities become more reliant on this water source.
- Average annual rainfall is also expected to increase under the B1, B2 and A1F1 scenarios in the short-, medium- and long-term (Table 7). This will be attributable to a rise in average wet season – July to November – rainfall[143]. Contrastingly, average dry season – December to May – rainfall is expected to decrease[144]. Under such conditions, the frequency and intensity of floods in the wet season are expected to rise, while drought periods are likely to lengthen during the dry season.
- Flood frequency and intensity are also predicted to be intensified by early snowmelts on the Tibetan plateau near the source of the Mekong (lancing Jiang) River, as well as an increase in the occurrence of tropical storms (monsoons) over the middle and lower Mekong River Basin.3-D hydrodynamic models project increases in annual maximum water depth and flood peaks. This is expected to affect agriculture and aquaculture negatively and shorten the fishing season in the Dong Thap province[145].
- Sea-level rise (SLR) in the South China sea[146] may result in a 30 cm increase in water levels in the rivers and canals of Dong Thap province by 2050[147]. This will further compound flooding in the province, negatively affecting livelihoods such as agriculture and aquaculture.

Climate change adaptation

To reduce the vulnerability of communities to the climate change threats described above, a suite of climate change adaptation interventions, including EbA, will be implemented in the Young River Basin in Thailand and in and around Tram Chim National Park in Vietnam.

A vulnerability assessment conducted at each site during the project development phase (see Supplementary report I & II) identified adaptation interventions and sites. Extensive community consultation was undertaken to identify climate vulnerabilities, adaptation options to be implemented and specific sites. For Thailand, Young river basin is divided into three zones based on their climate vulnerabilities i.e. upper, middle and lower river basin, while adaptation initiatives in Tram Chim National park will be implemented in five zones. During the initial phase of project implementation, additional assessments and consultations will be conducted to ensure that the adaptation interventions are climate resilient.

The adaptation interventions proposed are broadly categorized into: i) climate-resilient agriculture; ii) ecosystem-based adaptation; iii) water infrastructure and water management improvement; and iv) climate-resilient livelihood options. The adaptation initiatives were identified

[140] Dong Thap DONRE, 2011. Dong Thap Province Climate Change Action Plan, 2011–2020.
[141] Under the B1, B2 and A1F1 scenarios.
[142] Dong Thap DONRE, 2011. Dong Thap Province Climate Change Action Plan, 2011–2020.
[143] Under the A1F1 scenario.
[144] Under the A1F1 scenario.
[145] Tuan & Suppakorn, 2011. Climate Change in the Mekong River Delta and Key Concerns on Future Climate Threats.
[146] Known as the East sea in Vietnam.
[147] Dong Thap DONRE, 2011. Dong Thap Province Climate Change Action Plan, 2011–2020.

by local communities based on proven benefits provided by these initiatives in other parts of the country. For example, living check dams are promoted extensively in Thailand and Vietnam for water management and widely accepted by government agencies and communities as technology providing benefits to society with low environmental risk.

In Thailand, living check dams are promoted in small rivers and tributaries in different parts of the country and is included in Royal project. In Vietnam, local communities have built 20 check dams in Thien Hung Commune in Binh Phuoc Provice using bamboo plants and pineapple leaves. The living check dams support in flood regulation as well as conserve water in dry season for irrigation. Similarly, 15.2 km of water channel built in Truong Dinh Village in Binh Phuoc Province provided irrigation for rice farming during dry season in the village. These initiatives are proven to be cost effective and provide social benefits while having low environmental risk.

Alternative livelihood options proposed will provide economic empowerment to the local communities, mainly women and enhance the adaptive capacity of women to face the adverse impacts in agricultural productivity due to drought and flood.

During the process of participatory planning, the project beneficiary communities will be selected at project onset based on transparent selection criteria that will be developed by the project management unit in consultation with local government and community leaders, at the start of project implementation. These criteria will include *inter alia* the motivation to participate in the adaptation activities and some sort of in-kind co-financing model that will provide assurance of commitment to success. Targeting would also be carried out according to gender equity considerations and low-income groups. Local community coordinators (one each from the upper, middle and lower Young River Basin) which will be hired to assist the project manager.

In both countries, the project will work with the respective Ministries of Agriculture and rice departments to identify the appropriate varieties to use for drought, flood, excessive temperatures and saline conditions.

Output 1.1: A suite of climate change adaptation interventions, including EbA, implemented at Young River Basin in Thailand.

People in the Young River Basin in Thailand are vulnerable to climatic changes. This is because of: i) the dependence of a great proportion of the population on agriculture (~50% of which is rain-fed rice production), which is dependent upon reliable rainfall; and ii) their reliance on ecosystem goods and services that are threatened by both changes in climate and ongoing degradation.

As described previously (Part I), climate change is predicted to cause increased temperatures and increasingly variable rainfall in the Young River Basin. These changes are predicted to result in increases in both the intensity and frequency of droughts in summer and floods during the monsoon period. This will negatively affect the ~540,000 people living within the basin.

To reduce the vulnerability of communities living within the Young River Basin to climate change, the proposed project will implement a suite of adaptation interventions, with focus on EbA interventions. These adaptation interventions will be tailored to:

- increase the climate resilience of ongoing agricultural activities to secure food and income for farmers;
- enhance the provision of ecosystem goods and services to provide water, food and alternative sources of income;
- improve water infrastructure and management to reduce the negative impacts of floods and

droughts; and
- provide additional, climate-resilient livelihood options to communities (especially women) to diversify income generation.

A vulnerability assessment conducted during the project development phase (see Supplementary report I) identified adaptation interventions that meet the criteria listed above. During the initial phase of project implementation, additional assessments and consultations will be conducted – if necessary – to strengthen the information required to develop detailed implementation protocols for each intervention.

The information generated during these assessments – combined with that generated during the proposal development – will be used to develop training material for communities on the selected adaptation interventions. Training events will then be organised with relevant community groups, including women's groups, to teach them how to implement the various adaptation interventions. Indigenous knowledge will be incorporated into training material where relevant.

Activities to be implemented under Output 1.1. will include the following:

1.1.1 Develop detailed implementation protocols and associated ESMP for the climate change adaptation interventions, including EbA, to be implemented in the Young River Basin. The intervention protocols will specify climate-resilient methodologies to implement the adaptation interventions identified in the vulnerability assessments. The protocols will be developed by a national consultancy with assistance from international experts to ensure that international best-practice is applied.

Indicative sub-activities:
- *Conduct participatory planning workshops with relevant stakeholder groups (including Young River Basin Committee) to validate the climate change adaptation interventions identified in the vulnerability assessment*
- *Undertake an environmental and social assessment (ESA), and develop an associated environmental and social management plan, to identify and mitigate potential environmental and social risks associated with the implementation of climate change adaptation interventions, including EbA (see Annex XIII for terms of reference for this work).*
- *Prepare Gender Action Plan (based on the issues identified in Gender Assessment) to ensure that gendered vulnerabilities are captured and are integrated while implementing adaptation initiatives.*
- *Develop technical specification of the proposed adaptation interventions in consultation with expert including engineers, climate change expert, water experts and other sector specific experts etc. to ensure that the interventions are climate resilient from current as well as future climate change impacts and meet all national standards.*
- *Select heterogenous households, taking gender disaggregated data into consideration in trying new adaptation methods and technologies in farm level EbA, according to a method deemed fair by the community and with leadership by local community leaders.*
- *Undertake a market assessment to validate/identify additional livelihood options.*
- *Develop detailed implementation protocols that will guide the on-the-ground implementation of the selected climate change adaptation interventions.*

1.1.2 Train communities in the Young River Basin to implement climate change adaptation interventions according to the implementation protocols developed through Activity 1.1.1.

Indicative sub-activities:
- *Develop a training course and materials for the implementation of climate change adaptation interventions, including EbA, using the information generated through the assessments*

conducted in Activity 1.1.1.

- *Deliver training to communities on climate change adaptation interventions and additional climate-resilient livelihood options. The training program will ensure at least 50% women participation.*

1.1.3 Implement climate-resilient agriculture interventions in the selected sites within the Young River Basin.

Climate-resilient agriculture interventions will include:

- *Implement agroforestry in targeted villages through the planting of multi-use climate-resilient tree species to increase water infiltration, reduce erosion and diversify food and income generation.*
- *Introduce drip irrigation technologies on local farmland to increase production during drought periods.*
- *Pilot the use of flood- and drought-resistant crop varieties (particularly rice), working closely with the Ministry of Agriculture to test varieties appropriate to expected seasonal conditions.*

1.1.4 Implement ecosystem-based adaptation interventions within the Young River Basin to maintain the supply of ecosystem goods and services to surrounding communities.

Ecosystem-based adaptation interventions will include:

- *Restore/stabilise the banks of the Kood Mek waterway (520 m in length) through the planting of multi-use climate-resilient tree species to prevent the loss of dykes through soil erosion during flood events thereby attenuating flooding events.*
- *Restore/stabilise the right bank of the Huay Ma No canal through the planting of multi-use climate-resilient tree species to increase water flow during the dry season.*
- *Restore 2.24 ha of community forest at the Na Kra Dao Village with multi-use climate-resilient tree species to increase water infiltration and provide NTFPs.*
- *Restore forest in the headwaters of the Young River Basin to increase infiltration and thereby reduce flooding.*
- *Restore riparian vegetation on the banks of the Young River through the planting of multi-use climate-resilient tree and plant species to attenuate flooding and provide NTFPs.*
- *Establish seed bank and nursery, to promote locally driven reforestation of the upper Young River Basin.*
- *Establish a management and maintenance plan for the green infrastructure.*

1.1.5 Implement interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts.

Flood and drought management interventions will include:

- *Construct small-scale living check dams in at least 20 villages to store water during drought periods, increase groundwater recharge and attenuate flash flooding during monsoons.*
- *Rehabilitate weirs[148] in at least 10 selected villages to increase water holding capacity during drought periods.*
- *Extend the water canal (by 2 km) from the Huay Ma No reservoir to five villages to increase water supply during drought periods.*
- *Construct a water canal (800 m in length) connecting the Sai Na Wang and Nong Koog reservoirs to improve water supply to Na Kra Dao village Moo 5 during drought periods.*

[148] Currently weirs are in disrepair because of a lack of funding for their maintenance. Post-project, maintenance of these weirs will be the responsibility of the Young River Basin Committee in partnership with local communities. Local communities have committed to maintain the weirs even if government funding remains unavailable.

- *Restore the left bank (4 km in length) of the Huay Ma No reservoir's water diversion canal to maintain water supply to six local villages and to reduce the intensity of flooding during the monsoon season.*
- *Introduce innovative water harvesting techniques to households to increase water supply for domestic use.*
- *Establish a management and maintenance plan for the green and grey infrastructures.*

Figure 19: Example of a rehabilitated weir.

1.1.6 Establish additional, climate-resilient livelihood options in the communities within the targeted sub-districts in the Young River Basin in order to diversity livelihoods and build adaptive capacity.

Climate-resilient livelihood interventions will include:

- *Promote mushroom farming to diversify food and income generation under drought and flood conditions.*
- *Promote beekeeping to diversify food and income generation under drought and flood conditions.*
- *Establish multi-use home gardens in selected villages to diversify food and income generation.*
- *Construct farm ponds to store water for drought periods and use for fish farming during the monsoon season.*
- *Strengthen the capacity of local women to process NTFPs into products that can be sold locally to diversify income generation and empower women.*

Output 1.2: A suite of climate change adaptation interventions, including EbA, implemented in communities living around Tram Chim National Park in Vietnam.

Communities living around Tram Chim National Park are vulnerable to climatic changes. This is because of: i) the dependence of a great proportion of the population (89%) on agriculture (mainly paddy rice), which is dependent upon reliable rainfall; ii) high poverty levels – ~20% of the local population lives below the poverty line[149] – and therefore limited means to cope with extreme

[149] Less than US$ 44 per person per month.

climatic events that damage crops or infrastructure; iii) their reliance on ecosystems goods and services that are threatened by both changes in climate and ongoing degradation.

The communities living around Tram Chim National park are dependent on good and services provided by the ecosystem in the park. These goods and services, including NTFPs, fish, grazing and fuelwood, provide communities with additional food sources and livelihood options. More people are becoming reliant on these ecosystem goods and services for food and income generation as the impacts of climate change (droughts and floods) reduce the productivity of their primary livelihood source i.e. agriculture. Consequently, it is necessary to maintain the supply of ecosystem goods and services is necessary to strengthen the climate resilience of communities surrounding Tram Chim National Park.

As described previously, climate change is predicted to cause an increase in temperature and increasingly erratic rainfall at Tram Chim National Park. These climate change effects will lead to an increase in drought and flood events. This will negatively affect the ~50,000 people living around the national park.

To reduce the vulnerability of the communities living around Tram Chim National Park to climate change, the proposed project will implement a suite of adaptation interventions with focus on EbA interventions. These adaptation interventions will be tailored to:

- increase the climate resilience of ongoing agricultural activities to secure food and income for farmers;
- enhance the provision of ecosystem goods and services from Tram Chim National Park to provide water, food and alternative sources of income;
- improve water infrastructure and management to reduce the negative impacts of floods and droughts; and
- provide additional, climate-resilient livelihood options to communities (especially women) to diversify income generation.

A vulnerability assessment conducted during the project development phase (see Supplementary report II[150]) identified adaptation interventions that meet the criteria listed above. During the initial phase of project implementation, additional assessments and consultations will be conducted – if necessary – to strengthen the information required to develop detailed implementation protocols for each intervention.

The information generated during these assessments – combined with that generated during the proposal development – will be used to develop training material for communities on the selected adaptation interventions. Training events will then be organised with relevant community groups, including women's groups, to teach them how to implement the various adaptation interventions.

The communities to be targeted for climate change adaptation interventions and training are:

- Phu Hiep commune
- Phu Duc commune
- Phu Thanh B commune
- Phu Tho commune
- Tan Cong Sinh commune
- Tram Chim town

[150] Supplementary report II: Vietnam inception workshop report, CVA and validation report

The project beneficiary communities will be selected at project onset based on transparent selection criteria that will be developed by the project management unit in consultation with local government and community leaders, at the start of project implementation. These criteria will include *inter alia* the motivation to participate in the adaptation activities and some sort of in-kind co-financing model that will provide assurance of commitment to success. Targeting would also be carried out according to gender equity considerations and low income groups. Local community coordinators (one each from the upper, middle and lower Young River Basin) which will be hired to assist the project manager. A local community coordinator will be hired to assist the project manager.

Activities to be implemented under Output 1.2. will include the following:

1.2.1 Develop detailed implementation protocols and associated ESMP for the climate change adaptation interventions, including EbA, to be implemented in the communities living around Tram Chim National Park. The intervention protocols will specify climate-resilient methodologies to implement the adaptation interventions identified in the vulnerability assessments. The protocols will be developed by a national consultancy with assistance from international experts to ensure that international best-practice is applied.

Sub-activities will include:

- *Conduct participatory planning workshops with relevant stakeholder groups (including Tram Chim National Park management and commune authorities) to validate the climate change adaptation interventions identified in the vulnerability assessment and develop a detailed plan for the implementation of these interventions.*
- *Undertake an environmental and social assessment (ESA), and develop an associated environmental and social management plan, to identify and mitigate potential environmental and social risks associated with the implementation of climate change adaptation interventions, including EbA (see Annex XIII for terms of reference for this work).*
- *Prepare Gender Action Plan (based on the issues identified in Gender Assessment) to ensure that gendered vulnerabilities are captured and are integrated while implementing adaptation initiatives.*
- *Undertake expert consultation including engineers, climate change expert, water experts and other sector specific experts etc. to validate the interventions to be resilient to current as well as future climate change impacts and meet all national standards.*
- *Select heterogenous households taking gender disaggregated data into consideration in trying new adaptation methods and technologies in farm level EbA, according to a method deemed fair by the community and with leadership by local community leaders.*
- *Develop detailed implementation protocols that will guide the on-the-ground implementation of the selected climate change adaptation interventions.*

1.2.2 Train communities living around Tram Chim National Park to implement climate change adaptation interventions according to the implementation protocols developed through Activity 1.2.1.

Sub-activities will include:

- *Develop a training course and materials for the implementation of climate change adaptation interventions, including EbA, using the information generated through the assessments conducted in Activity 1.2.1.*
- *Deliver training to communities living around Tram Chim National Park The training program will ensure at least 50% women participation.*

1.2.3 Implement climate-resilient agriculture interventions in the communities living around

Tram Chim National Park.

Climate-resilient agriculture interventions will include:

- *Introduce climate-smart agricultural techniques, including agroforestry to diversify agricultural production.*
- *Pilot the use of climate-resistant crop varieties (particularly rice)), working closely with the Ministry of Agriculture to test varieties appropriate to expected seasonal conditions.*
- *Introduce alternative, climate-resilient agricultural practices in target communities, including aquaculture.*
- *Establish multi-use home gardens – to which biomass from the wetlands can be applied as mulch – to diversify food and income generation under drought and flood conditions.*
- *Design and implement an integrated crop pest and disease management plan in the communities surrounding Tram Chim National Park. This plan would focus on strengthening the resilience of local farmers to the effects of crop pests and disease that are expected to increase under conditions of climate change.*

1.2.4 Implement ecosystem-based adaptation interventions within Tram Chim National Park (Figure 20) to maintain the supply of ecosystem goods and services to surrounding vulnerable communities.

The ecosystem-based adaptation interventions are aligned with management plan of Tram Chim National Park to improve the ecosystem good and services that the climate vulnerable communities depend upon. Ecosystem-based adaptation interventions will include:

- *Restore 200 ha of* Melaleuca cajuputi *forest – in zones A4 and A5 of the national park –to help ground water infiltration and to provide a sustainable supply of fuelwood to surrounding communities.*
- *Restore 500 ha of* Eleocharis ochrostachys *grassland – in zones A1, A4 and A5 of the national park – to improve water filtration (and therefore water quality) and enhance ecotourism (by providing additional habitat for Sarus Crane).*
- *Restore 225 ha of grassland (70 ha of* Eleocharis dulcis *in A1; 70 ha of* Leersia hercandra *A2; 20 ha of* Xyris indica *in A2; 50 ha of* Eleocharis dulcis *in A4 and 5 ha of* Utricularia punctata *in A5) to improve water filtration (and therefore water quality)*
- *Establish a management and maintenance plan for the green infrastructure.*

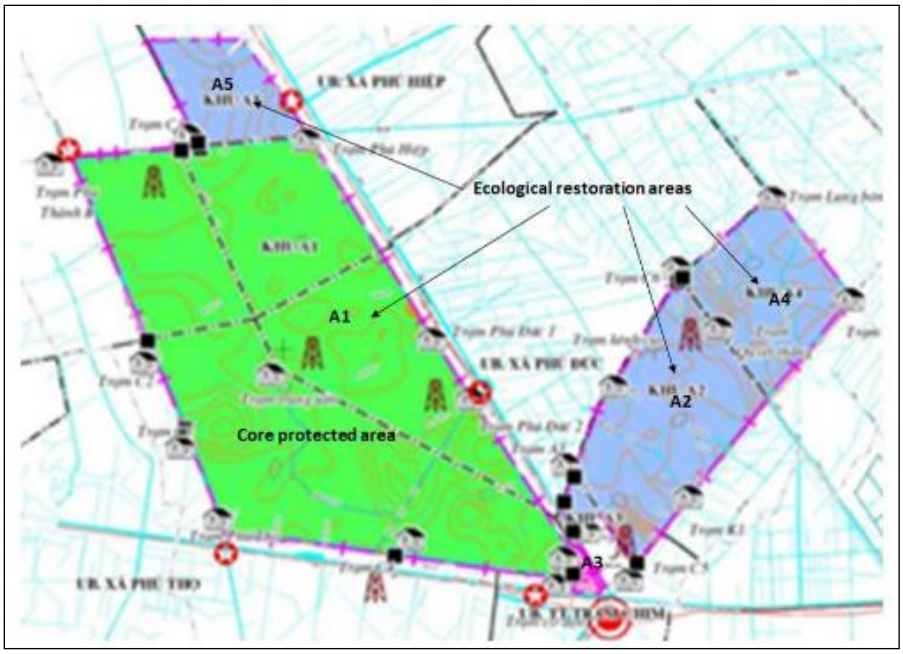

Figure 20: Schematic representation of Tram Chim National Park indicating EbA restoration activities will be implemented.

1.2.5 Implement interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts.

Flood and drought management interventions will include:

- *Construct living check dams in the six villages surrounding Tram Chim National Park to store water during drought periods, increase groundwater recharge and attenuate flash flooding during monsoons.*
- *Construct water-spreading weirs (as an extension of living check dams) to strengthen the distribution of water during drought periods and attenuate flooding.*
- *Restore/stabilise the banks of rivers and canals surrounding Tram Chim National Park to enhance the drainage of water during flood events through the planting of multi-use climate-resilient tree species.*
- *Improve the connectivity of Phu Hiep and Phu Hiep-Phu Duc canals through the construction of linking channels to enhance the drainage of water during flood events and the distribution/availability of water during droughts.*
- *Improve the connectivity of Phu Thanh 1,2,3 and Phu Thanh B-Phu Hiep canals through the construction of linking channels to enhance the drainage of water during flood events and the distribution/availability of water during droughts.*
- *Introduce innovative water harvesting techniques to households to increase water supply for domestic use. Establish a management and maintenance plan for the green and grey infrastructure.*

1.2.6 Establish additional, climate-resilient livelihood options in the communities living around Tram Chim National Park in order to diversity livelihoods and build adaptive capacity.

Climate-resilient livelihood interventions will include:

- *Promote mushroom farming to diversify food and income generation under drought and flood conditions.*
- *Promote beekeeping to diversify food and income generation under drought and flood conditions.*
- *Establish natural resource user groups among the communities surrounding Tram Chim*

National Park with clear mandates and responsibilities[151]. These may include fishing, beekeeping, handicraft, ecotourism and forestry groups.

- *Establish natural resource handicraft groups (with at least 50% female representation) to advance this additional livelihood activity under climate change conditions. The responsibilities of the group will include: i) promoting the use of alien invasive plant species (including Mimosa pigra and Pomacea canaliculate) in the production of handicrafts; ii) identifying new handicrafts; and iii) training community members (with a majority – greater than 50% – female representation) to produce handicrafts.*
- *Promote ecotourism-related business development in communities surrounding Tram Chim National Park.*

Output 1.3: Monitoring programme established to collect information on the cost-effectiveness of project interventions in different socio-ecological contexts in the GMS.

Comprehensive monitoring programmes will be designed and executed at each demonstration site to collect information on the cost-effectiveness of concrete adaptation interventions implemented through the project. These monitoring programmes will be designed and implemented with local research institutions and will collect information on: i) socio-economic impacts of the adaptation interventions; ii) ecological impacts of the adaptation interventions, including impacts on ecosystem goods and services; and iii) benefits of the adaptation interventions to women and other vulnerable groups. The Chinese Ecosystem Research Network (CERN)[152] will provide guidance during the design of monitoring programmes.
The information generated through the monitoring programmes will be used for the knowledge sharing and dialogue with other countries in the GMS on flood and drought management through regional activities in Components 2 and 3. Furthermore, this information will be used to expand the regional knowledge base on climate change adaptation in the GMS. Specifically, the accumulated information will contribute to the development of adaptation plans and policy briefs in Outcome 2. Additionally, the programmes will serve as an example of how to integrate M&E plans into adaptation projects and generate transferable knowledge and lessons learned (Output 2.4).

Activities to be implemented under Output 1.3. will include the following:

1.3.1 Design a monitoring and evaluation (M&E) plan – under the guidance of CERN – for each demonstration site that is context-specific but also allows for comparison among sites.

1.3.2 Implement the M&E plans to monitor the results, and collect information on the cost-effectiveness, of concrete adaptation technologies in different socio-ecological contexts. This information will be used to inform a cost-effectiveness analysis under Output 2.1.

Output 1.4: National level knowledge-sharing strategy implemented in Thailand and Vietnam.

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[151] Mandates and responsibilities may include the development of: i) regulations governing the use of natural resources within and outside of Tram Chim National Park; ii) protocols to ensure the sustainable management and harvesting of natural resources; and iii) guidelines on the monitoring on natural resources.

[152] CERN is an ecosystem research network with field stations throughout China covering the fields of agriculture, forest, grassland, lake and marine ecosystems. CERN is a key technical partner of the UNEP-IEMP, which is the main project executing agency for the regional outputs. It is considered as an appropriate institution to provide guidance during the design of monitoring programmes because: i) it has extensive experience in ecosystem monitoring throughout China, including in Yunnan Province – the Mekong headwaters area; ii) it includes scientists doing research on the response and adaptation of ecosystems to climate change; ecosystem restoration; ecological monitoring; and the impacts of human activities on ecosystem functions; and iii) there is a track record of successful previous collaboration between CERN and UNEP-IEMP.

National-level knowledge-sharing strategies will be designed and executed in Thailand and Vietnam to share the best practices and lessons learned from project interventions between project beneficiaries and surrounding communities. Strategies may include: i) exchange visits; ii) awareness-raising at temples and schools; and iii) awareness-raising using media such as posters, radio and television. The target beneficiaries of the knowledge-sharing strategies will be communities living around the project interventions sites. This knowledge sharing will contribute to the autonomous upscaling and replication of project interventions beyond demonstration sites, thereby enhancing the climate resilience of non-beneficiary communities. The target group of the knowledge products are the local communities and will be developed in the local language. The products will be widely distributed among the relevant stakeholders.

Activities to be implemented under Output 1.4. will include the following:

1.4.1 Design knowledge-sharing strategies in Thailand and Vietnam that are locally appropriate and enhance the local transfer of applicable adaptation knowledge.

1.4.2 Implement the knowledge-sharing strategies in communities surrounding the project demonstration sites in Thailand and Vietnam.

Component 2: Regional knowledge base on climate change adaptation and regional cooperation expanded in the GMS.

There are several policies, plans, strategies and frameworks that provide theoretical information on climate change adaptation in the GMS (see Part II:E). The *Mekong Adaptation Strategy and Action Plan* (MASAP) developed by the MRC for the region of the GMS covering Cambodia, Lao PDR, Thailand and Vietnam is the most recent example. However, these documents provide limited information on effective concrete adaptation interventions – particularly EbA – and how they should be implemented to build climate resilience across the region. Where knowledge about on-the-ground implementation does exist, it is generally project-specific and shared mainly within the implementing country. There are also no standardised methods for collecting lessons learned and best practice from projects implementing adaptation interventions, which limits the potential to compare the effectiveness of these interventions in different socio-economic and environmental contexts.

This deficiency of adaptation information, as well as inadequate knowledge sharing among GMS countries, impedes regional cooperation on transboundary water and river basin management and limits adaptation to shared climate change impacts.

Component 2 of the proposed project will expand the regional knowledge base on concrete adaptation solutions in the GMS. This component will be executed by UNEP-IEMP in Beijing, hosted by the Institute of Geographic Sciences and Natural Resources Research (IGSNRR) under the Chinese Academy of Sciences (CAS). Coordinating the knowledge generation and sharing component from Beijing will provide a strategic advantage to facilitate the South-South exchange of knowledge between CAS and other GMS countries, particularly lessons learned from CERN. UNEP-IEMP will execute the regional component in close collaboration with regional bodies and research institutions such as LMC, MRC, CERN etc.

This component will focus on strengthening regional cooperation on climate change adaptation by sharing knowledge on the implementation of climate change adaptation interventions in response to climate change risks common to all the GMS countries. This will promote the harmonisation of regional and national policies and plans through the inclusion of similar, best-practice climate change adaptation interventions.

Outcome 2: Enhanced knowledge and awareness of adaptation measures, including EbA, to

shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.

Climate change adaptation knowledge products will be prepared and transferred within and among GMS countries. They will focus on the implementation of concrete adaptation interventions that are effective in building resilience to climate impacts such as floods and droughts across various socio-ecological contexts. The knowledge products generated by the proposed project will be shared via existing knowledge platforms and forums across the GMS, as well as through regional knowledge-sharing events. The relevant knowledge products will be translated into local languages and shared with local stakeholders of the GMS countries.

Output 2.1: GMS-specific cost-effectiveness analysis undertaken on climate change adaptation interventions that reduce the impact of floods and droughts.

An analysis will be performed to determine the environmental and socioeconomic cost-effectiveness of climate change adaption interventions – especially EbA – that reduce the impacts of floods and droughts in the GMS. The relative impact of different climate change adaptation interventions on women – and other marginalised and vulnerable groups – will be assessed as part of the socio-economic element of the cost-effectiveness analysis. The analysis will be conducted using several sources of information. Firstly, data and information generated through the monitoring programmes at the project demonstration sites (Output 1.3) will be used to provide examples of comparable on-the-ground adaptation interventions in different socio-ecological contexts across the GMS. Secondly, a comprehensive literature review of concrete adaptation interventions implemented through other projects in the GMS will be undertaken. Lastly, consultations and interviews with stakeholders involved in past and/or ongoing adaptation projects in the GMS will be conducted to gather first-hand knowledge on the cost-effectiveness of various adaptation measures. The results of the cost-effectiveness analysis will be shared among all countries in the GMS (Output 2.3) to inform best practice adaptation interventions to the shared climate change impacts of floods and droughts.

Activities to be implemented under Output 2.1 will include the following:

2.1.1 Collate information on cost-effectiveness generated through the monitoring programmes at each project demonstration site (Output 1.3).
2.1.2 Undertake a comprehensive literature review on the cost-effectiveness of different climate change adaptation interventions in the GMS.
2.1.3 Conduct interviews and consultations with stakeholders involved in climate change adaptation projects in the GMS on the cost-effectiveness of different climate change adaptation interventions.
2.1.4 Develop a cost-effectiveness analysis of climate change adaptations interventions that reduce the impacts of floods and droughts.

Output 2.2: Policy briefs – and paper for the Lancang-Mekong Cooperation Outlook Report series – developed on: i) good practice in managing shared climate change impacts in the GMS; ii) integrating climate change adaptation into transboundary water management; and iii) cost-effectiveness of EbA for reducing vulnerability to climate change.

Countries in the GMS are at various stages of developing and revising national climate change adaptation plans and transboundary water and river basin management strategies. Additionally, regional bodies (Mekong River Commission and Lancang-Mekong Cooperation (LMC) mechanism) are in the process of developing cooperative adaptation plans across the GMS. To strengthen national and regional coordination during the development and revision of these plans and strategies, policy briefs will be developed to communicate the: i) shared climate issues in the

GMS; ii) national and regional policy options to overcome these issues; and iii) recommended best policy options. The briefs will be generated using: i) knowledge and lessons learned from the demonstration sites of the proposed project; ii) collated information from other projects, programmes and strategies in the GMS; and iii) the results of the cost-effectiveness analysis (Output 2.1). The policy briefs will be shared with relevant stakeholders across the GMS (Output 2.3).

In addition to policy briefs, a paper on climate change adaptation strategies for the GMS – with a focus on EbA – will be developed for inclusion in the Lancang-Mekong Environmental Cooperation Centre Environmental Outlook Report series.

Under the umbrella LMC mechanism, the Lancang-Mekong Environmental Cooperation Centre (LMEC) was established in 2017 to, amongst other functions, provide a platform for environmental policy development and dialogue between member countries (see Part II: G for further information). Included in its strategy to promote policy dialogue is the production of an Environmental Outlook Report series every four or five years that will share information relating to its eight priority areas, one of which is climate change adaptation and mitigation. The proposed project will develop a paper on climate change adaptation strategies for the GMS for inclusion in this series. The paper produced will make use of information generated through the project demonstration sites (Output 1.3), as well as knowledge products (Outputs 2.1, 2.3, 2.4 and 3.1) that include information from other relevant projects. International experts will develop the paper with input from specialists within UNEP-IEMP and scientists within LMEC.

Activities to be implemented under Output 2.2 will include the following:

2.2.1. Identify policy barriers to climate change adaptation, upscaling and mainstreaming in the GMS, with a focus on policies relating to transboundary water and river basin management.

2.2.2. Develop one policy brief on good practice in managing shared climate change impacts (drought and floods) in the GMS.

2.2.3 Develop one policy brief on integrating climate change adaptation into transboundary water management.

2.2.4 Develop one policy brief on the cost-effectiveness of EbA for reducing vulnerability to climate change in the GMS.

2.2.5 Develop an original paper for LMEC Environmental Outlook Report series on climate change adaptation in the GMS with special reference to: i) concrete adaptation strategies – including EbA – for shared climate impacts like droughts and floods; ii) integrating climate change adaptation into transboundary water and river basin management; and iii) regional coordination on adapting to climate change.

Output 2.3: Knowledge on EbA that has been generated and collated through the project shared on the main regional knowledge platforms, presented at regional adaptation forums and shared through different media.

The knowledge generated and collated through this project will be shared extensively using existing online platforms as well as regional and international forums. There are several existing online platforms for knowledge sharing identified during stakeholder consultations for the proposed project. These include the ADB GMS CEP data portal[153], the MRC data portal,[154] and

[153] http://portal.gms-eoc.org/
[154] http://portal.mrcmekong.org/index

the Sustainable Rice Platform, and the EbA South portal[155]. The knowledge products generated through the proposed project – as well as other relevant information collected during the generation of these knowledge products[156] – will be shared on these existing platforms. Additionally, the products will be shared on the Lancang-Mekong Information Sharing Platforms that are currently under development. The knowledge products will be widely shared in various media both at national, regional and international level. The target groups for this knowledge-sharing and media outreach will be national government staff and other stakeholders involved in the design and implementation of climate change adaptation projects.

The knowledge products generated through the proposed project (Outputs 2.1, 2.3, 2.4 and 3.1) will also be presented at regional adaptation forums, such as the: i) CGIAR-WLE Greater Mekong Forum[157]; and ii) Asia Pacific Adaptation Network. Sharing the knowledge generated, best practices and lesson learnt at these regional platforms and forums will increase the outreach in the participating countries as well as the other four GMS countries. This GMS-wide knowledge sharing approach will help achieve coordination on climate change adaptation at a regional level.

A project knowledge coordinator based at UNEP-IEMP will be responsible for the implementation of this Output.

Activities to be implemented under Output 2.3 will include the following:

2.3.1. Share knowledge products generated and collected by the proposed project on at least three regional online knowledge platforms.

2.3.2. Present cost-effectiveness analysis (Output 2.1), policy briefs (Output 2.2), and M&E guidelines (Output 2.4) at three regional forums.

Output 2.4: Guidelines for the design and implementation of EbA monitoring and evaluation systems developed, including simplified methods for collecting comparable information in different socio-ecological contexts.

M&E activities form an essential part of project implementation strategies. Effective M&E systems can allow project practitioners to assess the progress of a project and identify potential barriers preventing the achievement of project objectives. In doing so, M&E can support adaptive management. Additionally, M&E can help generate best practices and lessons learned that might apply to other adaptation projects. The effectiveness of M&E systems for inter-project knowledge-sharing is, however, undermined if the systems are too complicated, too project-specific and/or are designed without a focus on generating broadly-relevant data and information.

The proposed project will involve the development of guidelines for the design and implementation of M&E systems for climate change adaptation (including EbA) projects across the GMS. Methods to monitor the impact of climate change adaptation interventions on women and other vulnerable groups will be included. The guidelines on cost-effective, comparable and simplified M&E systems will be developed using the lesson learned through implementing the M&E plans developed in Output 1.3. Additionally, M&E plans of other adaptation projects will be reviewed to identify design features that encourage the generation of knowledge applicable to different socio-ecological contexts across a transboundary and shared natural resource like the Mekong River.

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[155] http://www.ebasouth.org

[156] For instance, knowledge products such as the Adaptation, Livelihoods and Ecosystems planning tool (ALivE) generated through the EbA South project will also be shared by the proposed project.

[157] https://wle-mekong.cgiar.org/

The development of these M&E guidelines is in line with specific actions identified in the draft Lancang-Mekong Environmental Cooperation Strategic Framework, specifically 'to promote the formulation of good practice guidelines for climate change and disaster prevention'. LMEC will, therefore, review and contribute to the development of M&E guidelines. The collection of comparable data from a range of projects using the methods stipulated in the guidelines will allow for the generation of best practice adaptation interventions to shared climate change impacts in different ecosystems, which will promote regional cooperation, planning and implementation of adaptation in the GMS.

Activities to be implemented under Output 2.4 will include the following:

2.4.1 Collate and evaluate lessons learned from the implementation of M&E plans at each project demonstration site.

2.4.2 Review M&E plans from other adaptation projects to identify design features that encourage cost-effective, simplified and comparable M&E systems.

2.4.3 Develop guidelines for the design and implementation of M&E systems for climate change adaptation (including EbA) projects in the GMS.

Output 2.5: Regional training events on ecosystem-based adaptation conducted with technical government staff from all GMS countries.

Regional training events on ecosystem-based adaptation will be organised for technical government staff from all the GMS countries, namely Cambodia, China, Lao PDR, Myanmar, Thailand and Vietnam. These training events will take place in China to promote the exchange of knowledge between CAS and other GMS countries, particularly lessons learned from the Chinese Ecosystem Research Network (CERN). The training events will focus on the implementation of EbA, capacitating government officials to transition regional adaptation plans and strategies into concrete, on-the-ground actions.

The training will be developed taking into account lessons learned through the implementation of climate change interventions in Thailand (Output 1.1) and Vietnam (Output 1.2). It will also incorporate the findings of the cost-effectiveness analysis (Output 2.1) and M&E guidelines (Output 2.5). A module on conducting gender analyses and incorporating gender considerations into the design of climate change adaptation interventions will also be presented.

Activities to be implemented under Output 2.5 will include the following:

2.5.1 Develop and/or update training material on best-practice ecosystem-based adaptation interventions in the GMS.

2.5.2 Host three regional training events on ecosystem-based adaptation for technical government staff from all GMS countries.

Component 3: Regional cooperation on climate change adaptation.

This component will focus on strengthening regional cooperation on climate change adaptation by sharing knowledge on the implementation of climate change adaptation interventions in response to climate change risks common to all the GMS countries. Creating a shared understanding of best-practice adaptation interventions, and how they may be implemented, in response to the shared risks of floods and droughts in particular, it is envisioned that countries may adopt similar and complementary approaches to managing these risks. This will promote the harmonisation of regional and national policies and plans through the inclusion of similar, best-practice climate change adaptation interventions.

Component 3 will be executed by UNEP-IEMP, which is based in Beijing. This will encourage

regular engagement with the Lancang-Mekong Cooperation (LMC) mechanism, also hosted in Beijing. The LMC mechanism is an emerging instrument working across all six countries of the GMS on topics that include transboundary water management and climate change adaptation. The LMC mechanism is, therefore, well positioned for fostering coordination on adapting to shared climate impacts relating to transboundary water resources across all six countries of the GMS.

Outcome 3: Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

Regional cooperation on climate change adaptation in the GMS will be strengthened through several knowledge-sharing and relationship-building activities at national and regional levels. Activities under this outcome will encourage a coordinated policy-driven approach to adapting to floods and droughts in the GMS, with a focus on scaling up EbA into transboundary water and river basin management in the region. To strengthen the alignment of policies and cooperation at the desired regional scale, activities under Outcome 3 will use existing national and regional institutions, committees and mechanisms as conduits for sharing the knowledge with, and building relationships between, relevant high-level stakeholders across the GMS.

Output 3.1: Recommendations for regional cooperation on the scaling up of climate change adaptation interventions through policy alignment – based on the results of the project – developed and presented at: i) Lancang-Mekong policy dialogues; ii) MRC regional stakeholder forums; iii) Thailand NAP stakeholder forum; and iv) Vietnam National Climate Change Strategy stakeholder forum.

Planning and policy development for climate change adaptation takes place at both the regional and national level within the GMS. At the regional level, the Lancang-Mekong Environmental Cooperation Centre under the LMC mechanism is developing the *Lancang-Mekong Environmental Cooperation Strategic Framework,* which will include cooperation on climate change adaptation. In addition, the centre plans to lead policy dialogues on regionally relevant topics, including climate change adaptation. Also, at the regional level, the Mekong River Commission (MRC) is finalising the *Mekong Adaptation Strategy and Action Plan* (MASAP) for the portion of the GMS covering Cambodia, Lao PDR, Thailand, and Vietnam. At a national level, most GMS countries have existing climate change adaptation plans and strategies[158] and/or are in the process of developing National Adaptation Plans (NAPs)[159].

Under Output 3.1, recommendations for strengthening regional cooperation – with a focus on policy-making and alignment – and the scaling up of climate change adaptation interventions into these regional and national planning processes will be developed and compiled into a summary report. These will be based on the experience gained from the proposed project, as well as lessons learned from other adaptation and transboundary resource management projects in the GMS[160] and elsewhere[161]. The recommendations on regional cooperation will be shared with stakeholders at the primary national and regional climate change adaptation policy dialogues and forums across the GMS. The targeted stakeholders will include representatives from the countries involved directly in the proposed project, as well as from China, Cambodia, Lao PDR and Myanmar.

[158] For example, Vietnam has a National Climate Change Strategy and Mekong Delta Master Plan.
[159] The final draft of Thailand's NAP is expected to be finalised and published in 2018 once the public consultation process has been completed.
[160] For example, ADB GMS CEP works on the management of terrestrial transboundary natural resource areas.
[161] For example, GIZ is implementing a transboundary water management project in southern Africa.

Activities to be implemented under Output 3.1. will include the following:

3.1.1. Develop recommendations for strengthening regional cooperation on implementing climate change adaptation interventions – with a focus on policy-making and alignment – using information generated through: i) the proposed project; and ii) a review of past and ongoing projects on regional climate change adaptation and transboundary water and river basin water management within and beyond the GMS.

3.1.2. Present the set of recommendations at primary national and regional climate change adaptation policy dialogues and forums, including: i) Lancang-Mekong policy dialogues; ii) the MRC regional stakeholder forum; iii) the Thailand NAP stakeholder forum; and iv) the Vietnam National Climate Change Strategy stakeholder forum.

Output 3.2: Regional cooperation and relationship building on climate change adaptation promoted through regional dialogue between policy-makers and planners of the GMS countries.

Regional dialogue will be organized inviting policy makers and government officials of GMS countries. During these events, learning of the project will be shared as well as issues and recommendation on regional coperation will be discussed. The regional dialogue will be organized in pilot countries which will give an opportunity for high level government officials of GMS countries to learn about the project interventions. These regional dialogue will create an environment of regional cooperation among GMS countries.

Media products will be developed to capture and share the knowledge gained. These media products could include short documentaries, social media pieces and popular science articles. These media products will then be disseminated via online platforms to share the results and lessons learned through the proposed project with a wider audience.

Activities to be implemented under Output 3.2. will include the following:

3.2.1 Organise four regional dialogue meeting to facilitate regional cooperation on climate change adaptation.

3.2.2 Produce media products, such as short documentaries, social media products and articles, that capture knowledge and information generated by this project.

3.2.3 Disseminate media products at national, regional and international level detailing climate change adaptation interventions implemented and lessons learned.

B. Innovativeness

Describe how the project /programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.

The design of the proposed project incorporates innovative solutions which are centred around the concrete implementation of climate change adaptation interventions in the GMS. These interventions focus on drought and flood management, and the regional dissemination of the resulting knowledge and lessons learned for transboundary river basin and water management. Implementation of adaptation interventions, most notably EbA, is currently limited within the sub-region. Under the proposed project, adaptation interventions will be implemented in vulnerable communities located in and around several different ecosystems (including rivers, forests and wetlands) in the Mekong River Basin (MRB). Intervention sites will be situated in: i) the upper (Sai Na Wang sub-district, Kalasin province) and lower (Sriwilai sub-district, Roi-Et province) Young River Basin in Thailand; and ii) community land surrounding Tram Chim National Park (Tam Nong district, Đồng Tháp province) in Vietnam. Coordinating the regional activities of the proposed project through UNEP-IEMP – based in Beijing – will promote the exchange of innovative adaptation interventions (including EbA) from the CAS to other GMS countries and enable

mainstreaming of project results into the LMC, a newly established political cooperation process led by China. Knowledge exchange, intercountry dialogue and political cooperation will increase the possibility of coordinated responses to climate change between upper, middle and lower (MRB) countries. For decades, the effective cooperation related to the management of transboundary resources – such as water – in the region has been limited to middle and lower Mekong countries (Cambodia, Lao PDR, Thailand and Vietnam) through institutions such as the Mekong River Commission (MRC). Cooperation will be strengthened between upper (China), and middle and lower GMS countries through the involvement and input of Chinese institutions (such as the Chinese Academy of Sciences; CAS) in the proposed project. As a result, engagement between all MRB countries will be facilitated, strengthening regional cooperation on climate change adaptation and promoting knowledge exchange. The project will be among the first collaborative initiatives that connect Chinese institutions with regional and international partners in the GMS through the parallel implementation of adaptation interventions (including EbA), the exchange of knowledge and policy development. Consequently, South-South cooperation, a relatively new concept involving EbA, will be promoted in the sub-region.

Under Outcome 1 of the proposed project, the implementation of the climate change adaptation interventions (with a focus on EbA) will be carried out in the middle – Young River Basin, Thailand; Output 1.1 – and lower – communities surrounding Tram Chim National Park, Vietnam; Output 1.2 – MRB. Although situated in different parts of the MRB, adaptation interventions will be aligned through the purpose of enhancing management to climate change-related threats common to the region, droughts and floods. The project's interventions will be designed according to the specific socio-ecological contexts of the demonstration sites. Furthermore, adaptation interventions will be based on local knowledge and technologies available at each of the demonstration sites. The lessons learned and knowledge gained from these adaptation measures (including EbA) can then be used to advise drought and flood management in communities from similar socio-ecological contexts throughout the GMS.

During the proposed project's implementation period, an innovative monitoring programme (including an M&E plan) will be established under Output 1.3 – in collaboration with local research institutions and informed by CERN. This monitoring programme will be used to collect information on the cost-effectiveness and monitor the results of the project's adaptation interventions across various socio-economic contexts in the GMS. The resulting information will be used to conduct a cost-effectiveness analysis of climate change adaptation interventions – especially EbA – that reduce the impacts of droughts and floods (Output 2.1). The relative impact of different climate change adaptation interventions on women – and other marginalised and vulnerable groups – will be assessed as part of the socio-economic element of the cost-effectiveness analysis. Results of the cost-effectiveness analysis will inform the development of a policy brief for reducing vulnerability to climate change in the GMS (Output 2.2). This policy brief will be used to strengthen regional coordination during the development and revision of climate change adaptation plans and transboundary water management strategies in the GMS.

The information collected through the project's monitoring programme (Output 1.3) will also be used to develop guidelines which can advise the design and implementation of M&E systems for EbA (Output 2.4). These M&E systems will be designed to simplify the collection of comparable information under different socio-ecological contexts during future adaptation projects in the sub-region. The collection of such information will allow for the generation of best practice adaptation interventions to shared climate change impacts in different ecosystems, which will promote regional cooperation, planning and implementation of adaptation in the GMS.

Under Output 1.4 of the proposed project, novel national-level knowledge-sharing strategies will be developed and implemented in Thailand and Vietnam. These strategies (including inter alia

exchange visits and awareness raising via media) will ensure the transfer of best practices and lessons learned from project adaptation measures between beneficiary and neighbouring communities. Consequently, the autonomous upscaling and replication of measures beyond demonstration sites will be promoted, which will strengthen the climate-resilience and adaptive capacity of non-target communities.

Output 2.3 includes the sharing of EbA knowledge – a relatively new concept in the region – and lessons learned generated during the project on pre-existing regional knowledge platforms[162] and presented at regional adaptation forums[163]. By sharing EbA knowledge on regional platforms and forums, the proposed project would benefit not only the selected GMS countries but also those that were not directly involved with the project. This would, in turn, promote coordination and cooperation on climate change adaptation and transboundary water and river basin management across the GMS.

Under Output 2.5, regional training events focusing on EbA will be organised for technical government staff of GMS countries. Training events will equip attendees with the knowledge and skills necessary to transition regional adaptation plans and strategies into concrete, on-the-ground interventions. By strategically hosting these training events in Beijing, the sharing of EbA knowledge[164] between Chinese institutions (such as CAS) and other GMS countries will be facilitated.

Approaches to strengthening transboundary cooperation on climate change adaptation are outlined by Outputs 3.1 and 3.2. Under Output 3.1, recommendations for the regional implementation of adaptation measures – particularly EbA – focusing on transboundary water and river basin management will be developed. Recommendations will then be shared with stakeholders from across the GMS at national and regional adaptation dialogues and forums – such as the Thailand NAP stakeholder forum and Lancang-Mekong policy dialogues. Utilising emerging national and regional climate change adaptation planning mechanisms to mainstream EbA represents an innovative aspect of the proposed project.

The regional exchange of knowledge generated by the proposed project will also be carried out under Output 3.2. This Output includes intra- and inter-country exchange visits by stakeholders from the GMS countries to project demonstration sites in Thailand and Vietnam. The exchange visits will promote the exchange of innovative ideas, knowledge and skills between participants from different socio-ecological contexts. Furthermore, the visits will emphasise the importance of collaborative transboundary resource management and adaptation to shared climate impacts in the GMS. In doing so, these visits will encourage relationship-building between high-level stakeholders from different countries in the GMS and, therefore, contribute to regional cooperation on climate change adaptation. Media products will be developed to capture and share the knowledge gained during the exchange visits. Additionally, they will advocate South-South cooperation, fostering further relationships within the GMS.

C. Economic, social and environmental benefits

Describe how the project / programme would provide economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy

[162] Including the ADB GMS CEP data portal, MRC data portal and EbA South portal.
[163] Such as the CGIAR-WLE Greater Mekong Forum and Asia Pacific Adaptation Network.
[164] Most notably lessons learned from CERN.

of the Adaptation Fund.

Through on-the-ground climate change adaptation (including EbA) interventions in Thailand and Vietnam, the proposed project will indirectly benefit ~60,000 people from vulnerable communities in the GMS through the community drought and flood protection adaptation interventions This figure includes ~10,000 beneficiaries from the Young River Basin[165] in Thailand and ~50,000 beneficiaries from the communities surrounding Tram Chim National Park[166] in Vietnam. While 1000 households in both Thailand and Vietnam will benefit from the farm-level EbA interventions. Indirect beneficiaries of the project include communities: i) surrounding the demonstration sites that will benefit from awareness-raising and knowledge-sharing; and ii) upstream and downstream of demonstration sites in the MRB that will benefit from an improved supply of ecosystem goods and services generated through adaptation interventions (specifically EbA) and enhanced transboundary resource management. The specific economic, social and environmental benefits expected from the project are presented below.

Economic Benefits:

The natural resource-based livelihoods of ~75 million people in the GMS are vulnerable to the impacts of climate change. As a result, economic stability in the region is threatened. Increasing temperatures, erratic rainfall and increasing frequency of extreme weather events (such as droughts and floods) will negatively impact agricultural yields, reduce the availability of fresh water, and threaten biodiversity as well as the provision of ecosystem goods and services. Rural communities – making up nearly 67% of the GMS population – are particularly vulnerable to climate change because of their dependence on rain-fed agriculture and other climate-sensitive natural resource-based livelihoods such as fishing and harvesting of non-timber forest products (NTFPs). By implementing climate change adaptation (including EbA) interventions within communities and ecosystems at demonstration sites in the middle and lower reaches of the MRB (Thailand and Vietnam), the climate-resilience of some of the region's most vulnerable groups will be enhanced. This will be realised through the climate-proofing of rural natural resource- and agriculture-based livelihoods and strengthening of the functioning of, as well as conserving the ecosystems they depend upon.

Healthy ecosystems generate economic benefits by providing ecosystem goods and services to communities. For example, functioning ecosystems provide pollinators for food crops in agroforestry in Xishuangbanna and flood mitigation for communities around the wetlands in the Mekong Delta. Furthermore, the restoration of ecosystem functioning through EbA has previously built the climate-resilience of communities in northeast Thailand by improving the health of agro-ecosystems, thereby improving food security in the region. This is especially important for the proposed project's targeted communities in the demonstration sites in the Young River Basin and surrounding Tram Chim National Park, whose livelihoods are highly dependent on agriculture and natural resources.

EbA interventions have been shown to deliver favourable cost-benefit ratios compared with other adaptation approaches. A recent study by UN Environment[167] found that EbA interventions are not only less costly than other adaptation options, but also provide additional ecosystem-related benefits. The economic benefits of EbA are particularly important given the extreme poverty rates

[165] Sai Na Wang sub-district, Kalasin province in the upper and Sriwilai sub-district, Roi-Et province in the lower Young River Basin.
[166] Phu Thanh B, Phu Tho, Phu Hiep, Phu Duc and Tan Cong Sing communes and Tram Chim town, Tam Nong district, Đồng Tháp province.
[167] UNEP/SPREP 2012. A comparative analysis of ecosystem-based adaptation and engineering options for Lami Town, Fiji: Synthesis Report.

in the target communities. For example, the average poverty rate of the villagers at the Vietnam demonstration site (communities surrounding Tram Chim National Park) is 17.2%. In addition, 39 to 47% of the income of landless households in these communities is derived from fishing, aquaculture and the harvesting of other natural resources from in and around Tram Chim National Park.

Apart from improving the provision of ecosystem goods and services, the project will build the technical capacity of local communities to plan and implement climate change adaptation interventions – with a focus on EbA (Outputs 1.1 and 1.2). In addition, the exchange of knowledge at a national and regional scale will be enhanced, promoting the adoption of climate-resilient livelihoods and practices across vulnerable communities threatened by droughts and floods across similar socio-economic contexts in the GMS (Outcome 2). Improved climate change planning using EbA approaches ensures that investments in climate change adaptation that are urgently needed to safeguard the livelihoods of rural communities and the economic development of the GMS are economically and environmentally appropriate.

Further economic benefits in the short-term will be achieved through disaster risk reduction, by reducing flood damage to agricultural land and infrastructure through the implementation of adaptation interventions (including EbA). Furthermore, project activities will allow the various economic sectors to undertake medium- and long-term planning to reduce the negative impacts of climate change on resources (both national and transboundary) in the GMS.

Social benefits

Outcome 1 of the proposed project will build the climate resilience of vulnerable communities in different socio-ecological contexts in the GMS to the effects of droughts and floods. Activities under Outcome 1 will build the capacity of communities to plan and implement climate change adaptation interventions (most notably EbA). The participatory approach to technical assessments – involving local stakeholder consultations and capacity building activities especially targeted at local administrative officials – will increase the technical capacity of local stakeholders, providing valuable human resources for future climate change adaptation activities in the GMS beyond the lifespan of the project. Such activities will include a focus on gender sensitivity and social inclusiveness in EbA. The project will develop gender action plans at the initial stage of project implementation to ensure that gender is integrated in all aspects of the project. The gender action plan will refer to the AF gender policy and will ensure improvement of gender equality, empower women and adaptation options will meet the needs of targeted women and men. Adaptation interventions and planning will incorporate gender-specific traditional knowledge on local ecosystem services such as the use of NTFPs at the demonstration sites. Furthermore, women and vulnerable groups will be prioritised as main beneficiaries in demonstration activities to ensure that benefits accruing from on-the-ground activities are directly accessible. Specific training activities provided to local communities will target both women and vulnerable groups to improve living conditions, promote skills development and diversify livelihood opportunities. The incorporation of traditional knowledge shared by women, elderly and indigenous groups will directly benefit the project by identifying and prioritising EbA measures while increasing the value of those groups in society and contributing to social unity. Local accomplishments in terms of social inclusivity at the demonstration sites will be used as a model for further regional and national strategies.

An increase in the climate-resilience of target communities in Thailand (Young River Basin) and Vietnam (Tram Chim National Park) will strengthen the generation of both food and income the climate-proofing of agriculture-based livelihoods, as well as the introduction of additional livelihood options. The resulting increase in food security and reduction in debt associated with the impacts of droughts and floods will mitigate the need for community members (usually male) to migrate to

other cities for work. This, in turn, will alleviate the workload of family members (usually) who are left at home to run the households themselves, allowing them to allocate more time to adaptation activities.

Activities under Outcome 2 of the proposed project will provide opportunities for regional and national stakeholders to exchange knowledge on adaptation interventions based on successful practices and evidence generated from interventions at the demonstration sites, facilitating the expansion of projects and generating benefits at a larger scale. Additionally, a regional approach to transboundary water management will improve relationships between neighbouring countries as well as communities and promote the sharing of adaptation resources and knowledge across the GMS.

Environmental benefits

In addition to building the climate-resilience of vulnerable communities and ecosystems, EbA interventions implemented under Outcome 1 will provide multiple environmental benefits, including *inter alia*: i) strengthened ecosystem functioning, including the provision of goods and services; ii) carbon sequestration; iii) biodiversity conservation; iv) flood and drought mitigation; v) improved agricultural production; vi) increased water availability and quality; vii) increase soil nutrient contents; and viii) reduced environmental degradation. Furthermore, adaptation activities at the demonstration sites in Thailand and Vietnam will provide opportunities to test and evaluate adaptation approaches across several ecological contexts to demonstrate knowledge of best practices. This will facilitate the upscaling of project interventions and increase the environmental benefits on a broader scale across the GMS.

By providing recommendations on climate change adaptation to regional and institutions under Outcome 3, the proposed project will help guide policy dialogues and improve the regional planning and management of transboundary water catchments. This will result in regional environmental benefits including *inter alia* increased water quality and availability throughout the GMS.

D. Cost-effectiveness

Describe or provide an analysis of the cost-effectiveness of the proposed project / programme and explain how the regional approach would support cost-effectiveness.

There has been a limited focus on determining the cost-effectiveness of climate change adaptation interventions, including EbA, across the GMS as a whole. As a result, there is limited baseline information that can be used for comparative analyses of adaptation approaches to common climate change threats (such as droughts and floods) which are sustainable and replicable across different socio-economic contexts in the GMS. Consequently, outputs of the proposed AF project (1.3 and 2.1) will focus on the establishment of a monitoring programme[168] to collect information on the cost-effectiveness of adaptation (most notably EbA) interventions in different socio-economic contexts in the GMS, and the subsequent conduction of a cost-effectiveness analysis. The expertise of CERN will be used in developing monitoring framework and undertaking cost-effective analysis.

The cost-effectiveness analysis will take into account: i) data and information collected via the monitoring programmes at adaptation demonstration sites; ii) the results of a comprehensive

[168] This monitoring programme will be designed under the guidance of CERN, with a focus on the provision of ecosystem impact monitoring methods and experience.

literature review of concrete adaptation interventions implemented under other adaptation initiatives in the GMS; and iii) information on the cost-effectiveness of various adaptation measures implemented during past and ongoing adaptation initiatives in the GMS collected through consultations with relevant stakeholders. The results of the cost-effectiveness analysis will be shared among all countries in the GMS (Output 2.3) to ensure that future adaptation initiatives are designed based on the most economically beneficial approaches towards addressing the shared climate change impacts of floods and droughts.

The proposed project's activities under Component 1 will promote the concrete implementation of climate change adaptation interventions, with a particular focus on drought and flood management, which are common throughout the GMS. Such interventions, including EbA, will be based on traditional knowledge and can be implemented by communities using locally available materials. Furthermore, the interventions can be upscaled and replicated by communities facing common climate change threats (including floods and droughts) throughout the GMS. This will be facilitated through knowledge sharing activities under Outputs 1.4, 2.2, 2.3, 2.5 and 3.2.

Benefits from ecosystem restoration outweigh the costs. United Nations Environment estimates in the 2010 report Dead Planet:Alive Planet show that investment on ecosystems restoration may provide benefit cost ratio of between 3 and 75% and an IRR of 7– 79% even without considering the benefits they bring to mitigating climate change impacts. Ecological restoration can further act as an engine of economy and a source of green employment.

A growing body of scientific literature suggests that EbA measures are cost-effective compared to those based on the implementation of hard infrastructure. For example, an economic analysis on the use of EbA interventions and hard infrastructure in the Tha Di basin in Thailand found that the cost of living check dams (one of the possible EbA interventions recommended under Outputs 1.1 and 1.2) was ~2.5% of the total cost of constructing a concrete weir (THB50,000 and 2,000,000 respectively). Although the lifespan of a living check dam is ~10 years – compared to several decades for a concrete weir – the EbA intervention is the most cost-effective option in the long-term. Additionally, living check dams are accepted socially and can be built in less than two weeks by community members using locally available materials, while concrete weirs have a relatively low social acceptance and require the expertise of engineers for construction. A further example of the cost-effectiveness of the EbA approach also emerged from an economic analysis undertaken in Lami, Fiji. This analysis included assessments of the costs and benefits of three approaches to watershed management, namely: i) EbA measures only; ii) hard infrastructure interventions only; and iii) a hybrid approach applying both EbA measures and hard infrastructure interventions. The analysis demonstrated that EbA watershed management options are at least twice as cost-effective as hard infrastructure engineering options, i.e. a benefit:cost ratio of US$19.50:1 for EbA compared to US$9:1 for hard infrastructure.

Annex II provides an analysis of the relative costs and benefits of the proposed adaptation interventions versus alternative interventions.

The regional approach taken by this project is cost-effective for the following reasons:

1) The countries of the GMS face similar climate change threats. It is therefore useful to generate and document regional best-practice climate change adaptation interventions and share the knowledge thereof. Taking a regional approach and including multiple countries allows this to happen.
2) The ecosystems of the GMS are transboundary. These ecosystems provide important ecosystem goods and services to communities, buffering them against the negative effects of climate change. A regional approach allows countries to share knowledge and generate a

shared understanding of the importance, management and conservation of these ecosystems.

3) The regional approach allows the project to engage regional coordination mechanisms such the LMC and MRC. This is unlikely to happen in a country-specific project.

The regional approach provides a mechanism allows for South-South knowledge exchange, thereby promoting adaptation.

E. Consistency with regional/national strategies

Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist.

Regional level

Relevant policy and strategic documents of the three main regional bodies related to Mekong transboundary management have been reviewed. These three bodies are: i) Lancang-Mekong Cooperation Mechanism[169]; ii) Mekong River Commission[170]; and iii) Greater Mekong Sub-region Economic Cooperation Program[171]. The relevance and consistency of the proposed project with these regional strategies is presented in Annex III.

Country level

The proposed project is well-aligned with national strategies. The relevance and consistency of the proposed project with national strategies is presented in Annex III.

F. Technical standards

Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The proposed project is aligned with the requirements of the Environmental and Social Policy (ESP) of the Adaptation Fund (see Part II: L). The Adaptation Fund-accredited Implementing Agency, UN Environment, together with the UNEP-IEMP and relevant national partners, will ensure that the project follows procedures outlined in the ESP. This includes the requirement that

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[169] The Lancang-Mekong Cooperation (LMC) mechanism, initiated by China and officially launched in March 2016, is an emerging sub-regional cooperation that spans the entire Mekong and Lancang basin. The LMC mechanism has three pillars -- political and security issues; economic affairs and sustainable development; and social affairs and people-to-people exchanges. The Lancang-Mekong Environmental Cooperation under the LMC will promote cooperation of the Lancang-Mekong member countries' environmental protection, provide the platform on environmental laws and policy dialogues, and enhance the environmental management capacity, among others. Taking advantage of the cooperation, China is to further explore and practice South–South Environmental Cooperation with other countries to promote sustainable development of the Lancang-Mekong region.

[170] The MRC is an intergovernmental organisation for regional dialogue and cooperation in the Lower Mekong River Basin, established in 1995 based on the Mekong Agreement among Cambodia, Lao PDR, Thailand and Vietnam. The organisation serves as a regional platform for water diplomacy as well as a knowledge hub of water resources management for the sustainable development of the region. China and Myanmar are Dialogue Partners to the MRC.

[171] The Greater Mekong Subregion (GMS) is a program of sub regional economic cooperation under the assistance from the Asian Development Bank (ADB) to enhance the six countries' economic relations, covering nine priority sectors: agriculture, energy, environment, human resource development, investment, telecommunications, tourism, transport infrastructure, and transport and trade facilitation. The GMS Core Environment Program is established in response to growing concern about the environmental impacts of rapid economic development with an aim to achieve an environmentally friendly and climate resilient GMS Program.

project activities funded by the Adaptation Fund reflect local circumstances and needs and draw upon national actors and capabilities.

The proposed project's activities have been validated by national project partners to ensure that they are in line with the relevant technical standards within each country. These project partners include *inter alia:*

- Ministry of Natural Resources and Environment (MoNRE; Thailand); and
- Ministry of Natural Resources and Environment (MoNRE; Vietnam).

National technical standards or guidelines applicable to relevant activities of the proposed project are outlined below in Table 8.

Table 8: National technical standards or guidelines applicable to the proposed project.

Technical standards: Thailand	
Activity	**Technical standard or guideline**
Construction of small-scale living check dams (Activity 1.1.5)	• Royal Irrigation Department. 2016. Handbook on the construction, repair and maintenance of check dams. • Department of National Parks and Wildlife. 2007. Check dam construction handbook.
Technical standards: Vietnam	
Ecological restoration interventions in Tram Chim National Park (Activity 1.2.4)	• Projects using national park land may need to conduct an EIA prior to implementation. • Decree 18/2015/ND-CP, Appendix 2 of Circular 27/2015/TT-BTBMT.
Improving the connectivity of canals surrounding Tram Chim National Park (Activity 1.2.5)	• National canal design standards – TCVN 4118:2012. • Technical requirements for canal systems – TCVN 9164:2012.

In Thailand, according to national regulations, neither the proposed project nor its activities (for example, small-scale weir and check dam construction) require EIAs or Environmental and Health Impact Assessments (EHIAs)[172,173] to be conducted. In Vietnam, however, ecological restoration interventions planned for Tram Chim National Park (Activity 1.2.4) may require an EIA, in accordance with Decree 18/2015/ND-CP, Appendix 2 of Circular 27/2015/TT-BTBMT. The necessity of an EIA will be discussed during consultations with relevant stakeholders during the project's inception phase. If necessary, plans for an EIA will be incorporated into adaptation intervention protocols that will be designed under Activity 1.2.1. All other adaptation interventions to be implemented at demonstration sites in Vietnam will not be at the scale which requires an EIA. In addition, the proposed project's activities are in line with national social norms, including gender equality and equal access.

G. Project duplication

Describe if there is duplication of project / programme with other funding sources, if any.

With the GMS recognised as being highly vulnerable to the effects of climate change, particularly droughts and floods, the livelihoods of the ~75 million people reliant on the Mekong River and its associated ecosystems are at risk. Consequently, there are many past and ongoing climate change adaptation initiatives in the sub-region. Because of the large area covered by the GMS and its high number of vulnerable inhabitants, the reach and impact of past and previous initiatives

[172] According to Article 67 of the Constitution of Thailand (2007), activities expected to result in severe adverse impacts to communities with respect to environmental quality, natural resources and health, require the conduction of and EHIA.

[173] Asian Environmental Compliance and Enforcement Network (AECEN). 2015. Assessing Environmental Impact Assessment (EIA) in Thailand: Implementation Challenges and Opportunities for Sustainable Development Planning (Working Paper).

have been limited. Most past and ongoing initiatives have focused on individual countries, particularly Least Developed Countries (including Cambodia, Myanmar and Lao PDR), while few have been implemented at a regional level. Furthermore, adaptation initiatives with a regional scope, have been primarily implemented across the Lower Mekong – Cambodia, Lao PDR, Thailand and Vietnam. Such regional climate change adaptation initiatives, especially those implementing concrete EbA interventions are uncommon throughout the GMS. Those that have been implemented in the past have mainly involved in research and policy-related dialogues, with limited emphasis on regional cooperation and knowledge sharing, particularly between China and other GMS countries.

The proposed project will focus on the concrete implementation of on-the-ground climate change adaptation interventions, with an emphasis on flood and drought management, in Thailand and Vietnam. Through these interventions, the knowledge generated from them, transboundary water management will be enhanced. Additionally, this project will complement other national and regional initiatives within the GMS, incorporating input from and collaborating with a broad range of stakeholders. A brief outline of the most relevant of these initiatives is provided in the following table and Annex IV.

Ongoing initiative	Coordination and complementarity
Mekong River Commission (MRC)	• Building on the MRC's: i) ongoing assessment of climate change impacts on ecosystems; ii) design of the Mekong Adaptation Strategy and Action Plan (MASAP); and iii) formulation of the Basin Development Strategy. • MASAP and its associated implementation mechanisms/forums can serve the regional cooperation aspect of the proposed project. • MRC database (available on MRC website) can contribute to sharing knowledge produced by the proposed project. • Thailand pilot site builds on a small climate change adaptation project implemented under the MRC at the Young River Basin between 2011 and 2015.
Earth Net Foundation is implementing climate change adaptation pilot projects in Thailand.	• The proposed project will draw from the knowledge obtained from these ongoing pilot projects, such as the results of experimental rice farming, to inform the implementation of relevant adaptation interventions. • The proposed project will add to the knowledge generated and lessons learned from these pilot projects in Thailand.
World Bank's Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project	• The proposed project will complement this initiative through the use of EbA to improve the climate resilience of water and land management practices.
ADB's GMS Environment Operations Centre's Core Environment Programme	• The proposed project will build on the knowledge generated under this initiative, especially with regards to climate change adaptation. • The ADB GMS CEP will be interested to cooperate with the proposed project especially in terms of knowledge sharing through the CEP's existing knowledge platform and database.
NSFC – UNEP Water resources change and adaptive management in the Greater Mekong River drainage basin	• The results of this project, altogether with others, will be reviewed in order to synthesise relevant findings as input for the policy briefs, paper and recommendations under Components 2 and 3. • This project aims to produce a set of policy recommendations regarding climate change and water resources in the GMS that will complement the proposed project's policy cooperation component. • This ongoing initiative is interested in exploring potential collaboration with the proposed project's pilot sites in terms of scientific studies and exchange of technical knowledge.
UNEP GAN's Asia-Pacific Adaptation Network (APAN)	• The proposed project will support APAN by strengthening the knowledge base and institutional capacity for climate change adaptation in the GMS. • The project aims to share knowledge produced from the project results and beyond at APAN forums.

Sustainable Rice Platform (SRP)	• The proposed project, through its climate-resilient agriculture activities and introduction of climate-resilient rice varieties, will generate an invaluable body of knowledge related to adaptation-based technologies for rice production specific to the GMS that can be incorporated into SRP's advocacy and on the ground field-level activities. This will further strengthen SRP's role in facilitating South-South cooperation to address the region's increasing vulnerability to climate change impacts through interventions focusing on both mitigation and adaptation.

Lessons learned from ongoing initiatives include the importance of strengthening the resilience of ecosystems to the impacts of climate change through restoration and protection. At the Tram Chim National Park pilot site in Vietnam for example, ecosystem management measures such as: i) restoration of hydrological flows; ii) habitat restoration; iii) alien species control and iv) establishment of resource user groups, were successfully implemented by a WWF wetland restoration project in 2011. In addition, a pilot project in the park focussing on restoring grassland hydrology to mimic the hydrologic rhythm of the plain of reeds resulted in the restoration of 1,600 ha of grassland and an increase in water flows. In terms of the introduction of alternative livelihoods, previous work in and around the project pilot sites (by WWF Vietnam for example) has indicated that these livelihoods (such as beekeeping, mushroom growing and water lily harvesting) reduce the pressure on natural resources. However, stakeholders indicated the necessity of identifying markets for products related to alternative livelihoods to ensure that they are viable. Where viable, alternative livelihoods have been shown to have a positive impact on the local economy. For example, eco-tourism in and around Tram Chim National Park (supported by WWF Vietnam and the Coca-Cola Foundation), has resulted in a US$ 264,000 increase in the contribution of this livelihood to the local economy between 2013 and 2017. Apart from alternative livelihoods, diversifying and increasing the climate resilience of current livelihoods such as agriculture has been successful with communities in the Young River Basin in Thailand. This includes *inter alia*: i) selection of crops according to water availability during the dry season to promote water conservation; ii) use of animal manure instead of chemical fertilisers; iii) vegetable gardening to supplement agricultural production; iv) pond construction to store water for the dry season; v) fish rearing in water ponds as an additional food and income source; vi) extension of paddy ridges for tree planting and flood protection; and vii) depth extension in paddies to increase their water storing capacity.

H. Learning and knowledge management

If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The proposed project's substantial learning and knowledge management dimensions are integrated into several outputs of Components 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems, 2: Regional knowledge base on climate change adaptation expanded in the GMS and 3: Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

Under Output 1.4, national level knowledge-sharing strategies will be designed for and implemented in Thailand and Vietnam. Such strategies may include: i) exchange visits; ii) awareness raising at pagodas and schools; iii) the establishment of climate change adaptation learning centres; and iv) awareness raising using media such as posters, radio and television. Under these strategies, best practices and lessons learnt from project adaptation interventions will be shared between beneficiaries and surrounding communities. This knowledge sharing will contribute to the autonomous upscaling and replication of project interventions beyond demonstration sites, thereby also enhancing the climate resilience of non-beneficiary

communities.

Output 1.3 includes the collection of information on the cost-effectiveness of adaptation interventions (including EbA) through monitoring programmes designed for and implemented at each of the project's demonstration sites. Information will be collected on: i) socio-economic impacts of the adaptation interventions; ii) ecological impacts of the adaptation interventions, including impacts on ecosystem goods and services; and iii) benefits of the adaptation interventions to women and other vulnerable groups. This information will be used to enhance the regional climate change adaptation knowledge base and shared with other GMS countries (Component 2). Specifically, the information collected under Output 1.3 will inform the conduction of cost-effectiveness analyses of climate change adaptation interventions (particularly EbA) that reduce the impacts of droughts and floods (Output 2.1). Cost-effectiveness analyses will be further enhanced by the information resulting from a comprehensive literature review of adaptation interventions implemented through other projects in the GMS, as well as consultations conducted with stakeholders involved in past and ongoing adaptation projects in the sub-region (Output 2.1).

Output 2.2 covers the development of three policy briefs[174], as well as an EbA-focused paper for the Lancang-Mekong Environmental Cooperation Centre Environmental Outlook Report series. This output will be accomplished using information generated by the project including: i) knowledge and lessons learned from the demonstration sites of the proposed project; ii) collated information from other projects, programmes and strategies in the GMS; and iii) the results of the cost-effectiveness analyses (Output 2.1.). These policy briefs and paper will be shared with relevant stakeholders across the GMS (Output 2.3.).

Under Output 2.3, knowledge on EbA that has been generated and collated through the project (Outputs 2.1, 2.2, 2.4 and 3.1) will be shared on the main regional knowledge platforms, including the inter alia: i) ADB GMS CEP data portal; ii) MRC data portal; iii) EbA South portal; and iv) Lancang-Mekong information sharing platforms (currently being developed). Furthermore, project knowledge will be presented at three regional adaptation forums, such as the CGIAR-WLE Greater Mekong Forum and the Asian Pacific Adaptation Network. Through the use of the pre-existing regional platforms and forums mentioned above, the best practices of and lessons learned generated by the proposed project will not only strengthen national adaptation efforts in beneficiary countries but also foster coordinated regional responses to the impacts of climate change.

Output 2.4 includes the development of guidelines for the design and implementation of cost-effective, comparable and simplified M&E systems for climate change adaptation (including EbA) projects in the GMS. These guidelines will be informed by the lessons learned and knowledge generated through M&E plans developed for an implemented at demonstration sites (Output 1.3). Additionally, M&E plans of other adaptation projects will be reviewed to identify design features that encourage the generation of knowledge applicable to different socio-ecological contexts across a transboundary and shared natural resource like the Mekong River. The M&E guidelines produced will allow for the generation of best practice adaptation interventions to shared climate change impacts in different ecosystems, which will promote regional cooperation, planning and implementation of adaptation in the GMS.

[174] Policy briefs will be developed on: developed on: i) good practice in managing shared climate change impacts in the GMS; ii) integrating climate change adaptation into transboundary water management; and iii) cost-effectiveness of EbA for reducing vulnerability to climate change.

Through Output 2.5 of the proposed project, regional EbA training events will be conducted to strengthen the technical capacity of government staff from all GMS countries to implement concrete, on-the-ground interventions. The training (including training material) will be developed taking into account lessons learned through and best practices arising from the implementation of climate change interventions in Thailand (Output 1.1) and Vietnam (Output 1.2). It will also incorporate the findings of the cost-effectiveness analysis (Output 2.1) and M&E guidelines (Output 2.4).

Under Output 3.2, participants from GMS countries will be sent on exchange visits of the project demonstration sites. Participants may include representatives of: i) national government institutions; ii) country offices of regional institutions like the MRC and ADB; iii) national project teams; and iv) national research institutions. These visits will enhance knowledge sharing, encourage relationship building, will promote regional (South-South) cooperation on climate change adaptation, as well as highlight the importance of transboundary river basin management and shared climate impacts in the GMS. In addition, media products will be developed to capture and share the knowledge gained during the exchange visits. These media products could include short documentaries, social media pieces and popular science articles. These media products will then be disseminated via online platforms to share the results and lessons learned through the proposed project with a broader audience.

I. Consultative process

Describe the consultative process, including the list of stakeholders consulted, undertaken during project / programme preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The first round of preliminary consultations with participating countries took place between March and July 2016. The purposes of the consultations were to: i) introduce the project overview; ii) receive preliminary comments and advice; iii) consult on the site selection for demonstration of adaptation interventions; and iv) consult on the engagement of potential national, sub-national and local partners. The consultations consisted of: i) three formal meetings in Bangkok and Hanoi with representatives from focal agencies of the AF and potential national partners; ii) bilateral discussions with governmental agencies responsible for ecosystem management and climate change adaptation on the ground in China and Vietnam; and iii) field visits to the proposed demonstration sites in Vietnam. The agencies that took part in the consultation process included: i) the National Development and Reform Commission of China; ii) the Chinese Academy of Sciences and its institutes; iii) the Naban River Watershed Nature Reserve management unit in China; iv) the Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment of Thailand; v) the Department of Water Resources, Ministry of Natural Resources and Environment of Thailand; vi) the Department of Legal Affairs, Ministry of Natural Resources and Environment of Vietnam; vii) the Biodiversity Conservation Agency, Ministry of Natural Resources and Environment of Vietnam; and viii) GIZ teams involved in 'Strategic Mainstreaming of Ecosystem-based Adaptation Project' and 'Integrated Coastal Management Programme' in Vietnam.

During the consultations, the participating countries expressed strong interest and support for the proposed project. Valuable comments were received and have been incorporated into this proposal. These comments related to: i) project design; ii) the selection of demonstration sites; ii) ownership, benefits and capacity building opportunities for national partners; iii) relevant national policies; iv) climate change adaptation and EbA activities within the country and the region; and v) transboundary/upstream-downstream cooperation. Preliminary consultations and internal discussions with stakeholders from Vietnam were sufficient to select a demonstration site.

However, further consultations were required to select a demonstration site in Thailand.

From September to October 2016, the second round of preliminary consultations was conducted with participating countries. The primary objective of the consultations was to collect information regarding climate change impacts observed by the local stakeholders. Additionally, initial discussions on concrete adaptation interventions to be implemented at the demonstration sites were conducted.

The focal point for the implementation of the proposed project in Thailand, the Department of Water Resources (DWR), led an in-country consultation process on site selection. Through this process, the Young River Basin in the Roi-et and Kalasin provinces was selected as an appropriate demonstration site. The sub-national agency under the DWR, the Water Resources Regional Office 4, has consulted with local stakeholders and collected information about the Young River Basin, including: i) general information; ii) climate change impacts in the area; iii) potential local project implementing partners; v) beneficiaries; and vi) potential on-the-ground climate change adaptation interventions to be implemented at the site. In October 2016, a formal meeting was subsequently conducted in Bangkok among the Office of Natural Resources and Environmental Policy and Planning, DWR, UN Environment and UNEP-IEMP to discuss next steps.

Moreover, in Vietnam, information about the selected demonstration sites was collected through informal consultations with local stakeholders conducted by local partners, including: i) staff of Tram Chim National Park in Vietnam; and ii) the Institute of Ecological Geography and Environment in Vietnam. The collected information included: i) climate change impacts on the local communities; and ii) proposed adaptation interventions. Additionally, general and specific information about the sites on ecosystems, livelihoods, ecosystem services and management in Vietnam was extracted from the reports of the previous UNEP-IEMP's meetings at the sites[175].

In December 2016, several consultations with the Chinese counterparts took place to discuss their engagement with the proposed project. It was found that China is in a good position to support the project. Those organisations consulted with include: i) the Kunming Institute of Botany; ii) the Chinese Ecosystem Research Network; iii) various institutes under the Chinese Academy of Sciences; and iv) the China-ASEAN Environmental Cooperation Center. It was confirmed that Chinese participation would be in the form of the provision of data and information available from the upper reach of the GMS.

A summary of the formal meetings in Thailand and Vietnam (in June and October 2016) is enclosed as Supplementary report I & II.

[175] These two meetings were 'Capacity Building and Consultative Meeting with Stakeholders on Tram Chim National Park' (18 March 2016 in Dong Thap province of Vietnam) and 'Ecosystem Management Capacity Building and Consultation Workshop on Protected Areas in Xishuangbanna Prefecture' (12 May 2016 in Yunnan province of China) under the project 'South-South Capacity Building for Ecosystem Management in the Greater Mekong Sub-region' implemented by UNEP-IEMP.

Figure 21: Site visit to the Tram Chim National Park (March 2016).

In May 2017, a consultative mission was undertaken by representatives from UN Environment and UNEP–IEMP. The objective of the mission was to gather the information required to address the comments received from the AF on a previously submitted version of the concept note. Various meetings and consultations were conducted with community, national and regional stakeholders in Vietnam, Lao PDR and Thailand to gather the information required to revise the concept note. Additionally, field visits were undertaken to selected implementation sites in Vietnam and Thailand to identify potential on-the-ground implementation technologies for the project. In Vietnam, consultations were held with: i) various high-level government agencies; ii) managers of Tram Chim National Park; and iii) community members living around Tram Chim National Park. After consultations in Vietnam, a meeting was held with the Mekong River Commission (MRC) Secretariat in Lao PDR. In Thailand, meetings involved representatives from: i) the UN Environment Asia Pacific Regional Office; ii) the Climate Change Management and Coordination Division of the Office of Natural Resources and Environmental Policy and Planning; iii) the Department of Water Resources and the Water Resources Regional Office; iv) communities in the Young River Basin; v) the Core Environment Program (CEP) of the Asian Development Bank's Greater Mekong Sub-region (ADB GMS); vi) GIZ; vii) the European Union (EU); and viii) Sida.

During the preparation of the proposal for the proposed project, inception workshops were held in Thailand and Vietnam in March 2018. The purpose of the Thai inception workshop was to share adaptation knowledge and ideas, and to propose possible EbA approaches to reducing the adverse effects of climate change (focusing on droughts and floods) at the community level across the Young River Basin. This information was also used to inform the conduction of a vulnerability analysis of the Young River Basin (the vulnerability analysis report is presented in Supplementary report I). The resulting information was used to further refine the design of the proposed project, particularly the implementation of concrete, on-the-ground adaptation interventions at demonstration sites within the Young River Basin. The table below provides a breakdown of the participants in the inception workshop.

Table 9: Participants in the Thailand Inception workshop.

No.	**Groups**	***Number of participant (persons)***			
		Male	**Female**	**Children**	**Total**
1	Representative from Upper Young river basin	10	1	0	11
2	Representative from Middle Young river basin	9	2	2	13
3	Representative from Lower Young river basin	5	9	0	14
4	Related local government representatives (Kalasin, Khon Kaen and Roi Et.)	22	7	-	29
5	Representatives from related local association and educational institutions	2	1	-	3
6	Representatives from Department of Water Resources, and Policy and Planning Bureau Natural Resources and Environment	2	1	-	3

7	Representatives from related local private sectors	1	0	-	1
8	Representative from UNEP	0	2	-	2
Total number					**76**

A report for the Thai inception workshop is presented in Supplementary report I.

The objectives of the Vietnamese inception workshop (April 2018) were to: i) introduce the proposed project to stakeholders; ii) identify the main climate change threats for the project implementation area (communities surrounding Tram Chim National Park); iii) identify locally appropriate adaptation measures (with an emphasis on EbA) to reduce the adverse effects of climate change (particularly floods and droughts); and iv) identify additional stakeholders and project beneficiaries. This information was also used to inform the conduction of a vulnerability analysis of the communities surrounding Tram Chim National Park (the vulnerability analysis report is presented in Supplementary report II). The resulting information was used to further refine the design of the proposed project, particularly the implementation of concrete, on-the-ground adaptation interventions at demonstration sites within and surrounding Tram Chim National Park. In Vietnam, the inception workshop involved representatives from: i) C4 EcoSolutions (international consultancy contracted by UN Environment); ii) Government of Vietnam departments including DLA-MoNRE, IMHEN-MoNRE, ISPONRE-MoNRE and the Department of Natural Resources and Environment; iii) Tram Chim National Park; iv) local communes and towns; and v) local bodies (including the Forest Rangers Agency, People's Committee of Phu Thanh B Commune and Farmer's Union of Phu Hiep commune). In total, there were 32 participants in the workshop, of which 12 were women. A report for the Vietnamese inception workshop is presented in Supplementary report II.

Apart from the consultations in the beneficiary countries (Thailand and Vietnam), additional consultations on regional components were held in April 2018. These included meetings with senior scientists from the Chinese Academy of Sciences (CAS)[176] mainly on potential collaboration in the project activities involving regional knowledge enhancement and sharing. Discussions mainly focused on the contributions that the CAS's technical knowledge and experience of the upper reaches of the Mekong River that could make to the regional outputs. Moreover, a meeting with the Deputy Director of the Lancang-Mekong Environmental Cooperation Center (LMEC) was convened to confirm their interest in participating in the proposed project, particularly in the regional component on strengthening regional collaboration[177].

Furthermore, a regional consultation was held in Beijing, China, to bring together representatives from all 6 GMS countries, as well as the key strategic regional partner, the LMEC. During this consultation, discussions centred on the design of the regional components (focusing on regional knowledge enhancement and cooperation) and what the benefits would be for individual countries, as well as the GMS as a whole. Based on the results of this consultation, an additional output was added to the project (Output 2.5) on regional training events on ecosystem-based adaptation that would allow technical government staff from all GMS countries to benefit from the project's knowledge-sharing activities. In addition, this consultation served to identify the most appropriate regional forums and knowledge-sharing platforms for the project to work with. A summary of the regional consultations is provided in Annex XII.

Vulnerability assessments were also conducted during the development of the full proposal to

[176] Including representatives from the: i) Chinese Ecosystem Research Network (CERN); ii) Kunming Institute of Botany; and iii) Institute of Geographic Sciences and Natural Resources Research (IGSNRR).
[177] A mandate of the LMEC, as well as the Lancang-Mekong Cooperation Mechanism (LMC).

identify site-specific climate change impacts and appropriate adaptation interventions. Several consultations with targeted communities were conducted. The tables below summarise these consultations.

Table 10: Summary of consultations during the vulnerability assessment in Thailand

Place	Participants	Main outcomes
Sai Na Wang (upper Young river basin)	70 including community leaders, provincial-district-sub-district government officers, youth group leaders.	• Contrasting wet and dry episodes in recent years make their livelihood suffered from adjusting much change of the climate. • Heavy flood and drought caused much difficulty of their farming business by heavy rice yield loss. • Shortage of water for both agriculture and household consumption in summer are their main vulnerabilities. • Lack of policy and planning in adaptation to the climate impact of the country-provincial-district governments is another vulnerability. • Last, limited knowledge and experience in coping with and adapting to the climate impact particularly of the agriculture practice is also their vulnerability.
Wang Luang (middle and lower Young river basin)	74 including community leaders, women group leaders, youth leaders, and government officials.	• Heavy flood caused much rice yield loss while some households shift their cultivation to dry season which still experienced water shortage. • Water, agriculture, and family livelihoods were their main climate vulnerabilities. • Conservation of water during dry months and diversifying their livelihoods were their main actions to cope with the climate impacts.
Household surveys of target community members (middle and lower Young river basin)	97 households. 41 (43%) of the interviewees were women.	Please refer to Supplementary report I.

Table 11: Summary of consultations during the vulnerability assessment in Vietnam

Consultation mode/purpose	**Targets groups**	**Location**
Direct discussion with the management team on past and current climate threats to the park.	National park management team (3 officers)	Tram Chim national park head office for the first time
Dialogues with farmers on climate trends, threats and impact on farming practices and livelihood of their family.	Farmers/Farmer groups (18 farmers in which 8 farmers are female)	6 villages around the national park
Meeting with villagers to understand the management of climate threat in the communities	Village[178] leaders (8 head of villagers in which 3 are women)	In the inception workshops
Discuss with group leaders (for example, bee keeping, handcraft etc…) on the potential to expand the existing models and local markets for the products of these groups.	Group leaders (3 female and 6 male farmers)	
Discuss with technical staff of national park on water management, biodiversity conservation, sustainable use of natural resources and measures to improve ecosystem services in the park. The discussion was also focused on the challenges induced by climate change on water level, forest fire control.	Technical staffs of the national park (3 technical staffs)	National park waterways and stop-over stations in the park

[178] Village in this case indicate the commune the lowest administrative level in Vietnam's state management system.

Identify the challenges of the park and surrounding communities in the context of climate change as well as the options to cope with climate change impacts in and outside the park. Lessons learnt from the previous studies/projects in the areas. The consultations were conducted via individual dialogues/interviews and through consultation workshops.	Experts working in the area (6 experts including 2 female experts)	Ho Chi Minh, Ha Noi, and Can Tho city and Dong Thap provinces
Validating consultation on the proposed interventions in the project site. After the interventions proposed for the site, consultation via email and telephone was conducted to validate the intervention measure.	National park management team and head of villages (2 from management team and 6 from villages, in which 2 are female).	Tram Chim national park and surrounding villages

The full vulnerability studies for both Thailand and Vietnam are presented in Supplementary report I & II. The results of the validation studies informed the selection of adaptation interventions in Component 1.

Validation workshops to endorse the project document were held in July 2018. These workshops served to confirm the project design and implementation arrangements for each country. Summaries are these workshops are provided in Supplementary report I & II.

All the information from consultations with local, national and regional stakeholders has been integrated into this project proposal to ensure that the proposed project reflects national and regional priorities.

J. Justification for funding request

Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Component 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems.

Baseline scenario (without AF resources)

National governments and regional bodies in the GMS are aware of the threats that climate change poses to the people of the region. Accordingly, governments of countries like Thailand and Vietnam have developed or are developing comprehensive adaptation strategies[179] to guide efforts to enhance the climate resilience of their citizens. Likewise, regional cooperation mechanisms like the LMC and MRC are in the process of developing regional strategies for adaptation[180]. Although governments and regional bodies in the GMS have experience in developing these high-level, conceptual adaptation plans, they have less expertise in implementing concrete adaptation solutions (most notably, EbA) across diverse socioecological contexts. Indeed, projects financed by the Adaptation Fund are yet to be implemented in Thailand and Vietnam, further highlighting the lack of adaptation implementation experience in these countries (and the region). With limited knowledge on implementing concrete interventions (especially EbA) that address national and regional climate impacts, it is unlikely that governments will be able to transform national and regional strategies into effective on-the-ground adaptation actions. Therefore, people in the GMS who are vulnerable to the impacts of climate change are likely to remain vulnerable in the future.

[179] A National Adaptation Plan (NAP) in Thailand and National Climate Change Strategy in Vietnam.
[180] The LMCM is developing the Lancang-Mekong Environmental Cooperation Strategic Framework, and the MRC is developing the Mekong Adaptation Strategy and Action Plan (MASAP).

Additionality (with AF resources)

Under the proposed project, AF resources will be used to implement concrete climate change adaptation interventions in the GMS. A suite of interventions – including EbA – will be demonstrated in communities to reduce their vulnerability to the impacts of floods and droughts. Through a comprehensive M&E system, the project will generate knowledge on the cost-effectiveness of different concrete interventions in diverse socioecological contexts. This knowledge will be shared within and among GMS countries, enabling national governments and regional bodies to integrate concrete adaptation knowledge that is nationally and regionally appropriate into their climate change strategies. This will facilitate the effective conversion of conceptual adaptation strategies into on-the-ground actions, increasing the resilience of vulnerable people across the GMS to shared climate change threats.

Component 2: Regional knowledge base on climate change adaptation expanded in the GMS and
Component 3: Regional cooperation on climate change adaptation.

Baseline scenario (without AF resources)

Millions of people in GMS countries are threatened by a shared suite of climate impacts. As rainfall becomes more variable, temperatures rise and the flow dynamics of the Mekong River are altered, droughts and floods will continue to increase in frequency and intensity across the region. These climate impacts threaten the natural resource-based livelihoods of people from diverse socioecological contexts in the GMS. With people from six unique countries unified in their exposure to climate impacts and shared reliance on a transboundary resource (i.e. the Mekong River), there is an opportunity for South-South cooperation on adaptation among the countries of the GMS. However, previous and ongoing projects, plans and strategies to adapt to climate change have been mostly unsuccessful in capitalising on this opportunity. Most adaptation initiatives in the GMS have been national efforts with limited regional buy-in, coordination or knowledge transfer. This limits the effectiveness of such initiatives as climate threats impacting important transboundary water resources are, fundamentally, regional problems which require regional adaptation solutions. Additionally, national governments in the GMS have limited experience in integrating regional climate and transboundary resource concerns into national adaptation strategies. Consequently, the alignment of relevant policies, plans and strategies at the regional level remains weak, inhibiting a cooperative and coordinated approach to climate change adaptation, as well as transboundary resource management across the GMS. If climate change adaptation approaches continue to be isolated to individual countries in the GMS, it is likely that people will remain vulnerable to climate change in the future.

Additionality (with AF resources)

Through the proposed project, AF resources will be used to expand the regional knowledge base on climate change adaptation. Knowledge and lessons-learned relevant to GMS countries will be generated by implementing and monitoring concrete adaptation interventions in different socio-ecological contexts across the region. Additionally, thorough reviews and assessments of past and ongoing adaptation initiatives will be undertaken to complement the on-the-ground generation of knowledge. To ensure that knowledge on concrete adaptation solutions and transboundary water management is shared effectively among GMS countries, the proposed project will integrate generated information into appropriate national and regional institutions, cooperation mechanisms, forums and knowledge platforms. Through these knowledge-sharing events, the proposed project will also encourage relationship-building between GMS countries and institutions. In doing so, the proposed project will encourage a cooperative approach to adaptation

and transboundary water management in the region, which will enhance the effectiveness of future climate change adaptation initiatives across the GMS, including China.

Activities under the proposed project will also result in policy recommendations and promote policy-dialogue related to climate change adaptation and transboundary resource management between high-level government stakeholders from GMS countries. This will foster cooperation between GMS countries in their approaches to climate change adaptation and transboundary resource management, ensuring policy alignment as well as the implementation of complementary on-the-ground interventions.

K. Sustainability

Describe how the sustainability of the project / programme outcomes has been taken into account when designing the project / programme.

Project sustainability will be achieved by: i) implementing concrete on-the-ground adaptation interventions (with a focus on EbA) at demonstration sites in Thailand and Vietnam, which can be replicated in vulnerable communities across the MRB; ii) building the capacity of institutions and communities at the regional, national and local scales to integrate climate-resilient practices into policies and strategies; iii) engaging vulnerable communities to ensure buy-in and the implementation of project interventions; iv) using a participatory approach to build capacity and strengthen the regional knowledge base of technical governmental staff from GMS countries based on the implementation of concrete EbA interventions; v) encouraging the exchange of climate change adaptation knowledge at a local, national and regional level; vi) institutionalising climate change adaptation – particularly EbA – into government and community structures; and vii) promoting cooperation and alignment with regards to the design and implementation of national, as well as regional policies related to climate change adaptation.

Under **Outcome 1**, long-term sustainability will be achieved by: i) building the technical capacity of vulnerable communities and local government agencies to plan for and implement adaptation interventions; ii) raising awareness and knowledge of EbA interventions; and iii) facilitating participatory stakeholder engagement and knowledge exchange between local communities and government agencies. These points are discussed further below.

The EbA interventions that are implemented by beneficiary communities are expected to ameliorate the impacts of climate change upon livelihoods, ecosystems and biodiversity. Local communities will, therefore, be incentivised to continue implementing and maintaining the various EbA interventions upon which their livelihoods depend. The incentives for implementing EbA both during and after the proposed project include: i) increasing the climate resilience of ongoing agricultural activities, securing food and income generation for farmers; ii) enhancing the supply of ecosystem goods and services, strengthening the provision of water and food, as well as additional/alternative sources of income; iii) improving water infrastructure and management, reducing the adverse impacts of floods and droughts; and iv) providing additional, climate-resilient livelihood options to communities (women in particular). These will encourage project sustainability at both the community and government levels.

Interventions implemented to improve water infrastructure and management will continue to perform their function long after the project has been completed. This will assist in ensuring the sustainable supply and management of water to target communities in the long-term. Furthermore, soft infrastructure (EbA), including living check dams, which have a lifespan of ~10 years can be constructed from local materials by communities. The affordable cost of construction

and benefits accrued during the lifespan of living check dams[181] will encourage the construction of new and additional dams in the future.

Best practices and lessons learned from the implementation of adaptation interventions, such as living check dams, at demonstration sites will be shared with surrounding communities in Thailand and Vietnam through national knowledge-sharing strategies. The strategies and knowledge products will be in local language for wider reach. This will contribute to the autonomous upscaling and replication of interventions beyond demonstration sites, strengthening the climate-resilience of non-beneficiary communities in the long-term.

Under **Outcome 2**, knowledge adaptation measures (including EbA) will be generated, collated and shared using existing forums, workshops and networks in the GMS. This will include information generated through cost-effectiveness analyses of adaptation interventions (that reduce the impacts of droughts and floods) implemented through Outcome 1. The results of these analyses will be used to expand the local, national and regional knowledge base on climate change adaptation in all six countries of the GMS, thereby informing best practice adaptation interventions to the shared climate change impacts of droughts and floods. A thorough understanding of the cost-effectiveness of climate change adaptation (especially EbA) will further justify and sustain its implementation across the region in vulnerable communities and threatened ecosystems.

Information on the cost-effectiveness of EbA will be used in the development of one of three policy briefs related to climate change adaptation in the GMS[182]. The policy briefs will facilitate the institutionalisation of climate change adaptation, as well as lessons learned and information generated from project interventions. This will enhance the sustainability of the proposed project at both a national and regional level. In addition to policy briefs, the development of a paper on climate changes strategies for the GMS – with a focus on EbA – Lancang-Mekong Environmental Cooperation Centre Environmental Outlook Report series will ensure the regional dissemination of information generated through project demonstration sites.

The proposed project will also build upon existing climate change adaptation knowledge exchange platforms and databases that are both functional and have relevant stakeholder support across the sub-region[183]. Knowledge products generated through the proposed project – as well as other relevant information collected during the generation of these knowledge products[184] – will be shared on these existing platforms. Sharing knowledge using existing mechanisms that are independently organised and funded will ensure that the knowledge products generated by the proposed project remain available after the project's funding period has finished.

Ensuring that all of the EbA knowledge and information generated through the proposed project result in the implementation of concrete, on-the-ground interventions across all GMS countries will be catalysed through regional training events for technical government staff. The capacity development of these staff to transition regions adaptation plans into on-the-ground actions will promote both the continued and future implementation of EbA in all six sub-region countries[185].

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[181] Including water storage for drought periods, increased ground water recharge and the attenuation of flooding.
[182] Other policy briefs will be developed on good practice in managing shared climate change impacts in the GMS and integrating climate adaptation into transboundary water management.
[183] These include the ADB GMS CEP data portal, MRC data portal and EbA South portal, as well as other Lancang-Mekong information sharing platforms that are currently under development.
[184] For instance, knowledge products such as the Adaptation, Livelihoods and Ecosystems planning tool (ALivE) generated through the EbA South project will also be shared by the proposed project.
[185] Cambodia, China, Laos PDR, Myanmar, Thailand and Vietnam.

Guidelines for the design and implementation of climate change adaptation-specific M&E frameworks developed through the proposed project will further enhance long-term sustainability. The collection of comparable data from a range of projects using the methods stipulated in the guidelines will allow for the generation of best practice adaptation interventions to shared climate change impacts in different ecosystems, which will promote regional cooperation, planning and implementation of adaptation in the GMS. As a result, the effectiveness of climate change adaptation initiatives across the sub-region will continually be improved, building on the foundation prepared by other initiatives such as the proposed project.

Under **Outcome 3**, the regional approach to addressing climate change impacts in the GMS – particularly floods and droughts – will be strengthened through the linking of the adaptation science of, and knowledge[186] generated through the project with the political processes for transboundary water and river basin management in the region. Scaling up the drought and flood risk measures at a basin-scale could reduce the impacts of climate change in the given country and downstream in the Mekong River basin. A strengthened regional approach to climate change adaptation in the GMS will encourage a coordinated response in the member countries. This is essential for effective and sustainable adaptation and transboundary water management.

The development of recommendations for strengthening regional cooperation and the scaling up of adaptation interventions into regional and national planning processes of the GMS will foster a long-term response to climate change adaptation. Existing regional forums and policy dialogues[187] will be used as platforms to disseminate the resulting recommendations. This will be supplemented by exchange visits to project demonstration sites (in Thailand and Vietnam) by representatives of GMS countries allowing for the further exchange of adaptation knowledge, building relationships and encouraging regional cooperation. This collaboration will ensure that the sustainability of the project is secured at the regional level, whereby all countries in the GMS can share in the knowledge generated through the proposed project, as well as plan for and implement complementary adaptation interventions.

Sustainability of on-the-ground interventions and regional components

Sustainability criteria	Description
Institutional sustainability	Thailand: *Climate-resilient agriculture and climate-resilient livelihood interventions:* Under the supervision of national executing entity – Department of Water Resources (DWR), the national designated execution entity will implement these interventions directly with beneficiary community members. Community members will receive training on implementing and maintaining these interventions themselves, which will promote their long-term sustainability. *Ecosystem-based adaptation interventions:* Restoration of banks along rivers and channels will be implemented under the supervision of DWR. DWR will be responsible for the long-term maintenance of this interventions, ensuring that they are sustainable. Forest restoration will take place in community forests. Existing community forest management committees will be responsible for the long-term maintenance of these interventions. *Improved small-scale water infrastructure and water management interventions:* Living check dams will be constructed with local community involvement, and the community will then be responsible for long-term maintenance. This model has proved successful in other pilot projects. DWR, in collaboration with the Young River Basin Committee (RBC), will coordinate weir and canal rehabilitation interventions, and will be responsible for the sustainability of these interventions.

[186] Such as best practices and lessons learned.
[187] Including: i) Lancang-Mekong policy dialogues; ii) MRC regional stakeholder forums; iii) Thailand NAP stakeholder forum; and iv) Vietnam National Climate Change Strategy stakeholder forum.

	Vietnam: Thailand: *Climate-resilient agriculture and climate-resilient livelihood interventions:* Under the supervision of national executing entity – Ministry of Natural Resources and Environment (MoNRE), the national project management unit will implement these interventions directly with beneficiary community members. Community members will receive training on implementing and maintaining these interventions themselves, which will promote their long-term sustainability. *Ecosystem-based adaptation interventions:* Tram Chim National Park Management Board will be responsible for the long-term maintenance of EbA interventions implemented by the proposed project, as most will be implemented within the national park. As a well-established institution, the management board will ensure the sustainability of the interventions. *Improved small-scale water infrastructure and water management interventions:* Living check dams will be constructed with local community involvement, and the community will then be responsible for long-term maintenance. MoNRE, in collaboration with the 5 communes surrounding Tram Chim National Park, will coordinate weir and canal rehabilitation interventions, and will be responsible for the sustainability of these interventions. Regional components The project's knowledge management strategy will promote sustainability by focusing on sharing through existing mechanisms (forums, networks, knowledge platforms) that will continue to function beyond the project lifetime. These mechanisms include those under MRC, Asia Pacific Adaptation Network and CGIAR. Regional training events for technical government staff will help ensure that all the EbA knowledge and information generated through the proposed project result in the implementation of concrete, on-the-ground interventions across all GMS countries will be catalysed. Guidelines for the design and implementation of climate change adaptation-specific M&E frameworks developed through the proposed project will further enhance long-term sustainability.
Financial and economic sustainability	The institutions described above will be financially responsible for the long-term maintenance of relevant on-the-ground interventions implemented through the proposed project. In the case of interventions that will be directly implemented by community members, these beneficiaries will receive training on the long-term maintenance of these interventions to promote their sustainability. Furthermore, all interventions proposed in the project that will be implemented by communities directly (e.g. climate-resilient agriculture and livelihood interventions) are expected to generate additional income for beneficiaries (see Part II:D and Annex II) , which can be used to sustain these interventions in the future. These interventions are also expected to reduce impacts of climate change upon livelihoods, ecosystems and biodiversity, and local communities will therefore be incentivised to continue implementing them once the project has ended. A cost-effectiveness analysis of the various climate change adaptation interventions implemented by the proposed project will also be conducted. This analysis will inform relevant local, national and regional strategies and plans, thereby incorporating successful interventions into long-term planning strategies and promoting their sustainability.
Environmental and social sustainability	Environmental and social risks associated with on-the-ground interventions and appropriate mitigation measures have been during the development of the proposed project (see Part II:L. Part III:C; and Annex X). UN Environment, the regional project implementation unit, national executing entities in Thailand and Vietnam, and the national project management units in Thailand and Vietnam will be responsible for ensuring that these, and other environmental and social risks, are monitored and mitigated throughout project implementation. Furthermore, an environmental and social assessment will be undertaken in each target country during the development of the detailed implementation protocols. This will further identify any potential environmental and social risks associated with the proposed interventions. Based on this assessment, an environmental and social management plan will be developed, which will promote the long-term environmental and social sustainability of all project interventions. The proposed project was also designed with extensive stakeholder consultation (see Part II:I and Supplementary Reports I and II). This has meant that all on-the-ground

	interventions proposed meet community needs and are locally appropriate. This will promote the long-term sustainability of these interventions.

L. Environmental and social impact risks

Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

The proposed project's activities were evaluated against AF environmental and social principles to identify potential adverse impacts. Despite the positive impacts that can enhance the project results, some environmental and social principles of the AF could be triggered by the project in terms of environmental and social impact and risks. An evaluation of the project against each of the AF environmental and social principles is described below and summarised in Tables 12 and 13.

Principle 1: Compliance with the Law

During the development of the full project proposal, both regional and national stakeholders were consulted to ensure that all relevant and legal requirements were met. The proposed project is, therefore, well aligned and complies with regional, national and sub-national policies, laws, plans and priorities for sustainable development and climate change adaptation. A full description of this alignment and compliance is presented in Parts II E and F.

The proposed project will be implemented in a protected area in Vietnam, namely Tram Chim National Park, that is also a Ramsar site[188] and will comply with national protected area management laws. Once implemented, the monitoring of adaptation interventions (including EbA) at demonstration sites in and around the national park will provide a means of tracking their alignment with national protected area management laws during project implementation.

Principle 2: Access and Equity

The beneficiaries of the proposed project are poor people in vulnerable communities (in Thailand and Vietnam) and are not in decision-making processes. Therefore, certain community members may benefit more than others. Subsequently, this may result in both intra- and inter-community conflicts over benefits (such as additional or alternative livelihood options) accrued both during and after project implementation. This risk will be mitigated through the implementation of local knowledge-sharing strategies (Output 1.4) in communities surrounding the demonstration sites. The gender action plan will address the gender issues and ensure that vulnerable women benefit from the project interventions. As a result, the autonomous upscaling and replication of project interventions beyond these sites will be facilitated, enhancing the climate-resilience of non-beneficiary communities. Furthermore, both beneficiary and non-beneficiary communities[189] will be sensitised towards the approach of prioritising the support from the proposed project to most vulnerable communities while ensuring benefits reach further communities through one or more of the proposed project activities.

Implementation of the proposed project will take place under a rapidly changing context as hydropower and water extraction initiatives continue to be developed within the Mekong River Basin. There is a risk that these developments negatively affect the access of target communities

[188] A Ramsar Site is a wetland site designated of international importance under the Ramsar Convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by UNESCO, and coming into force in 1975.

[189] Including inter-community institutions such as the Young River Basin Committee.

to essential services, such as clean water, and negatively impact the productivity of livelihoods including fishing.

The involvement of local authorities[190] in the project design and implementation of adaptation interventions at demonstration sites (as well as other aspects of project design) mitigates the reduction or prevention of community access to: i) basic health services; ii) clean water and sanitation; iii) energy; iv) education; v) housing; vi) safe and decent working conditions; and vii) land rights. Adherence to these principles will be promoted further through additional engagements with beneficiary during the finalisation of adaptation interventions and consequent development of protocols during project inception.

Principle 3: Marginalised and vulnerable groups
There is a risk that vulnerable and marginalised groups will be excluded during the implementation project activities (particularly adaptation interventions – Component 1) and have insufficient access to the associated benefits. Consequently, the proposed project has been designed to ensure that marginalised and vulnerable groups – especially women, indigenous people, youth, and people living with disabilities – will not be adversely affected by, but instead benefit from, relevant climate change adaptation activities. In addition, to avoid the exclusion of these communities and groups, they were involved in extensive consultations carried out during the preparation of the full project proposal. The project will prepare implementation protocol as well as gender action plan to ensure equal participation and that social impacts do not unjustly impact on marginalised and vulnerable groups.

Principle 4: Human Rights
The design of the proposed project (including implementation arrangements) a human rights-based approach. No activities are included in the design of the project that violate established international human rights. Moreover, the proposed project will promote the basic human rights of access to food, water and information. There is a Human Rights Commission in each partner country with representatives up to district level that will ensure that human rights at the grassroots level is adhered to and promoted.

The project seeks to ensure that benefits of the project are shared broadly in a nondiscriminatory, equitable manner through participatory processes and transparent selection criteria. Extensive stakeholder consultations were held during project preparation (see Supplementary report I & II.) and will be continued throughout project implementation. Potential project-related concerns and/or grievances of local communities will be addressed through a Grievance Mechanism consistent with the UN Environment's Stakeholder Response Mechanism (see Annex IX).

Principle 5: Gender Equity and Women's Empowerment
The proposed project is targeting communities where men occupy the majority of the leadership positions. There is, therefore, a risk that women will not benefit equitably from the proposed project's climate change adaptation (including EbA) and capacity-building interventions.

Gender Action Plan will be prepared as per the Gender policy and guideline for ESMP of AF (Please refer to Annex XIII) to ensure that gender equity and women's empowerment are considered across all relevant design aspects of the proposed project and will be adhered to throughout the implementation period. To this end, a gender analysis was conducted during the development of the proposal, under the guidance of gender experts and non-governmental

[190] For example, Young River Basin Committee in Thailand and commune authorities in communities surrounding Tram Chim National Park.

organisations (NGOs), to ensure that gender considerations were fully considered during project design (see Annex XI). In particular, equal rights, responsibilities, opportunities and access of women to the benefits of climate change adaptation have been considered. For example, where applicable, project activities have been designed to include gender disaggregation (at least 50%), especially on-the-ground activities, such as those of Outputs 1.1 and 1.2. For technical assessments as well as capacity building activities, women will be strongly encouraged to participate.

The National Project Management Units (Thailand and Vietnam), local government authorities and bodies at the proposed project intervention sites will ensure gender issues are considered and addressed during project implementation. Gender-focused activities will also include raising awareness in the region to *inter alia*: i) acknowledge women for their contribution as an income generating individual in the household; and ii) highlight their role in climate change adaptation. This will enhance the value of women within their communities, as well as promote their equitable participation of women in the planning, implementation, monitoring and evaluation of the project. Furthermore, the fair and equitable selection (with a least 50% female representation) of beneficiaries will be conducted for capacity building and training sessions. A list of all the participants will be maintained, and gender ratio will be monitored by the National Project Management Units on a quarterly basis, ensuring that the progress of all gender-related targets in the project results framework are tracked and met.

Principle 6: Core Labour Rights

Local communities will be involved in the implementation and maintenance of climate change adaptation (including EbA) interventions. Though the project does not involve hard infrastructure construction, there may be possibilities of accidents while implementing the proposed project's interventions.

Thailand and Vietnam have ratified six and five out of the eight fundamental International Labour Organisation (ILO) Conventions, respectively[191,192]. Core labour rights, including the right to safe working conditions, were considered during the design of the proposed project and will be enforced where necessary during implementation. In addition, both national and regional stakeholders were involved in the design of project activities, ensuring that labour legislation in the beneficiary countries (Thailand and Vietnam) is adhered to. Compliance with labour rights will be ensured in all the proposed project activities through oversight by the National Project Management Units.

Component 1 of the proposed project will involve labour for the implementation of climate change adaptation interventions (including EbA) in Thailand and Vietnam. Labour (implementation and maintenance) will be carried out by consultants and firms hired through the project, as well as members of beneficiary communities. In cases where wages are to be paid for work completed, wages will be determined according to tasks. The wage rate will be calculated on the basis of prevailing minimum wage rate for the assigned task. A record of work done for labour engaged will have to be maintained and the wages paid accordingly. The hours of work and the timing of the hours will be determined in consultation with the labour and the prevailing practices in the area. Positive discrimination in favour of women may be used to provide fair and equal opportunity to women to seek employment as labourers. All forms of negative discrimination in respect of

[191] Source: https://www.ilo.org/gateway/faces/home/ctryHome?locale=EN&countryCode=THA&_adf.ctrl-state=58pa0fr9y_19.
[192] Source: https://www.ilo.org/gateway/faces/home/ctryHome?locale=EN&countryCode=VNM&_adf.ctrl-state=58pa0fr9y_56.

employment and occupation will be eliminated. The proposed project will not engage in child labour in any of its activities. All forms of forced or compulsory labour will be eliminated.

Principle 7: Indigenous Peoples
The project sites in Vietnam and Thailand do not have indigenous people.

Principle 8: Involuntary Resettlement
No activities are or will be included in the project design that will result in involuntary resettlement.

Principle 9: Protection of Natural Habitats
On-the-ground adaptation interventions (specifically EbA) will include the planting of species for enrichment and/or restoration of ecosystems. The project interventions will not have any negative impact on the natural habitat. However, the promotion of EbA interventions through the proposed project (including those based on traditional knowledge) is more likely to result in the restoration, improved management and protection of natural habitats, as well as the strengthened supply of ecosystem goods and services. To ensure that this principle is adhered to, the consultation with and inclusion of relevant stakeholders (community and authority level) during project design and implementation is prioritised.

Apart from EbA implemented under the proposed project, adaptation interventions involving hard infrastructure (for example, the lengthening of canals and construction of water reservoirs) are in very small scale to impact and disrupt natural habitat.

Adaptation interventions will be implemented in and around Tram Chim National Park. All necessary impact assessments will be conducted before the implementation of interventions around Tram Chim National Park, and park management will be consulted to ensure that the protection of natural habitats is enforced. Furthermore, all national protected area laws will be respected during the selection and implementation of adaptation interventions for Tram Chim National Park and its surrounding communities. Ecological restoration interventions planned for Tram Chim National Park (Activity 1.2.4) may require the conduction of an EIA, in accordance with Decree 18/2015/ND-CP, Appendix 2 of Circular 27/2015/TT-BTBMT, as they will be implemented on national park land. The necessity of an EIA will be discussed during consultations with relevant stakeholders during the project's inception phase. If necessary, plans for an EIA will be incorporated into adaptation intervention protocols that will be designed under Activity 1.2.1.

Principle 10: Conservation of Biological Diversity
There is a low risk that adaptation interventions involving the construction of hard infrastructure (such as the extending of canals; Component 1) could negatively impact biological diversity.

The project will ensure that the conservation and sustainable use of biological diversity factors into the process of finalising adaptation interventions and demonstration site selection. Adaptation demonstration sites will be selected using a participatory approach to ensure that activities do not cause significant loss of biological diversity or the introduction of known invasive species. Furthermore, the focus on EbA under the proposed project will result in the restoration of ecosystems, which will ultimately enhance the biological diversity of the areas surrounding the demonstration sites.

Principle 11: Climate Change
No climate change impacts are anticipated to be caused by the proposed project's activities. Indeed, project activities will contribute to climate change adaptation efforts in the GMS. The EbA-focused approach adopted for the project is unlikely to result in maladaptation, exacerbate the impacts of climate change threats (droughts and floods) or increase greenhouse gas emissions.

The project will contribute to climate change adaptation efforts in the GMS. Under Component 1, climate change adaptation interventions (including EbA) will be implemented by vulnerable communities in the sub-region – Thailand and Vietnam – to manage the climate change impacts, particularly droughts and floods. These interventions will contribute to the enhancement of the adaptation knowledge base in the GMS, which will promote regional cooperation, planning and implementation of adaptation (Component 2). Building on Component 2, through Component 3, regional cooperation on climate change adaptation in the sub-region, particularly in response to droughts and floods, will be strengthened.

Principle 12: Pollution Prevention and Resource Efficiency
Project activities are not expected to result in the generation of any considerable amounts of pollution, particularly hazardous or toxic waste. Project design will ensure that all applicable international standards are met for maximising resource efficiency and minimising waste production and the release of pollutants, including carbon emissions. In terms of resource efficiency, implementation of the proposed project will not require (during or after implementation) exorbitant amounts of water, energy, materials or other natural resources. All applicable international standards will be met for maximising efficient resource use and minimising the production of waste and the release of pollutants.

Principle 13: Public Health
Project activities will have no foreseeable adverse effects on public health. EbA interventions under Component 1 will likely improve public health through the strengthened provision of ecosystem goods and services, such as food, clean water and medicinal plants.

Principle 14: Physical and Cultural Heritage
There is a low risk that the adaptation interventions involving the construction of hard infrastructure (such as canals and water storage reservoirs) could result in negative impacts on physical and cultural heritage.

The participatory approach to project design included the use of local knowledge to ensure that physical and cultural heritage is not negatively affected by on-the-ground adaptation activities. In addition, the location of physical and cultural heritage sites will be considered during the finalisation of demonstration sites during inception to reduce the likelihood of negative impacts related to project interventions.

Principle 15: Lands and Soil Conservation
Project activities will promote land and soil conservation across the demonstration sites through EbA interventions such as agroforestry and riverbank restoration. Agroforestry, for example, will reduce erosion, limiting the loss of nutrients from topsoil and enhance soil fertility. In addition to the benefits of EbA interventions under Outcome 1, activities under Outcomes 2 and 3 will promote land and soil conservation on a regional scale through: i) knowledge sharing; and ii) recommendations for national and regional strategies and policy frameworks.

Table 12: Checklist for social and environmental principles.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	X	
Access and Equity		X
Marginalized and Vulnerable Groups		X
Human Rights	X	
Gender Equity and Women's Empowerment		X
Core Labour Rights	X	
Indigenous Peoples	X	
Involuntary Resettlement	X	
Protection of Natural Habitats	X	
Conservation of Biological Diversity		X
Climate Change	X	
Pollution Prevention and Resource Efficiency	X	
Public Health	X	
Physical and Cultural Heritage		X
Lands and Soil Conservation	X	

Table 13: Checklist for environmental and social impacts and risks of the project.

Checklist of environmental and social principles	Potential impacts and risks
Compliance with the Law	Project interventions will comply with the law.
Access and Equity	The beneficiaries of the proposed project are poor people in vulnerable communities who may not be into decision-making processes. There is, therefore, a risk that certain community members may benefit more than others.
Marginalized and Vulnerable Groups	There is a risk that vulnerable and marginalised groups will be excluded during the implementation project activities (particularly adaptation interventions – Component 1) and have insufficient access to the associated benefits. Thus, the Gender Action plan and implementation protocol will ensure that women, marginalized and vulnerable communities are well represented and benefit from the project interventions.
Human Rights	No activities are or will be included in the design of the proposed project that are not in line with established international human rights. Moreover, the proposed project will promote the fundamental human rights of access to food, water and information.
Gender Equity and Women's Empowerment	The proposed project is targeting communities where men occupy the majority of the leadership positions. There is, therefore, a risk that women will not benefit equitably from the proposed project's climate change adaptation (including EbA) and capacity-building interventions. Thus, the project has proposed to develop Gender Action Plan for the implementation of project interventions.
Core Labour Rights	Local communities will be involved in the implementation and maintenance of climate change adaptation (including EbA) interventions via local contractors and consultants. The local contractors and consultations will comply with the national labour right.
Indigenous Peoples	No indigenous people were identified at either of the project intervention sites.

Involuntary Resettlement	No activities are or will be included in the project design that will result in involuntary resettlement.
Protection of Natural Habitats	On-the-ground adaptation interventions (specifically EbA) will include the planting of species for enrichment and/or restoration of ecosystems. Adaptation interventions will be implemented around Tram Chim National Park. All necessary impact assessments will be conducted before the implementation of interventions.
Conservation of Biological Diversity	There is a low risk that adaptation interventions involving the construction of hard infrastructure (such as the extending of canals; Component 1) could negatively impact biodiversity.
Climate Change	No climate change impacts are anticipated to be caused by the proposed project's activities. Indeed, project activities will contribute to climate change adaptation efforts in the GMS. The EbA-focused approach adopted for the project is unlikely to result in maladaptation or exacerbate the impacts of climate change threats (droughts and floods).
Pollution Prevention and Resource Efficiency	Project activities are not expected to result in the generation of any considerable amounts of pollution (particularly hazardous or toxic waste). In terms of resource efficiency, implementation of the proposed project will not require (during or after implementation) exorbitant amounts of water, energy, materials or other natural resources.
Public Health	Project activities will have no foreseeable negative effects on public health.
Physical and Cultural Heritage	There is a low risk that the adaptation interventions involving the construction of hard infrastructure (such as canals and water storage reservoirs) could result in negative impacts on physical and cultural heritage.
Lands and Soil Conservation	Project activities will promote land and soil conservation across the demonstration sites through EbA interventions such as agroforestry and riverbank restoration (Outcome 1). In addition, activities under Outcomes 2 and 3 will promote land and soil conservation on a regional scale.

According to the AF's Environmental and Social Policy, a project can be categorised as either A, B or C. Category A refers to projects that are "likely to have significant adverse environmental or social impacts that are for example diverse, widespread, and irreversible". Because any adverse social and environmental impacts of the project are expected to be localised and minimal – on-the-ground interventions will largely be "green" and contain minimal construction of hard infrastructure – the Category A classification does not apply. Category B project is categorized as "less adverse than Category A projects. The proposed project is in Category B: moderate risk category. A Social and Environmental Action Plan has been prepared (Annex XIII). The project has proposed to prepare ESMP during the implementation phase and the risks identified in ESERN (refer Annex X), table 18 and ESAP (Annex XIII) will be revisited while preparing detail ESMP as well as regularly revisiting and monitored throughout the implementation phase.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Management arrangements

Describe the arrangements for project / programme management at the regional and national level, including coordination arrangements within countries and among them. Describe how the potential to partner with national institutions, and when possible, national implementing entities (NIEs), has been considered, and included in the management arrangements.

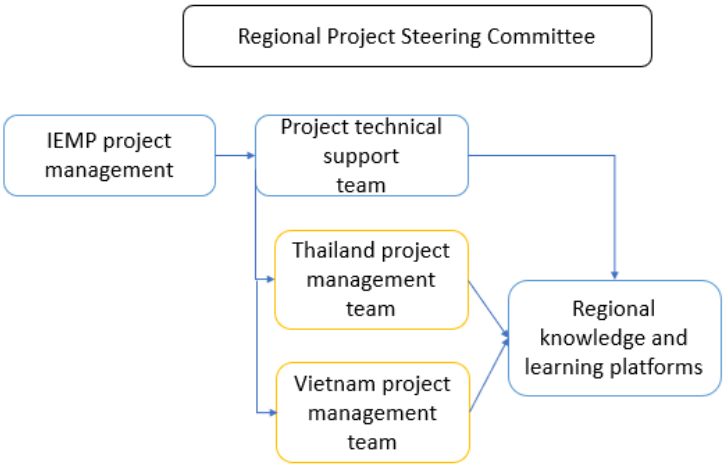


Figure 22: Project management arrangements.

Multilateral Implementing Entity

As requested by the participating countries, UN Environment will be the Multilateral Implementing Entity (MIE) for the proposed project. UN Environment has significant experience in implementing projects of this nature, with dedicated groups in Climate Change Adaptation and Terrestrial Ecosystems. UN Environment has implemented over 50 projects on climate change adaptation at global, regional and national levels. These projects develop innovative solutions for national governments and local communities to adapt to the predicted effects of climate change in an environmentally sound manner including enhancing climate resilience by restoring valuable ecosystems that are vulnerable to climate change. Investments into ecosystems, flood and coastal protection, water catchment and storage, and alternative livelihoods are aimed at helping people buffer extremes of droughts and floods, sea level rise and to adapt to projected climate change. The following implementation services under the MIE modality will be provided by UN Environment for the proposed project:

- overall coordination and management of UN Environment's MIE functions and responsibilities, and the facilitation of interactions with the AF Board and related stakeholders;
- oversight of portfolio implementation and reporting on budget performance;
- quality assurance and accountability for outputs and deliverables at the project development phase, during implementation and on completion;
- receipt, management and disbursement of AF funds in accordance with the financial standards of the AF;
- information and communication management, including maintaining specific project databases to track and monitor progress – financial and substantive – of project implementation;

- oversight and quality assurance of evaluation processes for project performance and ensuring that lessons learned/best practice are incorporated to improve future projects; and

The proposed project will be executed by three separate entities, one to execute regional activities, one within Thailand and one within Vietnam.

Executing Entity – Regional activities

The International Ecosystem Management Partnership (UNEP-IEMP) will be the executing entity for Components 2 and 3 of the proposed project, which represent the regional dimensions of the project, as follows:

- coordinating and managing the overall implementation of project outcomes and activities;
- monitoring and evaluating regional project outcomes and activities;
- regional knowledge management, communications and awareness raising;
- implementing the regional components of the project;
- providing technical advice on project activities carried out within Thailand and Vietnam (if and when necessary, in support of CTA work);
- managing procurement of goods and services for the regional activities of the project; and
- ensuring the overall quality and timeous delivery of regional project outputs.

The International Ecosystem Management Partnership is a collaborating centre of UN Environment. UNEP-IEMP is jointly developed to serve as a place of collaboration between UNEP and the Chinese Academy of Sciences (CAS). It is hosted by the Institute of Geographic Sciences and Natural Resources Research (IGSNRR) of CAS in Beijing, China, and is legally and financially managed by IGSNRR.

Regional project steering committee

A regional project steering committee (RPSC) will be established to provide strategic guidance for the implementation of the entire proposed project. In addition, the RPSC will: i) undertake project assurance – monitoring and evaluation; ii) ensure performance improvement; and iii) ensure accountability and learning. The RPSC will approve annual work plans and review project progress reports, as well as any deviations from the approved plans. The RPSC will meet annually.

Members of the RPSC will comprise:
MoNRE Thailand, MoNRE Vietnam, Chinese Academy of Sciences, Lancang-Mekong Environmental Cooperation Centre and Mekong River Commission and Chief Technical Advisor.

Regional project implementation unit

A regional project implementation unit will be established in UNEP-IEMP. The regional project implementation unit will be responsible for both the coordination and delivery of regional outputs and activities, under the guidance of Regional PSC. The regional implementing unit will be supported by technical support team comprising of regional finance and procurement assistant. The finance and procurement assistant will be responsible for ensuring that the regional components of the project's financial and administrative procedures comply with AF and UN Environment guidelines.

The regional project implementation unit will be supported by an adaptation specialist (see Budget notes 2.1a, 2.2a, 2.4a and 3.1a), a knowledge coordinator (see Budget Notes 2.2c, 2.3a, 2.5c, and 3.1g).

Table 14: Estimated project management costs for regional components.

Execution activity Role	US$
Finance and procurement assistant (@$1,800 per month)	86,400
Regional PSC meetings (@$7,500 per meeting)	30,000
Communication costs	4,503
TOTAL	**120,903**

Executing entity - Thailand

The Department of Water Resources (DWR), Ministry of Natural Resources and Environment (MoNRE) will be the executing entity for project activities within Thailand. The DWR will oversee the execution of Output 1.1, and the activities within Output 1.3 and Output 1.4 that will take place within Thailand. For these Outputs within Thailand, the DWR will be responsible for:

- coordinating and managing the implementation of national project outputs and activities;
- monitoring and evaluating national project outputs and activities;
- ensuring the overall quality and timeous delivery of national project outputs and activities; and
- coordinating with executing entities in Vietnam and UNEP-IEMP to implement regional project outputs and activities.

National project steering committee

A Working Group on climate change adaptation for Young River Basin, under the Climate Change Adaptation Committee within DWR, will be established to form the national project steering committee (PSC). The national PSC will be responsible for providing strategic oversight of project implementation in Thailand.

Members:

- Chair – MoNRE Thailand
- Representative of Climate Change Adaptation Committee of Thailand
- Office of Natural Resources and Environmental Policy and Planning (National focal point of UNFCCC)
- Department of Water Resources, Thai National Mekong Committee Secretariat
- Regional Office of Water Resources No. 4, Khonkaen province (local line agency in proximity of demonstration EbA project)
- Community/village leaders of Young river basin (of upper, mid and lower river basin)
- District administrative governor offices (from EbA demonstration projects)

National designated execution entity

The DWR will designate an institution (local government or external) to be responsible for the on-the-ground execution of the proposed project. The designated execution entity will be responsible for daily operation and management of the project with oversight and monitoring provided by the DWR. The designated execution entity will be located nearby the demonstration site so that it can easily coordinate with local partners and communities. DWR will ensure that the designated execution entity complies with all AF rules and procedures. Department of Water Resources intends to assure that the designated execution agency can implement on-the-ground interventions in the Young river basin in an effective and flexible manner. They have identified some possible institutions but must negotiate and agree on technical and financial conditions in compliance with AF Rules and Procedures.

Candidates are either local government agencies, local non-profit organizations, local private consultant companies or legalized individuals.

What is the selection process?
Department of Water Resources, through the Working Group on Climate Change Adaptation will consider and establish selection criteria for designated execution agency when the project is approved to commence. It is to ensure that the selected one is approved of their role, responsibility and qualification to achieve the outcomes for Department of Water Resources, and Young River basin's local communities. The process to select by DWR will comply with government procurement rules and procedures.

Within the designated execution entity, a project management unit (PMU) will be established that will be responsible for day-to-day management and implementation of the national activities.

Thailand Project Management Unit (PMU)
The PMU will be overseen by a National Project Director (NPD). The NPD will be a designated existing staff member of the DWR. The NPD will be responsible for coordinating all project activities in Thailand and will be the focal point for all communication between Thailand, Vietnam, UNEP-IEMP and UN Environment AF Coordination Unit. Costs related to the National Project Director will be covered in-kind by the DWR.

A Project Manager (PM) will be hired to lead the PMU. The PM will be responsible for the overall management of the proposed project within Thailand. The PM will ensure that the project is run transparently and effectively in accordance with AF and UN Environment guidelines and approved work plans and budgets. The PM will receive project support from a national finance and procurement assistant. The key functions of the PM will be:

- facilitating the day-to-day functioning of the project staff;
- managing human and financial resources in consultation with the National Project Director to achieve results in line with the outputs and activities outlined in the full proposal;
- leading the preparation and implementation of annual results-based work plans and logical frameworks as endorsed by the management;
- coordinating project activities with related and parallel activities;
- monitoring project activities, including financial matters, and preparing quarterly progress reports, and organising quarterly progress reviews;
- reporting and providing feedback on project strategies, activities, progress and barriers to the national PSC, UN Environment and UNEP-IEMP; and
- managing relationships with project stakeholders including communities, NGOs, government agencies and others as required.

Because many of the activities of the proposed project involve procurement and sub-contracting, the recruitment of a dedicated finance and procurement assistant will be necessary in order to ensure that the PMU has the required capacity to manage finances as per UN Environment and AF requirements. The finance and procurement assistant will be responsible for ensuring that the projects financial and administrative procedures comply with AF and UN Environment guidelines.

Three local community coordinators (one each from the upper, middle and lower Young River Basin) will be hired to assist the PM. These local community coordinators will be responsible for managing the on-the-ground implementation of adaptation interventions within their respective demonstration sites.

Table 15: Estimated project management costs for Thailand.

Execution activity Role	US$
Project director	In-kind
Project manager (@$1,700 per month)	81,600
Finance and procurement assistant (@$850 per month)	40,800
Three local community coordinators (@$450 per person per month)	64,800
National PSC meetings (@$2,000 per meeting)	8,000
Communication costs (@$2,000 per year)	9,000
Office space	In-kind
Office equipment	4,800
PMU travel costs (@$3,000 per year)	12,000
TOTAL	**221,000**

Executing entity - Vietnam

The Department of Legal Affairs (DLA), Ministry of Natural Resources and Environment (MoNRE) will be the executing entity for project activities within Vietnam. The DLA will oversee the execution of Output 1.2, and the activities within Output 1.3 and Output 1.4 that will take place in Vietnam. For these Outputs within Vietnam, the DLA will be responsible for:

- coordinating and managing the implementation of national project outputs and activities;
- monitoring and evaluating national project outputs and activities;
- ensuring the overall quality and timeous delivery of national project outputs and activities; and
- coordinating with executing entities in Thailand and UNEP-IEMP to implement regional project outputs and activities.

National project steering committee

A national project steering committee will be established. The national PSC will be responsible for providing strategic oversight of project implementation in Vietnam.

Members:

- Chair – MoNRE, Vietnam
- Department of Climate Change
- Institute of Meteorology Hydrology and Climate change
- Institute of Strategy and Policy on Natural Resources and Environment
- Vietnam Environment Administration
- Dong Thap Province's People Committee
- Tram Chin National Park management
- Community/village leaders of communes around Tram Chim National Park
- Academia and NGO/CSO[193]

Vietnam Project Management Unit (PMU)

Within DLA, MoNRE a national project management unit will be established. The PMU will be overseen by a National Project Director (NPD). The NPD will be a designated existing staff member of the DLA. The NPD will be responsible for coordinating all project activities in Vietnam

[193] Civil society organisation.

and will be the focal point for all communication between Thailand, Vietnam, UNEP-IEMP and UN Environment AF Coordination Unit. Costs related to the National Project Director will be covered in-kind by the DLA.

A Project Manager (PM) will be hired to lead the PMU. The PM will be responsible for the overall management of the proposed project in Vietnam. The PM will ensure that the project is run transparently and effectively in accordance with AF and UN Environment guidelines and approved work plans and budgets. The PM will receive project support from a national finance and procurement assistant. The key functions of the PM will be:

- facilitating the day-to-day functioning of the project staff;
- managing human and financial resources in consultation with the National Project Director to achieve results in line with the outputs and activities outlined in the full proposal;
- leading the preparation and implementation of annual results-based work plans and logical frameworks as endorsed by the management;
- coordinating project activities with related and parallel activities;
- monitoring project activities, including financial matters, and preparing quarterly progress reports, and organising quarterly progress reviews;
- reporting and providing feedback on project strategies, activities, progress and barriers to the national PSC, UN Environment and UNEP-IEMP; and
- managing relationships with project stakeholders including communities, NGOs, government agencies and others as required.

Because many of the activities of the proposed project involve procurement and sub-contracting, the recruitment of a dedicated finance and procurement assistant will be necessary in order to ensure that the PMU has the required capacity to manage finances as per UN Environment and AF requirements. The finance and procurement assistant will be responsible for ensuring that the projects financial and administrative procedures comply with AF and UN Environment guidelines.

A local community coordinator (to be based at the project intervention site) will be hired to assist the PM. The local community coordinator will be responsible for coordinating and managing the on-the-ground implementation of adaptation interventions in communities surrounding Tram Chim National Park.

Sub-contracting of on-the-ground implementation:
PMU will sub-contract firms or consultants to implement activities at Tram Chim National Park. These will be local organisations (Tram Chim National Park Management Board, or associations from communes).

Table 16: Estimated project management costs for Vietnam.

Execution activity **Role**	**US$**
Project director	In-kind
Project manager (@$1,700 per month)	81,600
Finance and procurement assistant (@$900 per month)	43,200
Local community coordinator (@$1,300 per month)	62,400
National PSC meetings (@$2,000 per meeting)	8,000
Communication costs (@$2,000 per year)	9,000
Office space	In-kind
Office equipment	4,800

Execution activity Role	US$
PMU travel costs (@$3,000 per year)	12,000
TOTAL	**221,000**

B. Financial and project risk management

Describe the measures for financial and project/programme risk management.

Table 17: Financial and project risk management measures for the proposed project, including risk ratings.

Identified risks	Risk rating	Mitigation measures
Institutional risks		
High turnover of staff members in implementing agencies and within different countries may negatively impact project deliverables.	Low–medium	• Proposed project will build partnerships between government and non-government agencies at the national and local levels to ensure continuity.
Disagreement amongst stakeholders with regards to demonstration site selection.	Low	• Intervention sites will be selected using an agreed upon list of criteria to ensure the selection is transparent and equitable. • There will be a participatory approach to the proposed project, particularly with regard to demonstration site selection.
Loss of government support may result in lack of prioritisation of proposed project activities.	Low	• Regular stakeholder consultation and involvement will be undertaken to ensure that both beneficiary governments (GoT and GoV) maintain their commitment and consider the proposed project as a support to their natural resource management, agriculture and rural development programmes. • The roles of DWR-MoNRE (Thailand) and DLA-MoNRE (Vietnam) as national executing entities under the proposed project ensures responsibility for and support of activities.
Institutional capacities and relationships are not sufficient to provide practical solutions to climate problems that are complex and multi-sectoral.	Medium	• Proposed project design includes the development of institutional capacity. This will ultimately lead to the development of an appropriate institutional framework for climate change adaptation planning (including EbA), altering policy and implementing interventions.
Capacity constraints of local institutions may limit the ability to undertake the research and interventions.	Medium	• Human resource capacity will be developed as required. • Collaboration and exchange between local institutions and international research institutes will be initiated. • A chief technical advisor (CTA) will work closely with the AF PM to ensure timely delivery of project outputs.
Conflicts/disagreements between GMS countries on the management of transboundary resources (such as water) prevents cooperation on regional activities.	Medium	• During the design phase, buy-in and support of all beneficiary countries were prioritised. As a result, the project and its design have been endorsed and validated, respectively, by all beneficiary countries. • The involvement of UN Environment as the implementing entity and UNEP-IEMP as the executing entity for regional components will ensure that regional dialogue over and participation in relevant activities is promoted as well as maintained. • Consultations with, as well as input and endorsement from regional bodies (such as the LMC and MRC) regarding the implementation of the proposed project will mitigate the impacts of regional disputes on regional project activities.
Social risks		
Lack of commitment/buy-in from local communities may result in failure of intervention sites.	Low	• A stakeholder engagement plan will be developed during the inception phase.

Identified risks	Risk rating	Mitigation measures
		• Community stakeholders were consulted through a bottom-up approach integrating the community into the proposed project's implementation phases will be followed. • Awareness-raising in and training of beneficiary communities are included in the project's design to promote buy-in and ensure awareness and understanding of activities.
Disagreement among stakeholders with regard to roles in the proposed project.	Low	• Stakeholder roles are detailed clearly in the stakeholder involvement plan. This plan will be presented and confirmed during the Inception Workshop. • The stakeholder involvement plan has been designed to be representative of gender, vulnerable groups and local communities.
Trees planted by the project are cut down by the communities.	Medium	• Community involvement – i.e. 'bottom-up' approach – and awareness-raising will be undertaken to avoid this risk.
Some infrastructure put in place by the project could lead to conflicts associated with different user access.	Medium	• Community management structures such as village water committees established and trained in integrated water resources management and conflict resolutions.
Community access to goods and services supplied by the EbA interventions in Tram Chim National Park is restricted or prevented.	Low	• Consultations between project management, community representatives and management of Tram Chim National Park during the project's inception phase will ensure that agreements are made regarding the access of communities to ecosystem goods and services.
Financial risks		
Priority interventions implemented are not found to be cost-effective.	Low	• Cost-effectiveness is a core principle in the implementation of adaptation measures. Detailed information will be recorded regarding the cost-effectiveness of interventions at all of the demonstration sites (Output 1.3). A cost-effectiveness analysis will then be conducted based on this information. Results from the analysis will be used to inform the adaptative management of interventions and will be disseminated across the GMS for use in the design of future adaptation initiatives. • Adaptation interventions (particularly EbA) will be designed to ensure that they are no-regret and low cost, using locally available materials and knowledge.
Environmental risks		
Current climate and seasonal variability and/or hazard events result in poor results for the adaptation (including EbA) and restoration activities.	Medium	• Current climatic variability will be taken into account in the planning of the adaptation (including EbA) and conservation agriculture activities. • Drought- and flood-resilient plants (including crops) species will be selected for relevant interventions. • Techniques to assist plant growth particularly in the seedling/sapling phases and to reduce the risk of damage from climate change hazard impacts will be used. • Species will be planted in appropriate seasons to reduce the risk of hazard impact. • Diversity in planted crops will reduce this risk. • M&E at demonstration sites will allow for adaptive management, allowing for appropriate decisions to be made in the event of climate-related hazards and seasonal variability. • The design of adaptation (including EbA) intervention protocols will include considerations for the effects of climate-related hazards and seasonal variability. • The involvement of local communities in the design, implementation and management of adaptation interventions at demonstration sites promotes the use of local knowledge. This includes extensive knowledge of current climate-related hazards and seasonal variability.

Identified risks	Risk rating	Mitigation measures
Ecosystem goods and services supplied by EbA interventions in Tram Chim National Park are overexploited by local communities, resulting in environmental degradation.	Medium	• Agreements on the extraction and use of ecosystem goods and services by local communities will be made during the inception phase. Resource user groups and park management will work together to ensure that overexploitation is mitigated. • The extraction of ecosystem goods and services from Tram Chim National Park by local communities will be tracked through the project's M&E framework. • Interventions within the national park will be designed and managed to ensure that they are compliant with Vietnam's protected area management laws. This will also cover the extraction of ecosystem goods and services and will be enforced throughout the project's implementation period.

C. Environmental and social risk management measures

Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

Environmental and social impacts and risks have been identified for the proposed project (see Part II:L). The table below describes risks and impacts management in the proposed project in accordance with the Environmental and Social Principles of the AF.

Table 18: Environmental and social risk management measures with responsible entity for M&E

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
Compliance with the Law	The proposed project is well aligned with and will comply to regional, national and sub-national policies, laws and plans. A full description of this alignment and compliance is presented in Parts II:E and Part II:F of the full proposal. During implementation, the project must ensure that remains up-to-date on any legislative amendments and ensure compliance. In Vietnam, selected activities will be	Negligible	The involvement of multiple stakeholders in the selection of adaptation interventions and design of their detailed implementation protocols during the project's inception phase (Output 1.2), will ensure that the project remains up-to-date any legislative changes and that all relevant laws are considered during this process. All of the activities proposed to take place within Tram Chim National Park are identified in the current park management plan and are therefore aligned with relevant national laws. The PMU in Vietnam will ensure regular communication with Tram Chim National Park	MoNRE Thailand MoNRE Vietnam	The project manager in each country will continuously ensure compliance of all project activities with relevant laws. The finance and procurement assistant in each country will ensure all procurement is compliant with relevant national laws and government procedures.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	implemented within a national park. There is a small risk that the project implements activities that do not comply with national protected area management laws.		management and keep abreast of any amendments to this management plan. This will ensure the project complies with all relevant laws.		
Access and Equity	The beneficiaries of the proposed project are poor people in vulnerable communities (in Thailand and Vietnam) that are sometimes excluded from decision-making processes. Therefore, certain community members may benefit more than others. The implementation of adaptation activities on private land limits access of certain community members to essential services.	Low-Moderate	The project plans to limit or discourage some types of illegal fishing activities and encroachment onto parkland. Are they mostly the marginalized or vulnerable people? While the project intends to control the natural resources that are approved, some potential issues for the restriction of natural resources should be carefully assessed and alternative options should be proactively explored. A transparent and consultative approach will be used to select project beneficiaries. This risk will be further mitigated through the implementation of local knowledge-sharing strategies (Output 1.4) in communities surrounding the demonstration sites. As a result, the autonomous upscaling and replication of project interventions beyond these sites will be facilitated, enhancing the climate-resilience of non-beneficiary communities. Furthermore, both beneficiary and non-beneficiary communities will be sensitised towards the	MoNRE Thailand MoNRE Vietnam	Each PMU, together with local authorities, will ensure that transparent and consultative selection criteria are developed for the selection of project beneficiaries during the inception phase of the project. Each PMU will ensure that, during the development of the detailed implementation protocols, all infrastructural intervention sites are situated on public land. Local implementing partners will ensure that individual landowners provide written consent for interventions to take place on their land. Each PMU will respond promptly and appropriately to a complaint registered through the grievance mechanism.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
			approach of prioritising the support from the proposed project to most vulnerable communities while ensuring benefits reach further communities through one or more of the proposed project activities. All infrastructural development (such as small-scale water infrastructure development) will take place on public lands. Household-level interventions (such as climate-resilient agriculture) will only be implemented with the written consent of the landowner. Furthermore, the project will involve local authorities in the project design and implementation of adaptation interventions at demonstration sites (as well as other aspects of project design) to prevent a reduction of community access to essential services. In addition, the introduction of climate-resilient livelihood options (Outputs 1.1 and 1.2) under the proposed project will provide local communities with alternative sources of food and income.		
Marginalized and Vulnerable Groups	There is a risk that vulnerable and marginalised groups will be excluded during the implementation project activities (particularly adaptation interventions –	Low-Moderate	See above on access and equity issue. The proposed project has been designed to ensure that marginalised and vulnerable groups – especially women, indigenous people, youth, and people living with disabilities – will	UNEP-IEMP MoNRE Thailand MoNRE Vietnam	Each PMU, together with local authorities, will ensure that transparent and consultative selection criteria are developed for the selection of project beneficiaries during the inception phase of the project. The inclusion of marginalised and

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	Component 1) and have insufficient access to the associated benefits.		not be adversely affected by, but instead benefit from, relevant climate change adaptation activities. The inclusion of marginalised and vulnerable groups will be one of the criteria for selecting project beneficiaries for agricultural and livelihood activities. Comprehensive stakeholder mapping will take place through Outputs 1.1 and 1.2 as adaptation demonstration sites are identified. This will allow for the identification of marginalised and vulnerable groups. In addition, to avoid the exclusion of these communities and groups, they were involved in extensive consultations carried out during the preparation of the full project proposal. This ensures equal participation and that social impacts do not unjustly impact on marginalised and vulnerable groups. To avoid social exclusion of marginalised communities, orientation/sensitisation will be conducted at the village level to ensure equal participation and that social impacts do not unjustly impact on marginalized and vulnerable groups. An ESMP will be developed and followed throughout project implementation to ensure vulnerable and		vulnerable groups will be one of the criteria for selecting project beneficiaries for agricultural and livelihood activities. Each PMU/PIU will conduct a comprehensive stakeholder mapping exercise during the inception phase of the project. Each PMU will conduct field visits to the project intervention sites during the project inception phase to sensitise communities to the project, identify all relevant stakeholder and develop transparent criteria for selecting beneficiaries. The project managers, UNEP-IEMP and UN Environment will ensure that a ESA and subsequent ESMP are undertaken at each project intervention site during the inception phase of the project.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
			marginalised groups have adequate access to and benefit from project interventions.		
Human Rights	No activities are or will be included in the design of the proposed project that are not in line with established international human rights. Moreover, the proposed project will promote the fundamental human rights of access to food, water and	Negligible	There is a Human Rights Commission in each partner country with representatives up to district level that will ensure that human rights are adhered to and promoted. The project seeks to ensure that benefits of the project are shared broadly in a nondiscriminatory, equitable manner through participatory processes and transparent selection criteria. Extensive stakeholder consultations were held during project preparation (see Supplementary report I & II.) and will be continued throughout project implementation. Potential project-related concerns and/or grievances of local communities will be addressed through a Grievance Mechanism consistent with the UN Environment's Stakeholder Response Mechanism (see Annex IX).	UN Environment UNEP-IEMP MoNRE Thailand MoNRE Vietnam	Each PMU will respond promptly and appropriately to a complaint registered through the grievance mechanism.
Gender Equity and Women's Empowerment	The proposed project is targeting communities where men occupy the majority of the leadership positions. There is, therefore, a risk that women will not benefit equitably from the proposed project's climate change	Minor	Gender equity and women's empowerment were considered across all relevant design aspects of the proposed project and will be adhered to throughout the implementation period. To this end, a gender analysis was conducted during the development of the proposal, under the guidance of gender experts and NGOs, to ensure that gender	UNEP-IEMP MoNRE Thailand MoNRE Vietnam	Each PMU will ensure that a Gender Action Plan is developed during the inception phase of the project. Each PMU/PIU, local government authorities and bodies at the proposed project intervention sites will ensure gender issues are considered and addressed during project

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	adaptation (including EbA) and capacity-building interventions.		considerations were fully considered during project design (see Annex XI). In particular, equal rights, responsibilities, opportunities and access of women to the benefits of climate change adaptation have been considered. For example, where applicable, project activities have been designed to include gender disaggregation (at least 50%), especially on-the-ground activities, such as those of Outputs 1.1 and 1.2. For technical assessments as well as capacity building activities, women will be strongly encouraged to participate. A Gender Action Plan will be developed to ensure that gender-focused activities will include raising awareness in the region to *inter alia*: i) acknowledge women for their contribution as an income-generating individual in the household; and ii) highlight their role in climate change adaptation. This will enhance the value of women within their communities, as well as promote their equitable participation of women in the planning, implementation, monitoring and evaluation of the project. Furthermore, the fair and equitable selection (with a least 50% female representation) of beneficiaries will be conducted for capacity building and training		implementation. A list of all the participants will be maintained, and gender ratio will be monitored by the National Project Management Units on a quarterly basis, ensuring that the progress of all gender-related targets in the project results framework are tracked and met.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
			sessions. Gender discrimination will be commensurate with the identified gaps in gender equality and will not go beyond providing equal opportunities for women.		
Core Labour Rights	Local communities will be involved in the implementation and maintenance of climate change adaptation (including EbA) interventions. There may be exposed to the risk of accidents while implementing the proposed project's interventions.	Minor	During implementation, the national PMUs will ensure respect for international and national labour laws and codes, for any work that may be carried out in relation to the project. This includes the eight International Labour Organization Convention (ILO) core labour standards related to fundamental principles and rights of workers, as well as ILO Convention No. 169 which concerns rights of indigenous and tribal peoples. Positive discrimination in favour of women may be used to provide fair and equal opportunity to women to seek employment as labourers. All forms of negative discrimination in respect of employment and occupation will be eliminated. The proposed project will not engage in child labour in any of its activities. All forms of forced or compulsory labour will be eliminated. An ESMP will be developed and followed throughout project implementation to ensure core labour rights are adhered to.	MoNRE Thailand MoNRE Vietnam	Each PMU will ensure respect for international and national labour laws and codes, for any work that may be carried out in relation to the project. The project managers, UNEP-IEMP and UN Environment will ensure that a ESA and subsequent ESMP are undertaken at each project intervention site during the inception phase of the project. Each PMU will respond promptly and appropriately to a complaint registered through the grievance mechanism.
Indigenous people	No indigenous peoples were identified at the	Negligible	Comprehensive stakeholder mapping will be conducted	MoNRE Thailand MoNRE	Each PMU/PIU will conduct a comprehensive

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	project intervention sites during the project development phase. However, if indigenous peoples are identified during the ESA and ESMP development processes, there is the risk for inequitable access of indigenous peoples to the project's resources and benefits.		during the inception phase of the project. This will confirm whether or not there are indigenous peoples living at the project intervention sites. If indigenous peoples are identified during the stakeholder mapping, ESA and ESMP development processes, an Indigenous Peoples Plan will be prepared at each project site. Part of the Indigenous Peoples Plan will be a Free, Prior and Informed Consent (FPIC) process, which will allow identified communities to give or withhold consent to project activities that may affect them or their territories. The inclusion of indigenous people is seen as essential and beneficial since they possess traditional knowledge related to EbA that will contribute to the inclusive selection and implementation of EbA interventions. Therefore, if present at project intervention sites, they will be included in the local-level assessments, demonstration of EbA interventions, capacity-building, knowledge management and training activities implemented under the proposed project. This will ensure that the UN Declaration on the Rights of Indigenous Peoples, including matters of free, prior and informed consent, will be upheld.	Vietnam	stakeholder mapping exercise during the inception phase of the project. If indigenous peoples are identified during the stakeholder mapping, each PMU will ensure that an Indigenous Peoples Plan is prepared at each project site. Part of the Indigenous Peoples Plan will be a Free, Prior and Informed Consent (FPIC) process, which will allow identified communities to give or withhold consent to project activities that may affect them or their territories. If indigenous peoples are identified during the stakeholder mapping, each PMU will ensure that they are included in the implementation of the projects climate change adaptation interventions.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
Involuntary Resettlement	The proposed project does not include voluntary or involuntary resettlement.	Negligible	The project will work with communities in their locations and will not in any way promote resettlement of communities to new locations.	MoNRE Thailand MoNRE Vietnam	The PMUs/PIU will monitor and ensure that the project does not lead to any involutory resettlement.
Protection of Natural Habitats	On-the-ground adaptation interventions (specifically EbA) will include the planting of species for enrichment and/or restoration of ecosystems. Adaptation interventions involving hard infrastructure will also be constructed (for example, the lengthening of canals and construction of water reservoirs). Such interventions may result in the disturbance of small areas of natural habitat. While no hard infrastructure will be constructed within Tram Chim National Park (interventions within the park will be restricted to restoration with indigenous species), adaptation interventions implemented in surrounding communities may disturb the natural habitats and/or hydrology of the park.	Low-moderate	The project will be in the areas where alien invasive species are widely spread and carry out agroforestry, tree planting and water management activities, there are possible indirect and unintended impact An ESMP will be developed and followed throughout project intervention to ensure that adaptation interventions have minimal impact on natural habitats. All activities will adhere to the EIA regulations of the relevant country. Ecological restoration interventions planned for Tram Chim National Park (Activity 1.2.4) may require the conduction of an EIA, in accordance with Decree 18/2015/ND-CP, Appendix 2 of Circular 27/2015/TT-BTBMT, as they will be implemented on national park land. The necessity of an EIA will be discussed during consultations with relevant stakeholders during the project's inception phase. If necessary, plans for an EIA will be incorporated into adaptation intervention protocols that will be designed under Activity 1.2.1. Detailed implementation protocols will be	MoNRE Thailand MoNRE Vietnam	The project managers, UNEP-IEMP and UN Environment will ensure that a ESA and subsequent ESMP are undertaken at each project intervention site during the inception phase of the project. Each PMU will ensure that detailed implementation protocols, that take into account the protection of natural habitats, are developed for all project interventions during the inception phase of the project. The PMUs and national project steering committees will ensure that all relevant EIA regulations are adhered to. PMU in Vietnam will ensure regular communication with Tram Chim National Park management and keep abreast of any amendments to this management plan. Each PMU will conduct field visits to the project intervention sites at least twice a year to ensure that adaptation interventions are being implemented

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
			developed for all adaptation interventions (including hard infrastructure) during the inception phase of the project to ensure that they will not result in significant adverse impacts on natural habitat. Interventions to improve water infrastructure and water management (Activity 1.2.5) will be small-scale and restricted to canals/channels that do not affect the hydrology of Tram Chim National Park. All of the activities proposed to take place within Tram Chim National Park are identified in the current park management plan and are therefore designed to improve natural habitat within the reserve. The PMU in Vietnam will ensure regular communication with Tram Chim National Park management and keep abreast of any amendments to this management plan.		according to the detailed implementation protocols and are in line with the ESMP.
Conservation of Biological Diversity	By implementing climate-resilient agriculture techniques and particularly EbA activities, the proposed project promotes the improved management of natural habitats. The proposed project is therefore likely to result in the improved protection of natural habitats and biodiversity.	Low-moderate	An ESMP will be developed and followed throughout project intervention to ensure that adaptation interventions have minimal impact on biodiversity. All activities will adhere to the EIA regulations of the relevant country. Ecological restoration interventions planned for Tram Chim National Park (Activity 1.2.4) may require an EIA, in accordance with Decree 18/2015/ND-	MoNRE Thailand MoNRE Vietnam	The project managers, UNEP-IEMP and UN Environment will ensure that a ESA and subsequent ESMP are undertaken at each project intervention site during the inception phase of the project. Each PMU will ensure that detailed implementation protocols, that take into account the protection of

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	There is a low risk that adaptation interventions involving the construction of hard infrastructure (such as the extending of canals) could negatively impact biodiversity.		CP, Appendix 2 of Circular 27/2015/TT-BTBMT, as they will be implemented on national park land. The necessity of an EIA will be discussed during consultations with relevant stakeholders during the project's inception phase. If necessary, plans for an EIA will be incorporated into adaptation intervention protocols that will be designed under Activity 1.2.1. Detailed implementation protocols will be developed for all adaptation interventions (including hard infrastructure) during the inception phase of the project to ensure that they will not result in significant adverse impacts on biodiversity. The protocols will stipulate that no known invasive species are used in any of the projects restoration interventions. Interventions to improve water infrastructure and water management (Activity 1.2.5) will be small-scale and designed in such as way that they do not restrict fish movement. If required, fish ladders will be added to the design of small-scale living dams. All of the activities proposed to take place within Tram Chim National Park are identified in the current park management plan and are therefore designed to improve		biodiversity, are developed for all project interventions during the inception phase of the project. The PMUs and national project steering committees will ensure that all relevant EIA regulations are adhered to. PMU in Vietnam will ensure regular communication with Tram Chim National Park management and keep abreast of any amendments to this management plan. Each PMU will conduct field visits to the project intervention sites at least twice a year to ensure that adaptation interventions are being implemented according to the detailed implementation protocols and are in line with the ESMP.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
			natural habitat within the reserve. The PMU in Vietnam will ensure regular communication with Tram Chim National Park management and keep abreast of any amendments to this management plan.		
Climate Change	The proposed project's climate change interventions focus climate-resilient agriculture, EbA, small-scale water infrastructure and livelihood development activities. None of these interventions are likely to result in an increase in greenhouse gas emissions.	Negligible	Detailed implementation protocols will be developed for all adaptation interventions (including hard infrastructure) during the inception phase of the project to ensure that they will not result in significant release of greenhouse gasses.	MoNRE Thailand MoNRE Vietnam	Each PMU will ensure that detailed implementation protocols are developed for all project interventions during the inception phase of the project.
Pollution Prevention and Resource Efficiency	Project activities are not expected to result in the generation of any considerable amounts of pollution, particularly hazardous or toxic waste.	Low-moderate	Detailed implementation protocols will ensure that all applicable international standards are met for maximising resource efficiency and minimising waste production and the release of pollutants, including carbon emissions. In terms of resource efficiency, implementation of the proposed project will not require (during or after implementation) exorbitant amounts of water, energy, materials or other natural resources. All applicable international standards will be met for maximising efficient resource use and minimising the production of waste and the release of pollutants.	MoNRE Thailand MoNRE Vietnam	Each PMU will ensure that detailed implementation protocols are developed for all project interventions during the inception phase of the project.

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
Public Health	Project activities will have no foreseeable adverse effects on public health. EbA interventions under Component 1 will likely improve public health through the strengthened provision of ecosystem goods and services, such as food, clean water and medicinal plants.	Negligible	An ESMP will be developed and followed throughout project intervention to ensure that adaptation interventions have no impact on public health.	UNEP-IEMP MoNRE Thailand MoNRE Vietnam	The project managers, UNEP-IEMP and UN Environment will ensure that a ESA and subsequent ESMP are undertaken at each project intervention site during the inception phase of the project.
Physical and Cultural Heritage	The project plans construction of check dams, rehabilitate weirs, extend the water canal and restore the bank. There is a low risk that the adaptation interventions involving the construction of hard infrastructure (such as canals and water storage reservoirs) could result in negative impacts on physical and cultural heritage.	Low-moderate	The participatory approach to project design included the use of local knowledge to ensure that physical and cultural heritage will not be negatively affected by on-the-ground adaptation activities. In addition, the location of physical and cultural heritage sites will be considered during the development of detailed implementation protocols during inception to reduce the likelihood of negative impacts related to project interventions. The project will bring in experts and technically sound approach for construction and maintenance. All national safety requirements will be complied to.	MoNRE Thailand MoNRE Vietnam	Each PMU will ensure that detailed implementation protocols, taking into account the location of physical and cultural heritage, are developed for all project interventions during the inception phase of the project.
Lands and Soil Conservation	None of the proposed projects activities have been identified	Negligible	Agroforestry and organic farming techniques will be promoted during the implementation of	MoNRE Thailand MoNRE Vietnam	Each PMU will ensure that agroforestry and organic farming techniques are promoted through the

Checklist of environmental and social principles	Description of potential impacts and risks	Risk Rating	Mitigation Measures	Responsible entity	Monitoring and Evaluation
	as causing soil degradation or loss of productive lands. Project activities will promote land and soil conservation across the demonstration sites through EbA interventions such as agroforestry and riverbank restoration. Agroforestry, for example, will reduce erosion, limiting the loss of nutrients from topsoil and enhance soil fertility.		climate-resilient agricultural techniques (Activity 1.1.3 and 1.2.3). Targeted communities will be trained on climate-resilient agriculture and soil conservation techniques (Activity 1.1.2 and 1.2.2).		project. Each PMU will ensure that climate-resilient agriculture and soil conservation techniques are included in the training provided through the project.

D. Monitoring and evaluation

Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The proposed project will comply with formal guidelines, protocols and toolkits issued by the AF and UN Environment. UN Environment will develop a **Supervision Plan** during the project's inception phase which will be distributed and presented to all stakeholders during the Inception Workshop. The emphasis of the Supervision Plan will be on outcome monitoring, learning and sustainability and financial management. Proposed project risks and assumptions will be regularly monitored by UN Environment. Risk assessment and rating is an integral part of the Project Progress Review (PPR). The quality of the project's M&E will also be reviewed and rated as part of the PPR. Appropriate financial parameters will be monitored annually to ensure the cost-effective use of financial resources.

The proposed project will undergo an independent **Mid-Term Review** at the mid-point of project implementation. The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify corrective actions if needed. It will: i) focus on the effectiveness, efficiency and timeliness of project implementation; ii) highlight issues requiring decisions and actions; and iii) document initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for improved implementation during the final half of the project's term.

An independent **Terminal Evaluation** will take place three months prior to the proposed project's end date in accordance with UN Environment guidance. The Final Evaluation will focus on the delivery of the project's results as initially planned – and as corrected after the Mid-Term Evaluation, if any such correction took place. The Final Evaluation will assess the impact and sustainability of results, including their contribution to capacity development and the achievement of adaptation benefits.

An **Annual Project Progress Review** (PPR) will be prepared to monitor progress made since the project's start and in particular for the previous reporting period. The PPR includes, but is not limited to, reporting on the following:

- progress on the project's objective and outcomes – each with indicators, baseline data and end-of-project targets (cumulative);
- project outputs delivered per project outcome (annual);
- lessons learned/good practice;
- annual Work Plan and expenditure reports; and
- project risk and adaptive management.

Periodic monitoring will be conducted through visits to the intervention sites undertaken by relevant staff from UN Environment. Visits will be jointly conducted based on the agreed schedule to assess project progress first hand. A summary of the M&E costs is provided in Table 19.

Table 19: Monitoring and evaluation costs of the proposed project. *Note: The costs indicated here do not*

include the costs associated with UN Environment staff. Such costs will be covered by the MIE fee.

Type of M&E activity	Responsible parties	Budget US$ (excluding project team time)	Timeframe
Direct Project Monitoring and Quality Assurance including progress and financial reporting, project revisions, technical assistance and risk management	• Project Managers • Finance and procurement assistants • UNEP-IEMP • External consultants – CTA	(supported from staff costs included in Project execution, and from MIE fee)	Quarterly, half-yearly and annually and as needed
Evaluations (Mid-term review and Independent terminal evaluations)	• Project Managers • UNEP-IEMP • UN Environment • External consultants	Mid-term: 36,290 (covered by the MIE fee) Terminal: 50,000	At midpoint and end of project implementation
Audit	• Project Managers • UNEP-IEMP	Supported from MIE fee	Annually at year end
Inception meeting, field visits and steering committee meetings	• Project Managers • UNEP-IEMP	Regional: 30,000 (7,500 annually) Thailand: 8,000 (2,000 annually) Vietnam: 8,000 (2,000 annually)	Inception meeting within the first two months and annual PSC meetings
TOTAL indicative cost			**US$ 96,000**

E. Results framework

Include a results framework for the project/programme proposal, including milestones, targets and indicators.

Please see Annex V for the project's Results Framework.

F. Project alignment with AF results framework

Demonstrate how the project/programme aligns with the Results Framework of the Adaptation Fund.

Table 20: Proposed project alignment with the AF Results Framework.

Project Objective(s)[194]	**Project Objective Indicator(s**	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)**
To strengthen the capacity of governments and communities in the GMS to adapt to climate change using EbA.	Change in the capacity score assessment framework for each targeted institution.	**Outcome 5.** Increased ecosystem resilience in response to climate change and variability-induced stress.	**5.** Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress.	7,000,000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Outcome 1. Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.	**1.1.** Natural and physical assets necessary for adaptation to climate change (droughts and floods) protected or rehabilitated. **1.2.** Number of people practising climate change adaptation interventions (including EbA).	**Output 5.** Vulnerable, physical, natural, and social assets strengthened in response to climate change impacts, including variability.	**5.1.** Number and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets).	4,800,000
Outcome 2. Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.	**2.1** Number of projects utilising the guidelines for the design and implementation of EbA monitoring and evaluation systems generated.	**Output 3.** Targeted population groups participating in adaptation and risk reduction awareness activities.	**3.1.2.** Number of news outlets in the local press and media that have covered the topic.	638,709
Outcome 3. Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.	**3.1.** Number of regional adaptation strategies/plans that incorporate the climate change interventions demonstrated through the project (EbA, climate-resilient agriculture and additional climate-resilient	**Output 7.** Improved integration of climate-resilience strategies into country development plans.	**7.1.** Number, type and sector of policies introduced or adjusted to address climate change risks	400,000

[194] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology, but the overall principle should still apply.

	livelihoods).			

Table 21: Adaptation Fund Core Indicators

	Baseline	Target at project approval	Adjusted target first year of Implementation	Actual at completion
Direct beneficiaries supported by the project	0	1,000		
Female direct beneficiaries	0	500		
Indirect beneficiaries supported by the project	0	60,000		
Female indirect beneficiaries	0	30,000		
Natural Asset or Ecosystem: Forest, wetland, riparian habitat, grassland and agricultural land				
Ha or km Protected/rehabilitated,	0	930 ha		
Effectiveness of protection/rehabilitation - Scale (1-5)	1	4		

G. Budget

Please see Annex VI for the project budget, detailed budget notes and a breakdown of the implementing entity fee.

H. Disbursement schedule

Table 22: Disbursement schedule including milestones.

	Upon Agreement signature (US$)	**After Year 1 (US$)**	**After Year 2 (US$)**	**After Year 3 (US$)**	**TOTAL**
Scheduled date (tentative)	March 2019	March 2020	March 2021	March 2022	
Project funds	622,000	2,183,000	1,912,500	1,121,209	**5,838,709**
Project execution costs	147,300	137,700	137,700	190,203	**612,903**
Implementing Entity fee	65,390	197,260	174,268	111,470	**548,388**
TOTAL	**834,690**	**2,517,960**	**2,224,468**	**1,422,882**	**7,000,000**

PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[195]

See Annex VIII for all endorsement letters.

Table 23: List of endorsements provided for the proposed project.

Thailand: Mr. Wijarn Simachaya , Permanent Secretary , Ministry of Natural Resources and Environment	Date: 28 August 2018
Vietnam: Dr. Tran Hong Ha, Minister of Natural Resources and Environment Socialist Republic of Viet Nam	Date: 26 July 2018

B. Implementing Entity certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address.

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 **Monika G MacDevette (PhD)** Deputy Director and Director a.i., Ecosytems Division UN Environment Programme Nairobi, KENYA	
Date: 5 August 2019	Office Tel.: +: 254 20 762 4595; Office mobile: +254-719-867902 Email: monika.macdevette@un.org
Project Contact Person: Moon Shrestha	
Tel: +:254 20762 3717 Email: Moon.Shrestha@un.org	

[6.] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Annexes

Annex I	List of abbreviations and acronyms
Annex II	Relative costs and benefits of the proposed adaptation interventions versus alternative interventions
Annex III	Consistency with regional/national strategies
Annex IV	Coordination with other initiatives
Annex V	Results Framework
Annex VI	Budget
Annex VII	Terms of References (ToRs) for key project members
Annex VIII	List of endorsements and endorsement letters
Annex IX	Grievance mechanism
Annex X	UN Environment Environmental, Social and Economic Review Note (ESERN)
Annex XI	Synthesis report of Gender assessment
Annex XII	Regional consultation
Annex XIII.	Social and Environmental Action plan (SEAP) and Indicative ToR to prepare ESA, GAP and ESMP
Annex XIV.	Stakeholders and their role and responsibilities
Annex XV.	Letter of clarification regarding role of IEMP

Annex I. List of abbreviations acronyms

AAD	Average Annual Damage
ADB	Asian Development Bank
AF	Adaptation Fund
ALivE	Adaptation, Livelihoods and Ecosystems planning tool
APAN	Asia-Pacific Adaptation Network
ARCC	Adaptation and Resilience to Climate Change
BUR	Biennial Updated Report
CAEC	China ASEAN Environmental Cooperation Centre
CAS	Chinese Academy of Sciences
CEP	Core Environment Programme
CERN	Chinese Ecosystem Research Unit
CSO	Civil society organisation
CTA	Chief Technical Advisor
DLA	Department of Legal Affairs
DWR	Department of Water Resources
EbA	Ecosystem-based adaptation
EHIA	Environmental and Health Impact Assessment
EIA	Environmental Impact Assessment
ESERN	Environmental, Social and Economic Review Note
ESP	Environmental and Social Policy
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMS	Greater Mekong Sub-region
GoT	Government of Thailand
GoV	Government of Vietnam
IGSNRR	Institute of Geographic Sciences and Natural Resources Research
ILO	International Labour Organisation
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
IT	Information Technology
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
Lao PDR	Lao People's Democratic Republic
LDCF	Least Developed Country Fund
LMB	Lower Mekong River Basin
LMC	Lancang-Mekong Cooperation
LMEC	Lancang-Mekong Environmental Cooperation Centre
M&E	Monitoring and Evaluation
MASAP	Mekong Adaptation Strategy and Action Plan
MASL	Metres above sea-level
MEP	Ministry of Environmental Protection
MIE	Multilateral Implementing Entity
MoNRE	Ministry of Natural Resources and Environment
MRB	Mekong River Basin
MRC	Mekong River Commission
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NGO	Non-governmental organisation

NIE	National Implementing Entity
NPD	National Project Director
NSFC	Natural Science Foundation of China
NSEDP	National Socioeconomic Development Plan
NTFP	Non-timber forest product
NTP-RCC	National Target Programme to Respond to Climate Change
PM	Project Manager
PMU	Project Management Unit
PPR	Project Progress Review
PSC	Project Steering Committee
RAAMEGC	Responses and Adaptation of Asian Mountain Ecosystems to Global Change
RBC	Young River Basin Committee
RCPs	Representative Concentration Pathways
RPSC	Regional Project Steering Committee
SDG	Sustainable Development Goal
SLR	Sea-level rise
SNC	Second National Communication
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment
UNEP-IEMP	UN Environment-International Ecosystem Management Partnership
UNESCO	UN Educational, Scientific and Cultural Organisation
UNFCCC	UN Framework Convention on Climate Change
VRM	Vulnerability Reduction Measure
WWF	World Wildlife Fund

Annex II. Relative costs and benefits of the proposed adaptation interventions versus alternative interventions

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
Living check dams	Concrete weirs	Droughts and floods	*Benefits* • Relatively cheap to build (~US$1,500) • Socially accepted • Can be built/rebuilt and maintained by community members • Built in less than two weeks • Built using locally available materials • Increased groundwater recharge o An increase in groundwater levels of 1.5 m was observed after construction of a check dam in Chennai, India in 2011[196]. o In Gujarat, India, construction of check dams resulted in rise in the surrounding water table by 2.57 m in 2002 and 2.10 m in 2003[197]. • Flash flood attenuation o In Eastern Region of Thailand, check dams of 3 x 1.2 m yielded ~5000 m^3 in water preservation	*Benefits* Lifespan of several decades of water storage o A weir planned for the Nam Haad Irrigation Rehabilitation Subproject in Laos was projected to have 12,000 m^3 of storage capacity[199] *Disadvantages* • Relatively expensive to build (~US$61,100) • Low social acceptance • Requires the expertise of engineers for construction o The survey, design and bidding costs for the Nam Haad Irrigation Rehabilitation Subproject — a project with a total investment cost of US$775,500 — required a total of US$76,300[200] • Water levels will be threatened by evapoation • The average evaporation rate over 10 years for Pha Oudom District, Bokeo Province, Laos is ~1,600 mm[201]

[196] Renganayaki, S.P. and Elango, L., 2013. A review on managed aquifer recharge by check dams: a case study near Chennai, India. *Int J Res Eng Technol*, *2*(4).
[197] Renganayaki, S.P. and Elango, L., 2013. A review on managed aquifer recharge by check dams: a case study near Chennai, India. *Int J Res Eng Technol*, *2*(4).
[199] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf
[200] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf
[201] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			benefits, over an area of ~ 150 ha[198] *Disadvantages* • Lifespan of ~10 years	
River/canal bank restoration through tree planting/restoration of riparian vegetation	River/canal bank restoration through hard infrastructure	Droughts and floods	*Bene*fits • Flood attenuation • Flood control by forests in southern Laos provided a benefit of US$115/ha/y[202] • Riparian reforestation in Fiji was estimated to reduce flood damage by 10–40%[203] • • Relatively cheap to implement (~US$664/ha)[204] • Can be implemented by local community • Implemented using locally available materials • Provision of NTFPs to local communities • The direct value of NTFPs in Laos was estimated to be US$658/hh/y[205] and in Fiji as US$10–48/ha/y[206]	*Benefits* • Flood attenuation • Reinforcing riverbanks in Fiji was estimated to reduce flood damage by 30–80%[207] • • Lifespan of several decades *Disadvantages* • Relatively expensive to build (~US$365/m)[208] • Low social acceptance • Requires the expertise of engineers for construction

[198] International Journal of Environmental Science and Development, Vol. 2, No. 5, October 2011
[202] Rosales R, Kellesoe M, Gerrard P, Muangchanh P, Phomtavong S & Khamsomphou S. 2005. Balancing the Returns to Catchment Management: The Economic Value of Conserving Natural Forests in Sekong, Lao PDR. IUCN Water, Nature and Economics Technical Paper No. 5, IUCN — The World Conservation Union, Ecosystems and Livelihoods Group Asia.
[203] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.
[204] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.
[205] Rosales R, Kellesoe M, Gerrard P, Muangchanh P, Phomtavong S & Khamsomphou S. 2005. Balancing the Returns to Catchment Management: The Economic Value of Conserving Natural Forests in Sekong, Lao PDR. IUCN Water, Nature and Economics Technical Paper No. 5, IUCN — The World Conservation Union, Ecosystems and Livelihoods Group Asia.
[206] Brown P, Daigneault A, Gawith D, Aalbersberg W, Comley J, Fong P & Morgan F. 2014 Evaluating Ecosystem-Based Adaptation for Disaster Risk Reduction in Fiji. Land-care Research, New Zealand.
[207] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.
[208] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			• • Socially accepted • Ecosystems rehabilitated and maintained • Increased biodiversity • Requires limited maintenance once established • Easily upscaled *Disadvantages* • Takes time for trees and vegetation to grow and establish	
Forest restoration	Construction of canals, channels and storage ponds to diver flood waters	Floods	*Benefits* • Flood attenuation • Flood control by forests in southern Laos provided a benefit of US$115/ha/y[209] • Relatively cheap to implement (~US$596/ha)[210] • • Can be implemented by local community • Implemented using locally available materials • Provision of NTFPs to local communities • The direct value of NTFPs in Laos was estimated to be US$658/household/y[211]	*Benefits* • Flood attenuation • Lifespan of several decades • Results in tangible benefits in the short-term • Water storage for drought periods *Disadvantages* • Relatively expensive to build (~US$1,747–2,096/m)[213] • Low social acceptance • Possible loss of private land for construction and resettlement, resulting in negative social consequences • May be ineffectual in the long-term if extent of flooding increases with climate change

ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.

[209] Rosales R, Kellesoe M, Gerrard P, Muangchanh P, Phomtavong S & Khamsomphou S. 2005. Balancing the Returns to Catchment Management: The Economic Value of Conserving Natural Forests in Sekong, Lao PDR. IUCN Water, Nature and Economics Technical Paper No. 5, IUCN — The World Conservation Union, Ecosystems and Livelihoods Group Asia.

[210] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.

[211] Rosales R, Kellesoe M, Gerrard P, Muangchanh P, Phomtavong S & Khamsomphou S. 2005. Balancing the Returns to Catchment Management: The Economic Value of Conserving Natural Forests in Sekong, Lao PDR. IUCN Water, Nature and Economics Technical Paper No. 5, IUCN — The World Conservation Union, Ecosystems and Livelihoods Group Asia.

[213] Vietz GJ, Rutherfurd ID, Walsh CJ, Chee YE & Hatt BE. 2014. The unaccounted costs of conventional urban development: protecting stream systems in an age of urban sprawl.7th Australian Stream Management

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			• In Fiji the value of NTFPs was estimated to be US$10–48/ha/y[212] • Socially accepted • Increased biodiversity • Requires limited maintenance once established • Long-term solution • Easily upscaled • Water infiltration to augment groundwater reserves (strengthens resilience to drought) *Disadvantages* • Takes time for trees and vegetation to grow and establish	
Rehabilitation of weirs to strengthen water supply during drought periods	Building dams/ponds to strengthen water supply during drought periods	Droughts	*Bene*fits • Rehabilitation of previously existing infrastructure which will limit costs • Socially accepted as infrastructure is already present • Co-benefit of flood attenuation • Replacement of a wooden weir with concrete in the Naam Haad Irrigation Rehabilitation Subproject in Laos facilitated development of an additional 60 ha of rice paddy to the existing 90 ha[214]	*Bene*fits • Can be multipurpose (e.g. fish farming) • Can potentially be designed to hold more water than pre-existing weirs *Disadvantages* • Requires the expertise of engineers • Relatively expensive as there is no pre-existing infrastructure to build on • Rehabilitation of the Nam Haad Irrigation system in Laos cost as much as US$4,240/ha[215]

Conference.

[212] Brown P, Daigneault A, Gawith D, Aalbersberg W, Comley J, Fong P & Morgan F. 2014 Evaluating Ecosystem-Based Adaptation for Disaster Risk Reduction in Fiji. Land¬care Research, New Zealand.

[214] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf

[215] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			Disadvantages • Rehabilitation requires the expertise of engineers	• May not be socially accepted • Increasing ecosystem degradation • Possible loss of private land for construction and resettlement, resulting in negative social consequences o The Nam Haad project in Laos involved the construction of an access road to the weir site, with an estimated 15, 000 m^2 in land lost[216]. o Land acquisition and resettlement can also incur significant costs. •
Water canal extension/construction to strengthen water supply during drought periods	Construction of wells and boreholes to strengthen water supply during drought periods	Droughts	*Bene*fits • Socially accepted as similar infrastructure is already present • Co-benefit of flood attenuation *Disadvantages* • Water levels will be threatened by evaporation • In the Sri Prachan district, Thailand, evaporative water loss from surface canals was estimated to be ~12%[217]	*Bene*fits • Year-round access to water *Disadvantages* • Inconsistent supply of groundwater as a result of fluctuation aquifer levels • Over-extraction of groundwater supplies • Fuel required for pumps to extract water (increased cost of extraction) • Total groundwater pumping costs in Thailand and Viet Nam are estimated to be US$0.02–0.05/$m^3$ [218]

[216] Feasibility Study for Nam Haad Irrigation Rehabilitation: Lao PDR: Northern Rural Infrastructure Development Sector Project. Available at https://www.adb.org/sites/default/files/linked-documents/42203-02-lao-oth-01.pdf

[217] Porntepkasemsan B, Kulsawat W & Nochit P. 2019. Estimation of evaporative loss of surface water using stable isotopes in a lowland rice field, Suphanburi, Thailand. *Applied Mechanics & Materials*. 886: 8–13.

[218] Alam MF. 2016. Evaluating the benefit-cost ratio of groundwater abstraction for additional irrigation water on global scale. Degree Project in Environmental Engineering, Stockholm, Sweden.

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			• Water may not be available year-round	
Innovative household water harvesting techniques	Construction of wells and boreholes to strengthen water supply during drought periods	Droughts	*Bene*fits • Increased availability of water at households • Relatively cheap to install and maintain • In Thailand, a 2,000-litre water collection jar costs US$20–25 to build and install[219] • In Viet Nam, a 2,000-litre plastic foldable tank costs US$225 to install, while a 2,000-litre stainless steel tank costs US$380[220] • • Most household water harvesting techniques can be implemented and maintained by local people *Disadvantages* • Water harvesting techniques may not be socially acceptable • Communities may not have experience in using the innovative techniques which may restrict the uptake thereof	*Bene*fits • Year-round access to water *Disadvantages* • Inconsistent supply of groundwater as a result of fluctuation aquifer levels • Over-extraction of groundwater supplies • Fuel required for pumps to extract water (increased cost of extraction) • Total groundwater pumping costs in Thailand and Viet Nam are estimated to be US$0.02–0.05/$m^3$ [221]
Construction of farm ponds to store water during drought periods	Construction of wells and boreholes to strengthen water supply during drought periods	Drought	*Bene*fits • Year-round access to water • Can be used for fish farming during the monsoon season	*Bene*fits • Year-round access to water *Disadvantages* • Inconsistent supply of groundwater as a result of fluctuation aquifer levels

[219] Luong TV & Luckmuang P. 2002. Household rainwater harvesting — Thailand. Sustainable Environmental Sanitation and Water Services, 28th WEDC Conference, Kolkata, India.
[220] Nguyen DC, Dao AD, Kim T-I & Han M. 2013. A sustainability assessment of the rainwater harvesting system for drinking water supply: A case study of Cukhe Village, Hanoi, Vietnam. Environmental Engineering Research. 18: 109–114.
[221] Alam MF. 2016. Evaluating the benefit-cost ratio of groundwater abstraction for additional irrigation water on global scale. Degree Project in Environmental Engineering, Stockholm, Sweden.

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			• Catfish farming in Viet Nam can provide a net profit of US$10,500/yr[222] • The gross household income for freshwater fish farmers in Thailand is US$11,272[223] • • Flood attenuation co-benefits • Socially acceptable • In general, farmers have experience with farm ponds *Disadvantages* • Water levels will be threatened by evaporation • In Viet Nam, evaporation can account for ~3% of water loss from ponds[224]	• Over-extraction of groundwater supplies • Fuel required for pumps to extract water (increased cost of extraction) • Total groundwater pumping costs in Thailand and Viet Nam are estimated to be US$0.02–0.05/$m^3$ [225]
Climate-smart agriculture techniques (including agroforestry)	Increased use of agricultural inputs (such as fertiliser)	Floods and droughts	*Bene*fits • Increased productivity under flood and drought conditions • Socially acceptable as it is enhancing a pre-existing livelihood o 100% of households in two villages surveyed in 2013 were found to have home gardens where agroforestry is practiced[226] • • Reduction of water usage • Supply of NTFPs in the case of agroforestry, thereby providing	*Bene*fits • Short-term increases in productivity • Reduction in degradation of surrounding natural areas to increase farm sizes *Disadvantages* • Relatively expensive and therefore unsustainable in the long-term • May cause damage to local ecosystems (such as the pollution of local water sources by overuse of fertilisers) • Limited experience of local communities in implementation of techniques

[222] Duc NM. 2011. Vietnam fisheries sector value chain analysis. Nong Lam University, Vietnam.
[223] FAO. The socio-economics of freshwater fish farmers. Available at: http://www.fao.org/3/y2876e07.htm.
[224] Wageningen University Agriculture and Fisheries Department. 2011. Managing solid waste and oxygenation for sustainable pangasius aquaculture.
[225] Alam MF. 2016. Evaluating the benefit-cost ratio of groundwater abstraction for additional irrigation water on global scale. Degree Project in Environmental Engineering, Stockholm, Sweden.
[226] Nguyen, Q., Hoang, M.H., Öborn, I. and van Noordwijk, M., 2013. Multipurpose agroforestry as a climate change resiliency option for farmers: an example of local adaptation in Vietnam. *Climatic change*, *117*(1-2).

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			additional food and income • Relatively cheap to implement and requires limited additional investment over time • Agroforestry systems native to Thua Thien Hue, Central Province Vietnam provide benefits of 1,500 to 2,500 US$ ha^{-1} y^{-1} [227] o Other systems, such as intercropping of coffee, pepper, durian and other fruits can yield benefits of as much as 17,000 ha^{-1} y^{-1} • Sustainable • Reduction in degradation of surrounding natural areas to increase farm sizes *Disadvantages* • Limited experience of local communities in implementation of techniques	• Increased usage of declining water reserves • Not climate-resilient
Climate-resistant crop varieties (particularly rice)	Increased use of agricultural inputs (such as fertiliser)	Floods and droughts	*Bene*fits • Increased productivity under flood and drought conditions (increased food supply and income generation) o The ORYZA2000 model projects an increase in rice yield of up to US$ 3.3 billion in value for South Asia if climate resilient varieties are adopted[228]. •	*Bene*fits • Short-term increases in productivity • Reduction in degradation of surrounding natural areas to increase farm sizes *Disadvantages* • Relatively expensive and therefore unsustainable in the long-term • May cause damage to local ecosystems (such as the pollution of local water sources by overuse of fertilisers)

[227] Van Thang, H., Van Do, T., Kozan, O. and Catacutan, D.C., 2015. Cost-benefit analysis for agroforestry systems in Vietnam. *Asian Journal of Agricultural Extension, Economics & Sociology*.
[228] Mottaleb, K.A., Rejesus, R.M., Murty, M.V.R., Mohanty, S. and Li, T., 2017. Benefits of the development and dissemination of climate-smart rice: ex ante impact assessment of drought-tolerant rice in South Asia. *Mitigation and Adaptation Strategies for Global Change*, *22*(6).

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			• Socially acceptable as it is enhancing a pre-existing livelihood • Reduction of water usage • Relatively cheap to implement and requires limited additional investment over time • Sustainable • Reduction in degradation of surrounding natural areas to increase farm sizes *Disadvantages* • Limited experience of local communities in the use of climate-resistant crop varieties	• Limited experience of local communities in implementation of techniques • Increased usage of declining water reserves • Not climate-resilient
Climate-resilient agricultural practices (e.g. aquaculture)	Increased use of agricultural inputs (such as fertiliser)	Floods and droughts	*Bene*fits • Socially acceptable as it is enhancing a pre-existing livelihood o In Nepal, aquaculture was easily adopted by local communities and resulted in production increase from 89 tonnes in 1988 to 165 tonnes in 2005[229] • • Relatively cheap to implement and requires limited additional investment over time • Reduction in degradation of surrounding natural areas to increase farm sizes • Alternative livelihood option, strengthening food and income generation *Disadvantages* • Limited experience of local communities in the implementation of	*Bene*fits • Short-term increases in productivity • Reduction in degradation of surrounding natural areas to increase farm sizes *Disadvantages* • Relatively expensive and therefore unsustainable in the long-term • May cause damage to local ecosystems (such as the pollution of local water sources by overuse of fertilisers) • Limited experience of local communities in implementation of techniques • Increased usage of declining water reserves • Not climate-resilient

[229] Shelton, C., 2014. Climate change adaptation in fisheries and aquaculture: compilation of initial examples. *FAO Fisheries and Aquaculture Circular*, (8088), p.I.

Proposed intervention	Alternative intervention	Climate impact mitigated	Details of proposed intervention	Details of alternative intervention
			climate-resilient agricultural practices	
Restoration of forest and grassland ecosystems in Tram-Chim National Park	Hard infrastructure such as the construction of dykes and additional canals	Floods and droughts	*Bene*fits • Increased supply of ecosystem goods and services to surrounding communities, resulting in additional livelihood sources and increased food and income generation • Reduction in degradation of park buffer zone and surrounding natural areas • Improved water infiltration • Strengthened biodiversity through rehabilitation and maintenance of ecosystems • Enhanced ecotourism (e.g. through providing additional habitat for the endangered Sarus Crane) • Socially acceptable • Aligned with the park's management plan • Relatively cheap to implement (~US$664/ha)[230] *Disadvantages* • Increased reliance of local communities on Tram Chim National Park for livelihoods resulting in overexploitation of ecosystem goods and services	*Bene*fits • Flood attenuation • Increased water levels during drought periods *Disadvantages* • May not be socially acceptable • May cause declines in ecotourism potential of Tram Chim National Park resulting in a decrease in its impact on strengthening the local economy • Expensive to implement (~US$1,747–2,096/m)[231] • Requires the expertise of engineers

[230] Daigneault A, Brown P & Gawith D. 2016. Dredging versus hedging: comparing hard infrastructure to ecosystem-based adaptation to flooding. *Ecological Economics*. 122:25–35.

[231] Vietz GJ, Rutherfurd ID, Walsh CJ, Chee YE & Hatt BE. 2014. The unaccounted costs of conventional urban development: protecting stream systems in an age of urban sprawl.7th Australian Stream Management Conference.

Annex III. Consistency with regional/national strategies

Table V.1: Consistency with **r**egional policies, plans and strategies on climate change

REGIONAL
Sanya Declaration of the 1st Lancang-Mekong Cooperation Leaders' Meeting (2016)[232]
The First Lancang-Mekong Cooperation (LMC) leaders' meeting was held in March 2016 in Sanya City, Hainan Province of China, to discuss future cooperation under the theme "shared river, shared future" and to exchange views on promoting the LMC mechanism, strengthening all-round cooperation at the sub-regional level and advancing regional integration. The proposed project components are aligned with the following measures agreed at the meeting: 1. Promote high-level exchanges, dialogue and cooperation to enhance trust and understanding in the sub-region with a view to strengthening sustainable security. 4. Enhance cooperation against uncommon security threats, including terrorism, transnational crimes, and natural disasters; promote cooperation in addressing climate change impacts, humanitarian assistance, ensuring food, water and energy security. 10. Enhance cooperation among LMC countries in sustainable water resources management and utilization through activities such as the establishment of a center in China for Lancang-Mekong water resources cooperation to serve as a platform for LMC countries to strengthen comprehensive cooperation in technical exchanges, capacity building, drought and flood management, data and information sharing, conducting joint research and analysis related to Lancang-Mekong river resources. 26. Encourage closer exchanges among government agencies, local provinces and districts, business associations and non-governmental organisations of our six countries to discuss and carry out relevant cooperation.
The Lancang-Mekong Environmental Cooperation Strategic Framework (2019-2023) (draft)
The framework is currently under preparation. Its main objectives are to define priority areas of Lancang-Mekong Environmental Cooperation (LEMC), ensure necessary financial support and clarify key node and timeline arrangement. Under the support and joint efforts of related agencies, the framework will guide and serve the Lancang-Mekong Environmental Cooperation through an Action Plan which includes concrete projects. Aiming to be finalised by the end of 2017, the latest draft framework (June 2017) has been reviewed to define the relevance to this proposed project. The proposed project components are aligned with the following (tentative) priority areas: 1. Mainstreaming Environmental Policies. 2. Environmental Capacity Building. 3. Ecosystem Management and Biodiversity Conservation. 4. Climate Change Adaptation and Mitigation. 8. Management of Environmental Data and Information.
Mekong River Commission Basin Development Strategy 2016-2020
The Strategy reflects the dynamic challenges encountered in the Lower Mekong Basin and takes a long-term view to deal with water security challenges, including flood, drought, climate change, hydropower, irrigation, fisheries, and industrial development. Specifically, it will address a number of basin-wide priorities, including amongst others: i) increasing cooperation with partners and stakeholders; ii) reducing remaining knowledge gaps to minimise risks; iii) optimising basin-wide sustainable development and cost and benefit sharing; iv) strengthening the protection of mutually agreed environmental assets; v) strengthening basin-wide procedures; and vi) national implementation capacity.[233] The proposed project components are aligned with: • Priority 1: reduce remaining knowledge gaps to minimise risks. • Priority 2: optimise basin-wide sustainable development and cost and benefit sharing.

[232] Ref: http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1350039.shtml
[233] Source: http://www.mrcmekong.org/assets/Publications/strategies-workprog/MRC-BDP-strategy-complete-final-02.16.pdf

• Priority 4: strengthen basin-wide procedures and national implementation capacity. • Priority 6: enhance information management, communication and tools. • Priority 7: increase cooperation with partners and stakeholders.
Mekong River Commission Strategic Plan 2016-2020
The Strategic Plan sets out how for the period 2016-2020 the MRC will deliver the role established by the 1995 Mekong Agreement, i.e. to promote and coordinate sustainable development and management of the Mekong's water and related natural resources.[234] The proposed project components are aligned with: • Outcome 1: increased common understanding and application of evidence-based knowledge by policymakers and project planners. • Outcome 5: effective dialogue and cooperation between member countries and strategic engagement of regional partners and stakeholders on transboundary water management. • Outcome 6: basin-wide monitoring, forecasting, impact assessment and dissemination of results strengthened for better decision-making by member countries.
Mekong Adaptation Strategy and Action Plan (draft)
Mekong Adaptation Strategy and Action Plan (MASAP) has been formulated as a regional adaptation strategy. It is setting a vision for the Lower Mekong Basin, aiming at strengthening the basin-wide resilience and ensuring sustainable development of the basin in line with the 1995 Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin. The MASAP sets out the strategic priorities and actions at the basin level to address climate change risks on the basin and strengthen basin-wide resilience. Aiming to be finalised by the end of 2017, the latest draft (June 2017) has been reviewed to define the relevance to this proposed project. The proposed project components are aligned with all the seven strategic priorities for basin-wide adaptation to climate change: 1. Mainstream climate change into regional and national policies, programmes and plans; 2. Enhance regional and international cooperation and partnership on adaptation; 3. Enable implementation of transboundary and gender-sensitive adaptation options; 4. Support access to adaptation finance; 5. Enhance monitoring, data collection and sharing; 6. Strengthen capacity on development of climate change adaptation strategies and plans; and 7. Improve outreach of MRC products on climate change and adaptation.
The Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2012–2022[235]

[234] Source: http://www.mrcmekong.org/highlights/strategic-plan-2016-2020/
[235] Source: https://www.greatermekong.org/sites/default/files/gms-ec-framework-2012-2022.pdf

The 10-year strategic framework builds on the substantial progress the program has made, the likely future global and regional trends, the commitment that member countries have made in their national development plans to the promotion of regional integration, and the greater GMS integration within ASEAN and the Asia region. The vision and goals to guide the program include: (1) GMS countries envision a Mekong subregion that is more integrated, prosperous, and equitable. (2) The GMS Program will contribute to realising the potential of the subregion through (i) an enabling policy environment and effective infrastructure linkages that will facilitate cross-border trade, investment, tourism, and other forms of economic cooperation; and (ii) the development of human resources and skills competencies. (3) To ensure that this development process is equitable and sustainable, environmental and social interests will be fully respected in the formulation and implementation of the GMS Program. The proposed project components are aligned with the sector/multi-sector priorities: • Agriculture – Pillar 2: Promoting climate-friendly agriculture and natural resource management. • Climate change adaptation and mitigation: GMS countries are also concerned about the potential negative impacts of climate change on food and energy security. Increasing weather variability is also likely to increase the vulnerability of ecosystem services and amplify impacts on dependent poor communities.
The Greater Mekong Sub-region Economic Cooperation Program **Joint Ministerial Statement, 4th Environment Ministers' Meeting (2015)[236]**
This formal gathering of ministers, organised in Nay Pyi Taw, Myanmar, in January 2015, aimed to build a shared understanding among government and non-government environment leaders on critical natural capital issues and solutions. It provided a platform for Ministers to give directions and discuss approaches for addressing environmental challenges faced by the GMS. The Joint Ministerial Statement provides political support and direction for increasing investments in natural capital. The proposed project components are aligned with the following paragraphs from the joint ministerial statement: • Stating that the region and its people are highly vulnerable to climate change and increased risk of natural disasters. Concerted efforts are needed, including through regional cooperation, to mitigate these impacts and to promote sustainable development. • Encouraging to effectively implement the Core Environment Program Phase II with a focus on the following two priorities: - safeguarding the sub-region's natural capital/resources and associated ecosystem services; and - working more efficiently and effectively with other GMS working groups, development partners and stakeholders to operationalise the Regional Investment Framework Implementation Plan.

Table V.2: Consistency with national policies, plans and strategies for climate change.

NATIONAL	
Cambodia	
Component 1 of the project is aligned with:	**Cambodia Climate Change Strategic Plan 2014-2023** • Strategic objective 5. Improve capacities, knowledge and awareness of climate change responses. **Climate Change Action Plan 2016-2018** • Action 12: Launch and roll out of the national and sectoral M&E system. **National Strategic Development Plan 2014-2018** The following are identified as needed: • data and data management mechanisms for analysing and supporting responses to climate change; and • a knowledge management system for collection, analysis, and dissemination of data/knowledge, including knowledge of local communities on climate change.

[236] Source: http://www.gms-eoc.org/uploads/resources/559/attachment/7.Joint%20Ministerial%20Statement%20FINAL.pdf

Component 2 of the project is aligned with:	**Cambodia Climate Change Strategic Plan 2014-2023** • Strategic objective 1. Promote climate resilience by improving food, water and energy security. • Strategic objective 2. Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts. • Strategic objective 3. Ensure climate resilience of critical ecosystems (for example, Tonle Sap Lake, Mekong River, coastal ecosystems, and highlands), biodiversity, protected areas and cultural heritage sites. • Strategic objective 5. Improve capacities, knowledge and awareness of climate change responses. • Strategic objective 7. Strengthen institutions and coordination frameworks for national climate change responses. **Climate Change Action Plan 2016-2018** • Action 8: Establishment of a knowledge management system on climate change and green growth. • Action 9: Integrate climate change and environmental issues into the curriculum at all levels. • Action 10: Engage and raise awareness on climate change and green growth/sustainable consumption and production. • Action 11: Promote and improve the adaptive capacity of communities to respond to climate change. • Action 12: Launch and roll out of the national and sectoral M&E system. • Action 13: Capacity building of national institutions coordinating climate change response. • Action 14: Support to line ministries to climate mainstreaming into development planning and budgeting. **Cambodia's First Nationally Determined Contribution (NDC; 2015)** Cambodia's priority adaptation actions include: • Promoting and improving the adaptive capacity of communities, especially through community-based adaptation actions, and restoring the natural ecology system to respond to climate change. • Implementing management measures for protected areas to adapt to climate change. • Developing and rehabilitating the flood protection dykes for agricultural and urban development. • Increasing the use of mobile pumping stations and permanent stations in responding to mini-droughts and promoting groundwater research in response to drought and climate risk. • Developing climate-proof agriculture systems for adapting to changes in water variability to enhance crop yields. • Developing crop varieties suitable to Agro-Ecological Zones (AEZ) and resilient to climate change. • Strengthening technical and institutional capacity to conduct climate change impact assessments, climate change projections, and mainstreaming of climate change into sector and sub-sector development plans. **Second National Communication (SNC, 2015)** • South-South cooperation, in addition to North-South cooperation, should be given due attention to ensure transfer of appropriate and least-cost technologies. The transfer of adaptation technologies to Cambodia is even more important than the transfer of mitigation technologies, given Cambodia's high vulnerability to the impacts of climate change. **National Adaptation Programme of Action to Climate Change (NAPA, 2006)** • 17 (out of totally 24) provinces surveyed on climatic hazards have suffered from both floods and droughts. Villagers have identified floods and droughts as the most

	severe climate hazards in all the 17 provinces surveyed. Water shortages are a common occurrence all year-round. • Current national policies and programmes do not integrate global policies on climate change, focusing mainly on post-disaster emergency relief. • Programmes for improving community capacity and enhancing community-based initiatives to cope with climate hazards and adapt to climate variability receives little attention. Furthermore, these programmes have limited geographical coverage of areas identified as vulnerable to climate hazards. **National Strategic Development Plan 2014-2018** The following are identified as needed: • data and data management mechanisms for analysing and supporting responses to climate change; • a knowledge management system for collection, analysis, and dissemination of data/knowledge, including knowledge of local communities on climate change; • measures to control environment and ecosystems; • farmers' capacities in adapting to climate change in agriculture; • mitigation of impacts of climate change through the development of agro-industries; • technological and scientific capacity strengthening to assess vulnerabilities and hazard-prone areas in relation to climate change; • technical and institutional capacity strengthening to promote the mainstreaming of climate change responses into the policies, laws and plans at national and sub-national level; • capacity strengthening of national and sub-national officials, particularly at the community levels, on disaster risk reduction, climate change adaptation, and hazard resilience; • coordination and enhancement of capacity and public awareness on climate change at national and local levels; and • intensifying efforts to reduce the impact of climate change by strengthening the adaptation capacity and resiliency to climate change.
Component 3 of the project is aligned with:	**Cambodia Climate Change Strategic Plan 2014-2023** • Strategic objective 1. Promote climate resilience through improving food, water and energy security. • Strategic objective 2. Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts. • Strategic objective 3. Ensure climate resilience of critical ecosystems (for example, Tonle Sap Lake, Mekong River, coastal ecosystems and highlands), biodiversity, protected areas and cultural heritage sites. • Strategic objective 5. Improve capacities, knowledge and awareness of climate change responses. • Strategic objective 7. Strengthen institutions and coordination frameworks for national climate change responses. • Strategic objective 8. Strengthen collaboration and active participation in regional and global climate change processes. **Climate Change Action Plan 2016-2018** • Action 8: Establishment of a knowledge management system on climate change and green growth. • Action 9: Integrate climate change and environmental issues into the curriculum at all levels. • Action 10: Engage and raise awareness on climate change and green growth/sustainable consumption and production. • Action 11: Promote and improve the adaptive capacity of communities to respond to climate change. • Action 12: Launch and roll out of the national and sectoral M&E system.

	• Action 13: Capacity building of national institutions coordinating climate change response. • Action 14: Support to line ministries to climate mainstreaming into development planning and budgeting. **Cambodia's First Nationally Determined Contribution (NDC; 2015)** Cambodia's priority adaptation actions include: • strengthening technical and institutional capacity to conduct climate change impact assessments, climate change projections, and mainstreaming of climate change into sector and sub-sector development plans. **Second National Communication (SNC, 2015)** • South-South cooperation, in addition to North-South cooperation, should be given due attention to ensure transfer of appropriate and least-cost technologies. The transfer of adaptation technologies to Cambodia is even more important than the transfer of mitigation technologies, given Cambodia's high vulnerability to the impacts of climate change. • The general integration of climate change risks into policy, plans and strategies at the national and sub-national levels needs strengthening. **National Adaptation Programme of Action to Climate Change (NAPA, 2006)** • 17 (out of totally 24) provinces surveyed on climatic hazards have suffered from both floods and droughts. Villagers have identified floods and droughts as the most severe climate hazards in all the 17 provinces surveyed. Water shortages are a common occurrence all year-round. • Current national policies and programmes do not integrate global policies on climate change, focusing mainly on post-disaster emergency relief. Programmes for improving community capacity and enhancing community-based initiatives to cope with climate hazards and adapt to climate variability receives little attention. Furthermore, these programmes have limited geographical coverage of areas identified as vulnerable to climate hazards. **National Strategic Development Plan 2014-2018** The following are identified as needed: • data and data management mechanisms for analysing and supporting responses to climate change; • a knowledge management system for collection, analysis, and dissemination of data/knowledge, including knowledge of local communities on climate change. • measures to control environment and ecosystems; • farmers' capacities in adapting to climate change in agriculture; • mitigation of impacts of climate change through the development of agro-industries; • technological and scientific capacity strengthening to assess vulnerabilities and hazard-prone areas in relation to climate change; • technical and institutional capacity strengthening to promote the mainstreaming of climate change responses into the policies, laws and plans at national and sub-national level; • capacity strengthening of national and sub-national officials, particularly at the community levels, on disaster risk reduction, climate change adaptation, and hazard resilience; • coordination and enhancement of capacity and public awareness on climate change at national and local levels; • intensifying efforts to reduce the impact of climate change by strengthening the adaptation capacity and resiliency to climate change; • increasing the involvement in international cooperation in the water sector to ensure the sustainability and effectiveness of water resources use as well as to address negative impacts arising from floods, droughts and climate change; and

	• increasing the awareness and encouraging the implementation of river basin development and management plan with the cooperation of concerned ministries, stakeholders and beneficiaries, especially women.
China	
Component 1 of the project is aligned with:	**National Strategy for Climate Change Adaptation (2013-2020)** • To strengthen the effective protection of existing forest resources and other natural ecosystems. • To enhance water resource management. **Second National Communication (SNC, 2012)** • China will take effective policies and measures to enhance climate change adaptation capability by enhancing scientific research on climate change, observations and impact assessments. **China's 13th Socio-Economic Development Plan (2016-2020)** • To strengthen the systematic monitoring of climate change and the related scientific research.
Component 2 and 3 of the project is aligned with:	**National Strategy for Climate Change Adaptation (2013-2020)** • To share climate change adaptation experience with other developing countries by capacity building and joint-research. • To conduct South-South Cooperation in terms of water resource management. **Enhanced Actions on Climate Change: China's First Nationally Determined Contributions (NDC; 2015)** • To share good experience and best practices on climate change. • To conduct climate change international dialogue and communication. • To strengthen relevant policy coordination, and to conduct concrete cooperation. **China's 13th Socio-Economic Development Plan (2016-2020)** • To enhance transboundary river governance and to promote cooperation with the involved neighbouring countries. • To strengthen bilateral or multilateral dialogue and concrete cooperation on climate change.
Lao PDR	
Component 2 and 3 of the project is aligned with:	**Lao PDR's First Nationally Determined Contribution (2015)** • Enhance cooperation, strong alliances and partnerships with national stakeholders and international partners to achieve national development goals. • Improve public awareness and understanding of various stakeholders about climate change, vulnerabilities and impacts to increase stakeholder willingness to take actions. • Promotion of climate change capacity in the water resource sector. • Manage watersheds and wetlands for climate change resilience. **Second National Communication (SNC, 2013)** • The need of strengthening regional cooperation (such as Mekong sub-region) to enhance more practical, applicable and cost-effective technological transfers and knowledge exchange. • The need for more effective mainstreaming of the strategy with the sustainable social and economic development process of the country. • The need for developing technical capacities of relevant national personnel with regard to vulnerability and adaptation. **National Adaptation Programme of Action (NAPA, 2009)** • Priority 1: Strengthen the capacity of the national disaster management committees. • Priority 5: Awareness raising on water and water resource management. • Priority 8: Strengthen institutional and human resource capacities related to water and water resource management. **National Socio-Economic Development Plan (NSEDP, 2016-2020)**

	• Create coordination mechanism between the government, private sector, international organisations and development partners to jointly contribute to meeting all the NSEDP's targets. • Outcome 3, Output 1: environmental protection and sustainable natural resources management. • Outcome 3, Output 2: prepare to cope with the disaster risks and impacts of climate change. • Outcome 3, Output 3: Reducing the instability of agricultural production caused by disaster impact.
Myanmar	
Component 1 of the project is aligned with:	**National Adaptation Programme of Action (NAPA, 2012)** • The first priority in agriculture sector: reduced climate change vulnerability of rural and subsistence farmers through locally relevant technologies, climate-resilient rice varieties, and ex/in-situ conservation of plant genetic resources. **Initial National Communication (INC, 2012)** • A need of identifying cost-effective technological and policy adaptation measures.
Component 2 and 3 of the project is aligned with:	**National Adaptation Programme of Action (NAPA, 2012)** • The second priority of biodiversity sector: mainstreaming ecosystem-based climate change adaptation for buffering rural communities against climate change impacts into policy, planning and relevant projects. **Initial National Communication (INC, 2012)** • Lack of training, information and experience on environmentally sound technologies information systems. • A need of integrating climate change concerns into national long-term socio-economic and environmental planning.
Thailand	
Component 1 of the project is aligned with:	**Thailand UN United Nations Partnership Framework 2017-2021** • Outcome: By 2021, inclusive systems and processes advance sustainable people-centred, equitable develoment for all people in Thailand • Outcome Stategy 1: Strengthen systems, structures and processes for effective, inclusive and sustainable policy-making and implementation o Indicator 4: Number of hectares of land and forest that are managed sustainably under an in-situ conservation regime, sustainable use regime, with effective management. o Indicator 6: Extent to which implementation of comprehensive measures - plans, strategies, policies, programmes to achieve low-emission and climate-resilient development objectives has improved. **Climate Change Master Plan 2015-2050** • Measure 1.1 (1) Water, flood and drought management: Integrated water management. • Measure 1.1 (2) Water, flood and drought management: Preparedness to deal with and to reduce damages from flood and drought. • Measure 1.1 (3) Water, flood and drought management: Flood and drought risk management • Measure 1.2 (1) Agriculture and food security: Natural disaster risk management. • Measure 1.2 (2) Agriculture and food security: Preparedness to deal with and to adapt to climate change. • Measure 1.2 (3) Agriculture and food security: Food security and maintenance. • Measure 1.5 (1) Natural resources management: Conservation and restoration of healthy natural resources and ecosystems. • Measure 1.5 (2) Natural resources management: Regulation and control on sustainable use of natural resources. • Measure 1.6 (1) Human settlement and security: Reduction of risk and damages from natural disasters.

	• Measure 1.6 (2) Human settlement and security: Preparedness and capacity of communities to adapt. • Measure 3.1 (1) Information, research and technology development: Development of information and research. • Measure 3.1 (2) Information, research and technology development: Development of technology. • Measure 3.3 (1) Awareness raising and capacity building on climate change: Academic and research groups. • Measure 3.3 (3) Awareness raising and capacity building on climate change: Governmental officials and agencies. **Thailand's National Adaptation Plan (NAP; 2018)** The final draft of Thailand's NAP is expected to be finalised and published in 2018 once the public consultation process has been completed. Alignment with Component 1 includes: • the promotion of on-the-ground adaptation interventions, including EbA; and • the expansion of adaptation planning and implementation across priority sectors at the local and national level, such as water resources and agriculture. **Thailand's First Nationally Determined Contribution (2015)** Thailand's prioritised adaptation efforts are detailed below. • Promote and strengthen Integrated Water Resources Management (IWRM) practices to achieve water security, effective water resource management to mitigate flood and drought. • Safeguard food security through the guidance of Sufficiency Economy Philosophy, e.g. an application of the New Theory in agriculture and land management to promote appropriate resource allocation and economic diversification at the household level and sustainable management of community forests to promote food security at the community level, for instance. • Promote sustainable agriculture and Good Agricultural Practice. • Increase national forest cover to 40% through local community participation, including in particular headwater and mangrove forests to enhance adaptive capacities of the related ecosystem. • Safeguard biodiversity and restore ecological integrity in protected areas and important landscapes from the adverse impacts of climate change, with the emphasis on vulnerable ecosystems and red list species. • Strengthen disaster risk reduction and reduce population's vulnerability to climate risk and extreme weather events through enhanced awareness, coordination and adaptive capacity of local communities, especially in the disaster risk-prone areas. **12th National Economic and Social Development Plan 2017-2021** • Strategy 4, guideline 3.1.1 Conserve and restore forest resources for ecological balance. • Strategy 4, guideline 3.1.2 Conserve and sustainably utilise biodiversity. • Strategy 4, guideline 3.2.4 Improve efficiency of water storage and water distribution systems. • Strategy 4, guideline 3.4.2 Support agricultural production sector to become sustainable agriculture. • Strategy 4, guideline 3.4.5 Build knowledge, understanding, awareness, and participation of the public and different sectors to deal with climate change • Strategy 4, guideline 3.6.2 Build capacity in disaster preparedness.
Component 2 of the project is aligned with:	**Thailand UN United Nations Partnership Framework 2017-2021** • Outcome: By 2021, inclusive systems and processes advance sustainable people-centred, equitable develoment for all people in Thailand • Outcome Stategy 1: Strengthen systems, structures and processes for effective, inclusive and sustainable policy-making and implementation

	o Indicator 4: Number of hectares of land and forest that are managed sustainably under an in-situ conservation regime, sustainable use regime, with effective management. o Indicator 6: Extent to which implementation of comprehensive measures - plans, strategies, policies, programmes to achieve low-emission and climate-resilient development objectives has improved. **Climate Change Master Plan 2015-2050** • Measure 3.1 (1) Information, research and technology development: Development of information and research. • Measure 3.1 (2) Information, research and technology development: Development of technology. • Measure 3.2 (1) Development of mechanisms to support climate change management: Mechanisms to support climate change adaptation. • Measure 3.2 (3) Development of mechanisms to support climate change management: Mechanisms to support related development sectors. • Measure 3.3 (1) Awareness raising and capacity building on climate change: Academic and research groups. • Measure 3.3 (3) Awareness raising and capacity building on climate change: Governmental officials and agencies. **Thailand's National Adaptation Plan (NAP; 2018)** The final draft of Thailand's NAP is expected to be finalised and published in 2018 once the public consultation process has been completed. Alignment with Component 2 includes: • The promotion of on-the-ground adaptation interventions, including EbA. • The expansion of adaptation planning and implementation across priority sectors at the local and national level, such as water resources and agriculture. **Thailand's First Nationally Determined Contribution (2015)** • Thailand's prioritised adaptation efforts include: Build regional climate resilience by serving as a knowledge hub to foster regional cooperation and exchange experiences on adaptation. **Second National Communication (SNC, 2011)** • Needs identified include: developing climate change scenarios at the sub-regional level; developing socio-economic scenarios for use in vulnerability analyses; analysing climate change effects on major sectors such as agriculture and water; prioritising adaptation options within and across various sectors; developing regional information exchanges and communication. **12th National Economic and Social Development Plan 2017-2021** • Strategy 4, guideline 3.5.1 Enact and improve the laws related to climate change to support international agreements on climate change. • Strategy 4, guideline 3.5.4 Increase capacity on research and development related to science, technology and innovation to support climate change adaptation. • Strategy 4, guideline 3.4.5 Build knowledge, understanding, awareness, and participation of the public and different sectors to deal with climate change • Strategy 4, guideline 3.6.2 Build capacity in disaster preparedness.
Component 3 of the project is aligned with:	**Thailand UN United Nations Partnership Framework 2017-2021** • Outcome: By 2021, inclusive systems and processes advance sustainable people-centred, equitable develoment for all people in Thailand • Outcome Stategy 1: Strengthen systems, structures and processes for effective, inclusive and sustainable policy-making and implementation o Indicator 4: Number of hectares of land and forest that are managed sustainably under an in-situ conservation regime, sustainable use regime, with effective management. o Indicator 6: Extent to which implementation of comprehensive measures - plans, strategies, policies, programmes to achieve low-emission and climate-resilient development objectives has improved.

	Climate Change Master Plan 2015-2050 • Measure 3.2 (1) Development of mechanisms to support climate change management: Mechanisms to support climate change adaptation. • Measure 3.2 (3) Development of mechanisms to support climate change management: Mechanisms to support related development sectors. • Measure 3.3 (1) Awareness raising and capacity building on climate change: Academic and research groups. • Measure 3.3 (3) Awareness raising and capacity building on climate change: Governmental officials and agencies. **Thailand's National Adaptation Plan (NAP; 2018)** The final draft of Thailand's NAP is expected to be finalised and published in 2018 once the public consultation process has been completed. Alignment with Component 3 includes: • The promotion of on-the-ground adaptation interventions, including EbA. • The expansion of adaptation planning and implementation across priority sectors at the local and national level, such as water resources and agriculture. **Thailand's First Nationally Determined Contribution (2015)** • Thailand's prioritised adaptation efforts include: Build regional climate resilience by serving as a knowledge hub to foster regional cooperation and exchange experiences on adaptation. **Second National Communication (SNC, 2011)** • Needs identified include: Develop regional information exchanges and communication. **12th National Economic and Social Development Plan 2017-2021** • Strategy 4, guideline 3.5.1 Enact and improve the laws related to climate change to support international agreements on climate change. • Strategy 4, guideline 3.5.4 Increase capacity on research and development related to science, technology and innovation to support climate change adaptation. • Strategy 4, guideline 3.4.5 Build knowledge, understanding, awareness, and participation of the public and different sectors to deal with climate change. • Strategy 4, guideline 3.6.2 Build capacity in disaster preparedness. • Strategy 4, guideline 3.8 Develop international cooperation on environment. • Strategy 10, guideline 3.6.1 Increase the roles and participation of Thailand in international organisations.
Vietnam	
Component 1 of the project is aligned with:	**Vietnam UN One Strategic Plan 2017-2021** • Focus Area 2: Ensuring climate resilience and environmental sustainability o Outcome 2.1: Low-carbon, climate and disaster resilient development o Outcome 2.2: Sustainable management of natural resources and the enviroment **National Climate Change Strategy 2011-2020** • Task 1.b/ Proactive disaster response and climate monitoring: Reduction of damage due to disaster risks. • Task 2.a/ Food and water resource security assurance: Food security. • Task 2.b/ Food and water resource security assurance: Water resource security. • Task 3. Suitable proactive response to sea level rise in vulnerable areas • Task 4. Protection and sustainable development of forests, increase of GHG absorption and biodiversity conservation. • Task 7.a/ Building of communities to effectively respond to climate change: Communities responding to climate change. • Task 7.c/ Building of communities to effectively respond to climate change: Raising awareness, intensifying education and training. **Vietnam's First Nationally Determined Contribution (2015)**

	• There is a need for international assistance as well as cooperation with other developing countries on: tools to assess climate change impacts, vulnerability, exposure and climate change adaptation measures; as well as to strengthen the capacity to adapt to climate change at national and local level. • Adaptation priority actions for the period 2021-2030 include: Implement ecosystem-based adaptation through the development of ecosystem services and biodiversity conservation, with a focus on the preservation of genetic resources, species at risk of extinction, and important ecosystems. **Plan for Implementation of the Paris Agreement (2016)** Implementation of climate change adaptation activities 2016-2020 include: • Assessing the level of risk and vulnerability to climate change, identify the needs for climate change adaptation, loss and damage caused by climate change. • Developing and implementing effective projects to prevent and control natural disasters, respond to climate change in each sector. • Implementation of other activities to adapt to climate change to increase resilience, protect people's livelihoods and create the conditions for greater contributions in GHG emissions, including programs and projects underway or have been approved or are being developed in accordance with the priorities of the Government, Ministries, sectors and localities which have secured resources or can mobilize resources to implement. **The Initial Biennial Updated Report (BUR, 2014)** • The four criteria to evaluate and select priority adaptation technologies: (i) economic benefits; (ii) social benefits; (iii) environmental benefits and (iv) reduction of vulnerability to climate change. **National Target Program to Respond to Climate Change (NTP-RCC, 2008)** • Activity 2: identify measures to respond to climate change based on results of climate change results and vulnerability assessment for sector/areas and localities. **Socio-Economic Development Plan 2016-2020** • Strengthen management of natural resources, minerals and environmental protection. • Protect water sources, build an infrastructure system to encourage the effective and thrifty use of water resources, ensure sufficient supply of water for production and consumption by businesses and citizens.

Component 2 of the project is aligned with:	**Vietnam UN One Strategic Plan 2017-2021**
	• Focus Area 1: Investng in people
	  o Outcome 1.1: Poverty and vulnerability reduction
	• Focus Area 2: Ensuring climate resilience and environmental sustainability
	  o Outcome 2.1: Low-carbon, climate and disaster resilient development
	  o Outcome 2.2: Sustainable management of natural resources and the enviroment
	National Climate Change Strategy 2011-2020
	• Task 6.a/ Increasing the decisive role of the State in climate change response: Adjusting, and integrating climate change issues into, strategies, master plans and plans.
	• Task 6.b/ Increasing the decisive role of the State in climate change response: Improving and strengthening institutions.
	• Task 7.c/ Building of communities to effectively respond to climate change: Raising awareness, intensifying education and training.
	• Task 8. Development of advanced sciences and technologies for climate change response.
	• Task 9. Promotion of international cooperation and integration to enhance the country's status in climate change issues.
	Vietnam's First Nationally Determined Contribution (2015)
	• There is a need for international assistance as well as cooperation with other developing countries on: tools to assess climate change impacts, vulnerability,

	exposure and climate change adaptation measures; as well as to strengthen the capacity to adapt to climate change at national and local level. **Plan for Implementation of the Paris Agreement (2016)** Implementation of climate change adaptation activities 2016-2020 include: • Reviewing the existing database on adaption to climate change, propose additional research and management, data sharing practices to update reports of national contribution to climate change adaptation. **The Initial Biennial Updated Report (BUR, 2014)** • Capacity needs in the areas of: i) improving capacity and effectiveness of early warning and disaster prevention; and ii) assessment of water resources, climate resource, climate change and climate change impacts. **Second National Communication (SNC, 2010)** • Capacity building needs in the areas of: i) assessment of vulnerability for ecosystems, economic and social impacts of climate change, and development of appropriate adaptation measure; and ii) application of cost-benefit analysis to assess climate change response measures and solutions. **Socio-Economic Development Plan 2016-2020** • Strengthen organisational structure, forces, operating mechanisms associated with the synchronous deployment of measures to protect and develop forests, especially coastal protection forests, watershed forests, and special-use forests.
Component 3 of the project is aligned with:	**Vietnam UN One Strategic Plan 2017-2021** • Focus Area 1: Investng in people o Outcome 1.1: Poverty and vulnerability reduction • Focus Area 2: Ensuring climate resilience and environmental sustainability o Outcome 2.1: Low-carbon, climate and disaster resilient development o Outcome 2.2: Sustainable management of natural resources and the enviroment **National Climate Change Strategy 2011-2020** • Task 6.a/ Increasing the decisive role of the State in climate change response: Adjusting, and integrating climate change issues into, strategies, master plans and plans. • Task 6.b/ Increasing the decisive role of the State in climate change response: Improving and strengthening institutions. • Task 7.c/ Building of communities to effectively respond to climate change: Raising awareness, intensifying education and training. • Task 9. Promotion of international cooperation and integration to enhance the country's status in climate change issues. • Task 10. Diversification of financial resources and effective concentrated investment. **Vietnam's First Nationally Determined Contribution (2015)** • There is a need for international assistance as well as cooperation with other developing countries on: tools to assess climate change impacts, vulnerability, exposure and climate change adaptation measures; as well as to strengthen the capacity to adapt to climate change at national and local level. • Adaptation priority actions for the period 2021-2030 include: implement integrated water resources management in river basin systems; strengthen international cooperation in addressing transboundary water issues; and ensure water security. **Plan for Implementation of the Paris Agreement (2016)** Implementation of climate change adaptation activities 2016-2020 include: • Strengthening international cooperation and mobilize investment resources to effectively prevent and control natural disasters, respond to climate change, prevent flood in urban area, search and rescue; with special focus on completing projects to overcome drought, salinization, sea level rise in Central Region, Central Highlands and Mekong Delta, urgent projects against salinization, preserve fresh water for production and daily life of the people living in the Mekong Delta area.

	National Target Program to Respond to Climate Change (NTP-RCC, 2008) • Activity 4: strengthen the capacity of the organisation, institution and policy on climate change. • Activity 7: mainstreaming the NTP in strategies, plans, socio-economic development planning and other sectoral/local development plans. **Second National Communication (SNC, 2010)** • Capacity building needs in the area of technology development and transfer where technical experts and professional need to be trained to facilitate the prompt and successful adoption of new technologies. **Socio-Economic Development Plan 2016-2020** • Strengthen organisational structure, forces, operating mechanisms associated with the synchronous deployment of measures to protect and develop forests, especially coastal protection forests, watershed forests, and special-use forests.

Consistency with sub-national policies and plans in Thailand and Vietnam:

Dong Thap Province Climate Change Action Plan (2012-2020). There is limited integration of on-the-ground adaptation interventions into this plan. In particular, there are no adaptation interventions specific to Tram Chim National Park. Activities presented in the proposed project will serve as basis for integrating adaptation into the action plan and will inform the development of an adaptation plan for Tram Chim National Park. This is in alignment with Resolution No.120/2017/NQ-CP of the government of Vietnam on climate change adaptation and sustainable development in the Mekong Delta.

Dong Thap Province Socio-economic Development Plan (2011-2020). This plan does not include any climate change adaptation considerations. Best practices and lessons learned generated during project implementation will be used to inform the integration of climate change adaptation when the plan is reviewed in 2020.

Dong Thap Province Environmental Management Plan (2007). Climate change adaptation is not integrated into this plan. Best practices and lessons learned during the implementation of the proposed project will be used to inform the integration of climate change adaptation when the plan is reviewed by the South Vietnam Power Management Board.

List of laws, regulations in relation to the framework of issues in the environmental safeguard plan -ESP

No.	Related issues in the ESP	Vietnam		Thailand	
		Law/Regulations name	**Law number/Remarks**	**Law/Regulations name**	**Law number/Remarks**
1	Access and equity	Law on information access	104/2016/QH13 approved on 06 April 2016	Constitution Act 2017 (Ref_1)	Constitution Act 2017 (Ref_1)
2	Human/labour rights	Constitution of Viet Nam 2013; Labour Code	Article 14-49 (chapter 2- human rights, rights and basic obligations of citizens)	Constitution of Thailand 2017	Constitutional Act 2017; Section 43
3	Gender equality	Law on Gender Equality 2006	Law number 73/2006/QH11	Constitution of Thailand 2017	Constitutional Act 2017; Section 27
4	Involuntary resettlement	Land Law and other legal documents guiding or detailing the Land Law; Construction Law; Forestry Law Planing Law; Master Plan for land use in Mekong Delta	Land Law 2013, Decree No 01/2017/NĐ-CP and Decree No. 43/2014/NĐ-CP guiding implementation of the Land Law 2013	Local Government Act 1994,	Local Government Act 1994, Section 23 (Ref_2)
5	Protection of natural habitats	Biodiversity law 2008, Forestry Law 2017, Law on Environmental Protection 2014, Law on Fishery 2017; Forestry Law Sea Law	These 4 laws have regulated protection of natural habitats in Vietnam including national parks, wetland conservation areas, protected areas (sea and terrestrial areas),…	Local Government Act 1994,	Local Government Act 1994, Section 23 (Ref_2)
6	Conservation of biological diversity	Biodiversity Law 2008/Decree 65/2010/NĐ-CP on	Law number 20/2008/QH12	Local government at the project site has a legal mandate and	Local Government Act 1994, Section 23 (Ref_2)

		guiding the implementation of Biodiversity Law; Planing Law; Master Plan for land use in Mekong Delta; Forestry Law, Firshery Law		authority to manage and conserve natural resources (including; land, water, flora and fauna) in public land (According to Local Government Act 1994)	
7	Pollution prevention and resources efficiency	Law on Environmental Protection (LEP) 2014, Decree No 19/2015/ND-CP on guiding implementation of LEP; Decree No 18/2015/NĐ-CP; Decree No 38/2015/NĐ-CP; Energy Efficiency Law; Forestry Law, Land Law, Water Law, Mineral Law, Sea Law		There is no law and regulation imposed as the project intervention shall not pollute or exploit resources	
8	Public health	Law on medical examination and treatment; Law of people's health		There is no law and regulation imposed as the project intervention shall not harm any individual and community health	

Annex IV: Coordination with other initiatives

The **Mekong River Commission (MRC)** has generated a large variety of information on lower Mekong countries (Cambodia, Lao PDR, Thailand and Vietnam), which are signatories of the commission. The proposed project will build on the activities of the MRC, particularly those related to climate change adaptation, including the: i) ongoing assessment of climate change impacts on ecosystems; ii) design of the Mekong Adaptation Strategy and Action Plan (MASAP); and iii) formulation of the Basin Development Strategy. According to the consultation, MRC is interested in the regional knowledge sharing and policy elements of the proposed project. In particular, MASAP and its associated implementation mechanisms/forums can serve regional cooperation aspect of the proposed project. In addition, the MRC database (available on MRC website) can contribute to sharing knowledge produced by the proposed project. Importantly, the Thailand pilot site of the proposed project builds on a small climate change adaptation project under the MRC that was implemented also at the Young River Basin between 2011 and 2015. Although that previous project did not implement concrete on-the-ground EbA interventions related to droughts and floods, it significantly built capacity and awareness of local stakeholders (particularly farmers, local academic institutions and government agencies), established a climate change adaptation learning centre, installed climate early warning systems and carried out studies related to climate change at the basin. This proposed project, therefore, benefits from the relevant studies (which were updated during the full proposal development stage) and, importantly the momentum of active cooperation from the local stakeholders who are highly anticipated in the proposed project especially on the concrete implementation.

The **Earth Net Foundation** is currently implementing ongoing climate change adaptation pilot projects (funded by the Thai Health Promotion Foundation) in the Patthalung, Trung, Chiang Mai, Chachoengsao, Chiang Rai and Nakhon Ratchasima provinces of Thailand. Pilot projects include *inter alia*: i) rice cultivation in the flooded areas of the Tha Chang community; ii) climate surveillance and a marine warning system in Ban-Mod-Ta-Noi; iii) experimental rice farming for climate change adaptation; and iv) food storage to strengthen food security under climate change conditions. The proposed project will draw from the knowledge obtained from these ongoing pilot projects, such as the results of experimental rice farming, to inform the implementation of relevant adaptation interventions. Furthermore, the proposed project will add to the knowledge generated and lessons learned from these pilot projects in Thailand.

The **South-South Capacity Building for Ecosystem Management in the Greater Mekong Sub-region** project funded by the Chinese Ministry of Environmental Protection (MEP) focuses on capacity building for ecosystem management across the GMS. The 2-year project conducted capacity needs assessment for ecosystem management and developed a framework for regional cooperation on capacity building in the GMS. Similarly, the USAID's **Mekong Adaptation and Resilience to Climate Change (Mekong ARCC) Project** worked in the 4 Lower Mekong countries to, *inter alia*, conduct climate change impact assessments in various sectors and to implement adaptation interventions at selected demonstration sites. While both projects are already completed, their results can provide important input to the proposed project. The former one worked in the whole GMS and had its Vietnam pilot site also at Tram Chim National Park. Therefore, knowledge and lessons learned (for example, gaps and opportunities in transboundary ecosystem management), as well as problems encountered regarding ecosystem services areas in the GMS will be used to advise the planning and

implementation of the proposed project, particularly at the demonstration site in Vietnam. For Mekong ARCC, its assessments identified various environmental, economic and social effects of climate change in the Lower Mekong Basin and key results and lessons from on the ground adaptation implementation were well-documented. Therefore, all this information will provide useful background for paper, policy briefs as well as planning and implementation of the concrete adaptation interventions under the proposed project.

The World Bank's **Mekong Delta Integrated Climate Resilience and Sustainable Livelihoods Project**[237] in Vietnam (US$ 387 million, 2016–2022) aims to enhance tools for climate-smart planning and improve the climate resilience of land and water management practices. The proposed project plans to complement the work being done by the World Bank project both in Vietnam and across the GMS, and use the information generated by the project to advise its implementation.

The **ADB's GMS Environment Operations Centre's Core Environment Programme** is working to integrate climate change considerations in development planning and biodiversity conservation, among others. This Core Environment Programme is focussed on: i) building capacity to plan for climate change by helping practitioners to assess risks and plan for climate change adaptation; ii) strengthening national monitoring systems by building the capacity of local stakeholders to monitor forest resources and greenhouse gas reductions; and iii) developing and testing adaptation and mitigation options by assessing the feasibility of options, including new technology, ecosystem-based approaches and financing modalities, to promote climate-resilient and low carbon development. The proposed project will build on the knowledge generated under this initiative, especially with regards to climate change adaptation. Moreover, as per consultation, the ADB GMS CEP will be interested to cooperate with the proposed project especially in terms of knowledge sharing through the CEP's existing knowledge platform and database.

Within the National Natural Science Foundation of China (NSFC) – UN Environment cooperation framework, a research project titled: **Water resources change and adaptive management in the Greater Mekong River drainage basin** (2016–2020, US$ 600,000), has been launched. Under this project, a detailed assessment of the potential impacts of future climate change and socio-economic development on regional water resources is being conducted. The findings of this project will be used to determine how best to allocate water resources to maintain the health of various ecosystems in the GMS. The results of this project, altogether with others, will be reviewed in order to synthesise relevant findings as input for the policy briefs, paper and recommendations under components 2 and 3. Moreover, according to the consultation, this project aims to produce a set of policy recommendations regarding climate change and water resources in the GMS that will complement the proposed project's policy cooperation component. Besides, they are also interested in exploring potential collaboration with the proposed project's pilot sites in terms of scientific studies and exchange of technical knowledge.

The **Asia-Pacific Adaptation Network (APAN)**, which is part of UN Environment's Global Adaptation Network (GAN), is a regional programme for managing and applying knowledge regarding adaptation. APAN supports adaptation initiatives of governments and other organisations, with an emphasis on the management of knowledge and capacity

[237] Available at: http://projects.worldbank.org/P153544/?lang=en&tab=overview

building. Its mission is to assist in the building of resilient and sustainable social systems, ecosystems and economies in countries across the Asia-Pacific region under the conditions of climate change. The proposed project will support APAN by strengthening the knowledge base and institutional capacity for climate change adaptation in the GMS. Specifically, as an existing network that organizes regular events covering extensive stakeholders, including those from the GMS, the project aims to share knowledge produced from the project results and beyond at APAN forums.

Sustainable Rice Platform. The Sustainable Rice Platform (SRP) is a multi-stakeholder platform established in December 2011. The SRP is co-convened by UN Environment and the International Rice Research Institute to promote resource efficiency and sustainability in trade flows, production and consumption operations, and supply chains in the global rice sector.

In Thailand SRP is spearheaded by Thailand's Rice Department, supported by GIZ and 3 SRP corporate partners (Mars Food, Olam International, and Ebro Foods). Three major projects were recently approved for funding and are currently being mobilized. These are as follows:

1. *Thai Rice NAMA Project***:** The 5-year project, with Euro 14.9 million funding from the NAMA Facility, will provide support to enable a shift towards low-emission rice production in Thailand, using three intervention strategies: (a) low-emission rice production technology, (b) mitigation technology services (including a green credit program and a revolving fund), and (c) policy formulation and supporting measures. The project will reach 100,000 farmers in 6 central provinces.
2. *Market Oriented Smallholder Value Chains Project (MSVC):* Led by GIZ and the Thai Ministry of Agriculture, and supported by Germany's Federal Ministry of Economic Cooperation and Development (BMZ) and Olam International, this (Euro 3.8 million project will enhance rice value chains using the SRP Standard as a benchmark for best practice in 3 countries: 16,000 farmers in Thailand, 10,000 in Viet Nam, and 9,000 in Indonesia.
3. *Sustainable Hom Mali Rice Project:* Mars and Ebro Foods, supported by GIZ and Thailand's Rice Department, is to be implemented from 2018-2020 and targets sustainable sourcing of fragrant Hom Mai jasmine rice from 1,200 farmers and 12 Community Rice Centres in Roi Et province, northeastern Thailand. Adoption of SRP practices will reduce chemical usage and environmental impact of rice cultivation, while enhancing resilience to climate change.

SRP's activities in Vietnam revolve mainly around promoting adoption of climate-smart best practice in rice production under the SRP Standard, led by the Loc Troi Group, a major producer and exporter based in An Giang Province. Building on a successful pilot implementation on 150 farms in 2016, the initiative has now expanded to 4,000 farmers with support from the International Finance Corporation, the International Rice Research Institute and the Sustainable Rice Platform.

The proposed project, through its climate-resilient agriculture activities and introduction of climate-resilient rice varieties, will generate an invaluable body of knowledge related to adaptation-based technologies for rice production specific to the GMS that can be incorporated into SRP's advocacy and on the ground field-level activities. This will further strengthen SRP's role in facilitating South-South cooperation to address the region's increasing vulnerability to climate change impacts through interventions focusing on both mitigation and adaptation.

Annex V: Results Framework

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
Objective: Strengthened awareness and action of governments and communities in the GMS to adapt to climate change using EbA.	Change in the awareness score assessment framework for each targeted institution.	Baseline values to be at the beginning of project implementation.	Each targeted institution (MoNRE Thailand, MoNRE Vietnam, LMEC) has progressed by a minimum of 1 step in their capacity score assessment framework.	A capacity score will be generated for each targeted institution. The scoring will be based on four criteria expressed as questions (these criteria will be further validated at inception phase): 1. Degree to which there is greater awareness of how investments in natural and physical assets can deliver adaptation benefits and positive net returns. 2. Degree to which there is awareness of how to measure adaptation benefits and how this relates to national planning and budgetary processes. 3. Degree to which strengthened awareness has translated into adaptation investment planning. 4. Degree to which better adaptation information has translated into more informed regional dialogues on transboundary river management and adaptation needs. Each question is answered with an assessment and score for the extent to which the associated criterion has been met: not at all (= 0), partially (= 1) or to a large extent/ completely (= 2). An	The demonstration of EbA interventions, knowledge-sharing and training provided by the project increases the awareness of targeted institutions about EbA possibilities and implications for flood and drought management and transboundary climate change effects.	Regional Project implementation unit, UN Environment, Project knowledge coordinator

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
				overall score is calculated, with a maximum score of 10 given five criteria.		
Outcome 1. Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.	Natural and physical assets necessary for adaptation to climate change (droughts and floods) in Thailand and Vietnam protected or rehabilitated.	Areas of forest, wetland, riparian habitat, grassland and agricultural land are degraded through overexploitation of natural resources. Water infrastructure needed to attenuate flooding, as well as store and redistribute water during droughts is absent or insufficient.	930 ha of natural habitats restored at demonstration sites in Thailand and Vietnam.	Monitoring and evaluation reports per intervention site; reports on community consultations/trainings and field visits, GIS.	All communities surrounding project intervention sites are committed to participating in project activities and taking up/adopting climate change adaptation activities (including EbA).	Regional Project implementation unit, Thailand PMU, Vietnam PMU
	Number of people participating in concrete on-the-ground climate change adaptation interventions (including EbA) to build resilience from drought and flood.	0	At least 1,000 people (500 in the Young River Basin and 500 in the communities surrounding Tram Chim National Park, of which at least 50% should be women) are participating in concrete on-the-ground climate change adaptation (including EbA) interventions. 40% reduction in the	Registers of project beneficiaries with gender disaggregation at each site, site visits and community surveys.	Community members continue to participate in adaptation interventions once they have been trained and provided with the necessary equipment.	Regional Project implementation unit, Thailand PMU, Vietnam PMU

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
	Percentage of change in average annual household crop production loss because of drought and flood.	Baseline values will be determined at the beginning of the project implementation	average annual household crop production loss attributed to drought and flood.	Household survey, interview with local agricultural extension officers.	Community members will be able to separate out crop production losses attributable to drought and flood.	Regional Project implementation unit, Thailand PMU, Vietnam PMU, Terminal Evaluation
Outcome 2. Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.	Number of projects utilising the guidelines for the design and implementation of EbA monitoring and evaluation systems generated.	0	3 projects are utilising the guidelines for the design and implementation of EbA monitoring and evaluation systems.	Review of project documents. Interviews with project managers.		Regional Project implementation unit, Project adaptation specialist
Outcome 3. Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.	Number of national adaptation strategies/plans that incorporate the climate change interventions demonstrated through the project (EbA, climate-resilient agriculture and additional climate-resilient livelihoods).	0	At least 1 national adaptation strategy/plan incorporates the climate change interventions demonstrated through the project (EbA, climate-resilient agriculture and additional climate-resilient livelihoods).	Project reports. Review of regional adaptation strategies/plans.	All GMS countries are committed to regional cooperation, planning and implementation of adaptation in the region.	Regional Project implementation unit, Project knowledge coordinator

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
Output 1.1: A suite of climate change adaptation interventions, including EbA, implemented at Young River Basin in Thailand.	Number of climate change adaptation interventions implemented at Young River Basin in Thailand.	0	At least 4 (EbA, climate-resilient agriculture, small-scale water supply infrastructure and additional climate-resilient livelihoods) climate change adaptation interventions are implemented at Young River Basin in Thailand.	Monitoring and evaluation reports per intervention site. Field visits. Interviews with beneficiary communities.		Regional Project implementation unit, Thailand PMU
	Number of community members in Young River Basin trained to plan and implement adaptation interventions (including EbA).	0	At least 250 community members from each of the two target sub-districts of Young River Basin (total 500; at least 50% women) trained to plan and implement adaptation interventions (including EbA).	Monitoring and evaluation reports per intervention site. Training attendance registers. Interviews with beneficiary communities.		Regional Project implementation unit, Thailand PMU
	Number of community members in Young River Basin implementing climate-resilient agriculture interventions (including agroforestry, drip irrigation and flood- and drought-resilient crop varieties).	0	At least 500 community members in Young River Basin implementing climate-resilient agriculture interventions (including agroforestry, drip irrigation and flood- and drought-resilient crop varieties).	Monitoring and evaluation reports per intervention site. Interviews with beneficiary communities. Field visits by project staff to confirm implementation.		Regional Project implementation unit, Thailand PMU
	Hectares of riverbanks and community forests rehabilitated with multi-use climate-resilient tree species.	0	At least 200 hectares of riverbanks and community forests rehabilitated with multi-use climate-resilient tree species.	Monitoring and evaluation reports per intervention site. Field visits by project staff. GIS mapping.		Regional Project implementation unit, Thailand PMU
	In the Young River Basin, number of: i) living check dams	10 weirs in need of rehabilitation.	In the Young River Basin, at least: i) 20 living check dams established; ii) 10	Monitoring and evaluation reports per intervention site. Field visits by project staff.		Regional Project implementation unit, Thailand PMU

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
	established; ii) weirs rehabilitated; and iii) households utilising innovative rainwater harvesting techinques.		weirs rehabilitated; and iii) 500 households utilising innovative rainwater harvesting techinques.	Photos of living check dams and rehabilitated weirs.		
	Number of climate-resilient livelihood options introduced in the Young River Basin, and number of community members benefitting from these interventions.	0	At least 5 different climate-resilient livelihood interventions introduced in the Young River Basin, benefitting at least 500 community members (50% of which are women).	Monitoring and evaluation reports per intervention site. Training attendance registers. Interviews with beneficiary communities.		Regional Project implementation unit, Thailand PMU
Output 1.2: A suite of climate change adaptation interventions, including EbA, implemented in communities living around Tram Chim National Park in Vietnam.	Number of climate change adaptation interventions implemented in communities living around Tram Chim National Park in Vietnam.	0	At least 4 (EbA, climate-resilient agriculture, small-scale water supply infrastructure and additional climate-resilient livelihoods) are implemented in communities living around Tram Chim National Park in Vietnam.	Monitoring and evaluation reports per intervention site. Field visits. Interviews with beneficiary communities.		Regional Project implementation unit, Vietnam PMU
	Number of community members surrounding Tram Chim National Park trained to plan and implement adaptation interventions.	0	At least 100 community members from each of the six communities surrounding Tram Chim National Park (total 600; at least 50% women) trained to plan and implement adaptation interventions (including EbA).	Monitoring and evaluation reports per intervention site. Training attendance registers. Interviews with beneficiary communities.		Regional Project implementation unit, Vietnam PMU
	Number of community members surrounding Tram Chim National Park implementing climate-resilient agriculture	0	At least 500 community members in surrounding Tram Chim National Park implementing climate-resilient agriculture interventions (including agroforestry, drip	Monitoring and evaluation reports per intervention site. Interviews with beneficiary communities. Field visits by project staff to confirm implementation.		Regional Project implementation unit, Vietnam PMU

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
	interventions (including agroforestry, drip irrigation and flood- and drought-resilient crop varieties).		irrigation and flood- and drought-resilient crop varieties).			
	Hectares of forest and grassland within Tram Chim National Park restored to improve water infiltration and provide NTFPs to surrounding communities.	0	At least 900 hectares of forest and grassland within Tram Chim National Park restored to improve water infiltration and provide NTFPs to surrounding communities.	Monitoring and evaluation reports per intervention site. Field visits by project staff. GIS mapping.		Regional Project implementation unit, Vietnam PMU, Tram Chin National Park Management Board
	In communities surrounding Tram Chim National Park, number of: i) living check dams established; ii) weirs rehabilitated; iii) canals rehabilitated; and iv) households utilising innovative rainwater harvesting techinques.	0	In communities surrounding Tram Chim National Park, at least: i) 6 living check dams established; ii) 20 weirs rehabilitated; iii) 2 canals rehabilitated; and iv) 500 households utilising innovative rainwater harvesting techinques.	Monitoring and evaluation reports per intervention site. Field visits by project staff. Photos of living check dams and rehabilitated weirs and canals.		Regional Project implementation unit, Vietnam PMU,
	Number of climate-resilient livelihood options introduced in communities surrounding Tram Chim National Park, and number of community members benefitting from these interventions.	0	At least 5 different climate-resilient livelihood interventions introduced communities surrounding Tram Chim National Park, benefitting at least 500 community members (50% of which are women).	Monitoring and evaluation reports per intervention site. Training attendance registers. Interviews with beneficiary communities.		Regional Project implementation unit, Vietnam PMU,
Output 1.3: Monitoring programme established to collect information on the cost-effectiveness of	Number of monitoring programme established.	0	Monitoring programme established by the end of the second year of the project.	Interviews with the project management unit. Monitoring and evaluation reports per intervention site.		Regional Project implementation unit, Project knowledge coordinator, national research institutions

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
project interventions in different socio-ecological contexts in the GMS.						
	Number of monitoring reports that include information on the cost-effectiveness of project interventions in different socio-ecological contexts produced.	0	4 monitoring reports that include information on the cost-effectiveness of project interventions in different socio-ecological contexts produced.	Review of monitoring reports.		Regional Project implementation unit, Project knowledge coordinator, national research institutions
Output 1.4: National level knowledge-sharing strategy implemented in Thailand and Vietnam.	Number of knowledge-sharing strategies developed.	0	2 knowledge-sharing strategies developed.	Review of knowledge-sharing strategy. Interviews with the project management unit.		Thailand PMU, Vietnam PMU, awareness-raising firms
	Number of knowledge-sharing events in target communities.	0	At least 10 knowledge-sharing events held in each of the target communities.	Monitoring and evaluation reports per intervention site. Knowledge-sharing events register.		Thailand PMU, Vietnam PMU, awareness-raising firms
Output 2.1: GMS-specific cost-effectiveness analysis undertaken on climate change adaptation interventions that reduce the impact of floods and droughts.	Number of cost-effectiveness analyses of climate change adaptation interventions that reduce the impacts of floods and droughts developed.	0	1 cost-effectiveness analysis of climate change adaptation interventions that reduce the impacts of floods and droughts developed by the end of the project's third year of implementation.	Review of cost-effectiveness analysis.		Regional Project implementation unit, Project adaptation specialist
Output 2.2: Policy briefs – and paper for the Lancang-Mekong Cooperation Outlook Report series – developed on: i) good practice in managing shared climate change impacts in the GMS; ii) integrating climate change adaptation into transboundary water	Number of policy briefs - and papers for the Lancang-Mekong Cooperation Outlook Report series - developed.	0	3 Policy briefs and 1 and paper for the Lancang-Mekong Cooperation Outlook Report series developed.	Review of policy briefs and paper for the Lancang-Mekong Cooperation Outlook Report.		Regional Project implementation unit, Project adaptation specialist

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
management; and iii) cost-effectiveness of EbA for reducing vulnerability to climate change.						
Output 2.3: Knowledge on EbA that has been generated and collated through the project shared on the main regional knowledge platforms, presented at regional adaptation forums and shared through different media.	Number of regional knowledge platforms used to disseminate EbA knowledge generated through the project.	0	At least 3 regional knowledge platforms used to disseminate EbA knowledge generated through the project.	Interviews with project manager. Review of knowledge platforms.		Regional Project implementation unit, Project adaptation specialist
Output 2.4: Guidelines for the design and implementation of EbA monitoring and evaluation systems, including simplified methods for collecting comparable information in different socio-ecological contexts.	Number of guidelines developed for the design and implementation of EbA monitoring and evaluation systems in the GMS.	0	1 guideline developed for the design and implementation of M&E systems for climate change adaptation (including EbA) projects in the GMS).	Review of guidelines.		Regional Project implementation unit, Project adaptation specialist
Output 2.5: Regional training events on ecosystem-based adaptation conducted with technical government staff from all GMS countries.	Number of regional training events on ecosystem-based adaptation conducted.	0	3 regional training events on ecosystem-based adaptation conducted.	Interviews with project manager. Attendance registers from regional training events/		Regional Project implementation unit, Project adaptation specialist
	Number of technical government staff for GMS countries trained on EbA (gender disaggregated).	0	At least 54 (18 per events; three events) technical government staff from GMS countries trained on EbA (gender disaggregated).	Attendance registers from training events. Interviews with project manager.		Regional Project implementation unit, Project adaptation specialist

Expected outcome/outputs	Outcome indicator	Baseline	Target	Sources of verification	Assumptions	Responsibility
Output 3.1: Recommendations for regional cooperation on the scaling up of climate change adaptation interventions – based on the results of the project – developed and presented at: i) Lancang-Mekong policy dialogues; ii) MRC regional stakeholder forums; iii) Thailand NAP stakeholder forum; and iv) Vietnam National Climate Change Strategy stakeholder forum.	Number of sets of recommendations developed on regional cooperation on implementing climate change adaptation interventions.	0	1 set of recommendations developed on regional cooperation on implementing climate change adaptation interventions.	Review of recommendations.		Regional Project implementation unit, Project knowledge coordinator
Output 3.2: Regional cooperation and relationship building on climate change adaptation promoted through regional dialogue.	Number of regional dialogues	0	At least two (four in total) regional meeting conducted	Interviews with project manager. Review of meeting Photos and videos		Regional Project implementation unit, Project knowledge coordinator

Annex VI: Budget

Expected Outputs	Output budget (US$)	Activities	Inputs	Umoja code	Budget notes	Y1 (US$)	Y2 (US$)	Y3 (US$)	Y4 (US$)	Total (US$)
Component 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems.										
Outcome 1: Climate change adaptation interventions implemented by vulnerable communities in the GMS to manage climate change impacts, particularly droughts and floods.										**4,800,000**
Output 1.1: A suite of climate change adaptation interventions, including EbA, implemented at Young River Basin in Thailand.	2,100,000	1.1.1 Develop detailed implementation protocols for the climate change adaptation interventions, including EbA, to be implemented in the Young River Basin.	National consultancy - Adaptation specialists	010	1.1a	35,000				**35,000**
			International consultancy - ESA and ESMP	010	1.1a	35,000				**35,000**
			International consultant - Chief Technical Advisor	010	1.1b 1.2b	22,500	22,500	22,500	22,500	**90,000**
			Workshops - Community consultations	120	1.1c	30,000				**30,000**
			National consultancy - Gender specialist	010	1.1k	10,000				**10,000**
		1.1.2 Train communities in the Young River Basin to implement climate change adaptation interventions according to the implementation protocols developed through Activity 1.1.1.	National consultancy - Adaptation specialists	010	1.1a	20,000				**20,000**
			Printing costs - Training materials	130	1.1e	10,000				**10,000**
			Training events - Thailand	130	1.1f	50,000	50,000	25,000	25,000	**150,000**
		1.1.3 Implement climate-resilient agriculture interventions in the selected sites within the Young River Basin.	Climate change adaptation intervention inputs - climate-resilient agriculture	130	1.1g		200,000	150,000	50,000	**400,000**
		1.1.4 Implement ecosystem-based adaptation interventions within the Young River Basin to maintain the supply of ecosystem goods and services to surrounding communities.	Climate change adaptation intervention inputs - ecosystem-based adaptation	130	1.1h		200,000	150,000	50,000	**400,000**

		1.1.5 Implement interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts.	Climate change adaptation intervention inputs - water management	130	1.1i		250,000	200,000	50,000	**500,000**
		1.1.6 Establish additional, climate-resilient livelihood options in the communities within the targeted sub-districts in the Young River Basin.	Climate change adaptation intervention inputs - additional climate-resilient livelihoods	130	1.1j		190,000	120,000	110,000	**420,000**
Output 1.2: A suite of climate change adaptation interventions, including EbA, implemented in communities living around Tram Chim National Park in Vietnam.	2,100,000	1.2.1 Develop detailed implementation protocols for the climate change adaptation interventions, including EbA, to be implemented in the communities living around Tram Chim National Park.	National consultancy - Adaptation specialists	010	1.2a	35,000				**35,000**
			International consultancy - ESA and ESMP	010	1.1a	35,000				**35,000**
			International consultant - Chief Technical Advisor	010	1.1b 1.2b	22,500	22,500	22,500	22,500	**90,000**
			Workshops - Community consultations	120	1.2c	30,000				**30,000**
			National consultancy - Gender specialist	010	1.2k	10,000				**10,000**
		1.2.2 Train communities living around Tram Chim National Park to implement climate change adaptation interventions according to the implementation protocols developed through Activity 1.1.1.	National consultancy - Adaptation specialists	010	1.2a	20,000				**20,000**
			Printing costs - Training materials	130	1.2e	10,000				**10,000**
			Training events - Tram Chin National Park	130	1.2f	50,000	50,000	25,000	25,000	**150,000**
		1.2.3 Implement climate-resilient agriculture interventions in the communities living around Tram Chim National Park.	Climate change adaptation intervention inputs - climate-resilient agriculture	130	1.2g		200,000	150,000	50,000	**400,000**
		1.2.4 Implement ecosystem-based adaptation interventions within Tram Chim National Park to maintain	Climate change adaptation intervention inputs - ecosystem-based adaptation	130	1.2h		250,000	200,000	50,000	**500,000**

		the supply of ecosystem goods and services to surrounding communities.								
		1.2.5 Implement interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts.	Climate change adaptation intervention inputs - water management	130	1.2i		250,000	200,000	50,000	**500,000**
		1.2.6 Establish additional, climate-resilient livelihood options in the communities living around Tram Chim National Park.	Climate change adaptation intervention inputs - additional climate-resilient livelihoods	130	1.2j		145,000	95,000	80,000	**320,000**
Output 1.3: Monitoring programme established to collect information on the cost-effectiveness of project interventions in different socio-ecological contexts in the GMS.	250,000	1.3.1: Design a monitoring and evaluation (M&E) plan for each adaptation demonstration site that is context-specific but also allows for comparison among sites.	National consultants (Thailand) - researchers	010	1.3a	5,000				**5,000**
			National consultants (Vietnam) - researchers	010	1.3b	5,000				**5,000**
		1.3.2: Implement the M&E plans in association with local research institutions to monitor the results, and collect information on the cost-effectiveness, of concrete adaptation technologies in different socio-ecological contexts. This information will be used to inform a cost-effectiveness analysis under Output 2.1.	National consultants (Thailand) - researchers	010	1.3a		20,000	20,000	20,000	**60,000**
			National consultants (Vietnam) - researchers	010	1.3b		20,000	20,000	20,000	**60,000**
			Intervention monitors (Thailand)	010	1.3c		20,000	20,000	20,000	**60,000**
			Intervention monitors (Vietnam)	010	1.3d		20,000	20,000	20,000	**60,000**
Output 1.4: National level knowledge-sharing	350,000	1.4.1: Design knowledge-sharing strategies in Thailand and Vietnam that are locally appropriate and enhance	National consultancy (Thailand) - Awareness-raising firm	120	1.4a	25,000				**25,000**
			National consultancy (Vietnam) - Awareness-raising firm	120	1.4b	25,000				**25,000**

strategy implemented in Thailand and Vietnam.		the local transfer of applicable adaptation knowledge.								
		1.4.2: Implement the knowledge-sharing strategies in communities surrounding the project demonstration sites in Thailand and Vietnam.	National consultancy (Thailand) - Awareness-raising firm	120	1.4a	25,000	25,000	50,000	50,000	**150,000**
			National consultancy (Vietnam) - Awareness-raising firm	120	1.4b	25,000	25,000	50,000	50,000	**150,000**
Component 2: Regional knowledge base on climate change adaptation expanded in the GMS.										
Outcome 2: Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.										**638,709**
Output 2.1: GMS-specific cost-effectiveness analysis undertaken on climate change adaptation interventions that reduce the impact of floods and droughts.	130,000	2.1.1: Collate information on cost-effectiveness generated through M&E plans at project demonstration sites (Output 1.3).	Project adaptation specialist	010	2.1a	15,000	15,000	15,000	15,000	**60,000**
		2.1.2: Undertake a comprehensive literature review on the cost-effectiveness of different climate change adaptation interventions in the GMS.	International consultancy – Cost-effectiveness analysis	010	2.1b			5,000		**5,000**
		2.1.3: Conduct interviews and consultations with stakeholders involved in climate change adaptation projects in the GMS on the cost-effectiveness of different climate change adaptation interventions.	International consultancy – Cost-effectiveness analysis	010	2.1b			5,000		**5,000**
			Consultations - cost-effectiveness analysis	120	2.1c			20,000		**20,000**
		2.1.4: Develop a cost-effectiveness analysis of climate change adaptation interventions that reduce the impacts of floods and droughts.	International consultancy – Cost-effectiveness analysis	010	2.1b			30,000		**30,000**
			Printing costs - Cost-effectiveness analysis	130	2.1d			10,000		**10,000**
Output 2.2: Policy briefs – and paper	88,709	2.2.1: Identify policy barriers to climate change adaptation, upscaling and	Project adaptation specialist	010	2.2a	2,000				**2,000**

for the Lancang-Mekong Cooperation Outlook Report series – developed on: i) good practice in managing shared climate change impacts in the GMS; ii) integrating climate change adaptation into transboundary water management; and iii) cost-effectiveness of EbA for reducing vulnerability to climate change.		mainstreaming in the GMS, with a focus on policies relating to transboundary water and river basin management.								
		2.2.2: Develop one policy brief on good practice in managing shared climate change impacts (drought and floods) in the GMS.	Project adaptation specialist	010	2.2a		6,000			**6,000**
		2.2.3: Develop one policy brief on integrating climate change adaptation into transboundary water management.	Project adaptation specialist	010	2.2a		6,000			**6,000**
			Printing costs - Policy briefs	130	2.2b				8,709	**8,709**
		2.2.4: Develop one policy brief on the cost-effectiveness of EbA for reducing vulnerability to climate change in the GMS.	Project adaptation specialist	010	2.2a		6,000			**6,000**
		2.2.5: Develop an original paper for LM-ECC Environmental Outlook Report series on climate change adaptation in the GMS with special reference to: i) concrete adaptation strategies – including EbA – for shared climate impacts like droughts and floods; ii) integrating climate change adaptation into transboundary water and river basin management; and iii) regional coordination on adapting to climate change.	Project knowledge coordinator	010	2.2c		20,000	20,000	20,000	**60,000**

Output 2.3: Knowledge on EbA that has been generated and collated through the project shared on the main regional knowledge platforms, presented at regional adaptation forums and shared through different media.	130,000	2.3.1: Share M&E guidelines (Output 1.4), the cost-effectiveness analysis (Output 2.1) and policy briefs (Output 2.2) on three regional knowledge platforms.	Project knowledge coordinator	010	2.2a 2.3a	10,000	10,000	10,000	10,000	**40,000**
		2.3.2: Present M&E guidelines (Output 1.4), the cost-effectiveness analysis (Output 2.1) and policy briefs (Output 2.2) at three regional forums.	Project knowledge coordinator	010	2.2a 2.3a	10,000	10,000	10,000	10,000	**40,000**
			Travel - knowledge sharing	160	2.3b	5,000	15,000	15,000	15,000	**50,000**
Output 2.4: Guidelines for the design and implementation of EbA monitoring and evaluation systems, including simplified methods for collecting comparable information in different socio-	40,000	2.4.1: Collate and evaluate lessons learned from the implementation of M&E plans at each project demonstration site.	Project adaptation specialist	010	2.4a	5,000	5,000	5,000	5,000	**20,000**
		2.4.2: Review M&E plans from other adaptation projects to identify design features that encourage cost-effective, simplified and comparable M&E systems.	International consultant - M&E specialist	010	2.4b				10,000	**10,000**
		2.4.3: Develop guidelines for the design and implementation of M&E systems for climate change adaptation (including EbA) projects in the GMS.	International consultant - M&E specialist	010	2.4b				10,000	**10,000**

ecological contexts.										
Output 2.5: Regional training events on ecosystem-based adaptation conducted with technical government staff from all GMS countries.	250,000	2.5.1: Develop and/or update training material on best-practice ecosystem-based adaptation interventions in the GMS.	National consultants - trainers	010	2.5a	15,000				**15,000**
		2.5.2: Host three regional training events on ecosystem-based adaptation for technical government staff from all GMS countries.	Training workshops - regional EbA training	120	2.5b		60,000	60,000	60,000	**180,000**
			National consultants - trainers	010	2.5a	5,000	5,000	5,000	5,000	**20,000**
			Project knowledge coordinator	010	2.5c	5,000	5,000	5,000	5,000	**20,000**
			Printing costs - EbA training material	130	2.5d		5,000	5,000	5,000	**15,000**
Component 3: Regional cooperation on climate change adaptation.										
Outcome 3: Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.										**400,000**
Output 3.1: Recommendations for regional cooperation on the scaling up of climate change adaptation interventions – based on the results of the project – developed and presented at: i) Lancang-Mekong policy dialogues;	130,000	3.1.1: Develop recommendations for strengthening regional cooperation on implementing climate change adaptation interventions using information generated through: i) the proposed project; and ii) a review of past and ongoing projects on regional climate change adaptation and transboundary and river basin water management within and beyond the GMS.	Project adaptation specialist	010	3.1a			10,000	10,000	**20,000**
			National consultants (Thailand and Vietnam) - Adaptation specialists	010	3.1b			5,000	5,000	**10,000**
			International consultant - Policy expert	010	3.1c			10,000	10,000	**20,000**
			Printing costs - Recommendations	130	3.1d			5,000	5,000	**10,000**
		3.1.2: Present the set of recommendations at primary national and regional climate change adaptation dialogues and forums, including: i)	Project adaptation specialist	010	3.1a				20,000	**20,000**
			National consultants (Thailand and Vietnam) - Adaptation specialists	010	3.1b			5,000	5,000	**10,000**
			Travel - Recommendations	160	3.1e			10,000	10,000	**20,000**
			Project knowledge coordinator	010	3.1f	5,000	5,000	5,000	5,000	**20,000**

ii) MRC regional stakeholder forums; iii) Thailand NAP stakeholder forum; and iv) Vietnam National Climate Change Strategy stakeholder forum.		Lancang-Mekong policy dialogues; ii) the MRC regional stakeholder forum on MASAP; iii) the Thailand NAP stakeholder forum; and iv) the Vietnam National Climate Change Strategy stakeholder forum.								
Output 3.2: Regional cooperation and relationship building on climate change adaptation promoted through regional dialogue between policy-makers and planners of the GMS countries.	270,000	3.2.1: Organise four regional dialogue meeting to facilitate regional cooperation on climate change adaptation	Exchange visits	160	3.2a		40,000	80,000	85,000	**205,000**
			Project adaptation specialist	010	3.2b	5,000	5,000	5,000	5,000	**20,000**
		3.2.2: Produce media products, such as short documentaries, that capture knowledge shared during the exchange visits.	National consultancy - Awareness-raising firm	120	3.2d			10,000	10,000	**20,000**
			Project adaptation specialist	010	3.2c	5,000	5,000	5,000	5,000	**20,000**
		3.2.3: Disseminate media products detailing climate change adaptation interventions implemented and lessons learned.	National consultancy - Awareness-raising firm	120	3.2d			2,500	2,500	**5,000**
						622,000	**2,183,000**	**1,912,500**	**1,121,209**	**5,838,709**
Project Execution costs										
Project Execution	215,000		Thailand project manager	10		20,400	20,400	20,400	20,400	**81,600**
			Thailand administrative and procurement assistant	10		10,200	10,200	10,200	10,200	**40,800**

Costs Thailand			Thailand local community coordinators	10		16,200	16,200	16,200	16,200	**64,800**
			Thailand PSC meetings	125		2,000	2,000	2,000	2,000	**8,000**
			Thailand communication costs	125		2,000	2,000	2,000	3,000	**9,000**
			Thailand office equipment	135		4,800				**4,800**
			Thailand PMU travel costs	120		3,000	3,000	3,000	3,000	**12,000**
Project Execution Costs Vietnam	215,000		Vietnam project manager	10		20,400	20,400	20,400	20,400	**81,600**
			Vietnam administrative and procurement assistant	10		10,800	10,800	10,800	10,800	**43,200**
			Vietnam local community coordinator	10		15,600	15,600	15,600	15,600	**62,400**
			Vietnam PSC meetings	125		2,000	2,000	2,000	2,000	**8,000**
			Vietnam communication costs	125		2,000	2,000	2,000	3,000	**9,000**
			Vietnam office equipment	135		4,800				**4,800**
			Vietnam PMU travel costs	120		3,000	3,000	3,000	3,000	**12,000**
Project Management Costs Regional	120,903		Regional administrative and procurement assistant	10		21,600	21,600	21,600	21,600	**86,400**
			Regional PSC meetings	125		7,500	7,500	7,500	7,500	**30,000**
			Regional communication costs	125		1,000	1,000	1,000	1,503	**4,503**
Monitoring and Evaluation	62,000		Terminal evaluation	10					50,000	**50,000**
						147,300	**137,700**	**137,700**	**190,203**	**612,903**
Project Cycle Management Fee charged by the Implementing Entity (8.5%)										**548,388**
TOTAL										**7,000,000**

Table VIII.1: Budget notes.

#	Description	Budget notes
1.1a	National consultancy - Adaptation specialists	1.1.1 National consultancy to undertake the necessary assessments and design detailed implementation protocols for all climate change adaptation interventions. 1.1.2 The consultancy will also develop training materials, based on the assessments and implementation protocols, for communities on climate-resilient agriculture, EbA and additional climate-resilient livelihoods.
1.1a	International consultancy - ESA and ESMP	International consultancy to undertake an environmental and social assessments and develop an environmental and social management plan to identify and mitigate potential environmental and social risks associated with the implementation of climate change adaptation interventions, including EbA (see Annex XIII for terms of reference for this work).
1.1b 1.2b	International consultant - Chief Technical Advisor	Consultancy for an international consultant to perform the role of Chief Technical Advisor (CTA) for the entire implementation of the project. The CTA will oversee the development of the implementation protocols for all climate change adaptation interventions and provide quality assurance. 60 days per year at $650 per day = $39,000 per year. $6,000 per year travel and DSA. Total $45,000 per year. Cost of CTA split between Output 1.1 and Output 1.2.
1.1c	Workshops - Community consultations	Participatory planning workshops with relevant stakeholder groups (including Young River Basin Committee) to validate the climate change adaptation interventions identified in the vulnerability assessment and develop a detailed plan for the implementation of these interventions. 4 workshops (2 per sub-district) at $7,500 per workshop, all inclusive (including travel, venue hire, translation, etc).
1.1e	Printing costs - Training materials	Printing costs for training materials on climate change adaptation interventions for communities in the Young River Basin.
1.1f	Training events - Thailand	Cost of training communities in the Young River Basin on climate-resilient agriculture, EbA and additional climate-resilient livelihoods.
1.1g	Climate change adaptation intervention inputs - climate-resilient agriculture	Input costs for the implementation of climate-resilient agriculture interventions in the Young River Basin.
1.1h	Climate change adaptation intervention inputs - ecosystem-based adaptation	Input costs for the implementation of ecosystem-based adaptation interventions within the Young River Basin to maintain the supply of ecosystem goods and services to surrounding communities.
1.1i	Climate change adaptation intervention inputs - water management	Input costs for the implementation of interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts in the Young River Basin.
1.1j	Climate change adaptation intervention inputs - additional climate-resilient livelihoods	Input costs for the establishment of additional, climate-resilient livelihood options in the communities within the targeted sub-districts in the Young River Basin.
1.1 k	National consultancy - Gender specialist	National consultancy to develop a gender action plan and ensure that gender considerations are included in the climate change adaptation intervention protocols.
1.2a	National consultancy - Adaptation specialists	1.1.1 National consultancy to undertake the necessary assessments and design detailed implementation protocols for all climate change adaptation interventions. 1.1.2 The consultancy will also develop training materials, based on the assessments and implementation protocols, for communities on climate-resilient agriculture, EbA and additional climate-resilient livelihoods.
1.2c		

#	Description	Budget notes
	Workshops - Community consultations	Participatory planning workshops with relevant stakeholder groups (including Tram Chim National Park management and commune authorities) to validate the climate change adaptation interventions identified in the vulnerability assessment and develop a detailed plan for the implementation of these interventions. 4 workshops at $7,500 per workshop, all inclusive (including travel, venue hire, translation, etc).
1.2e	Printing costs - Training materials	Printing costs for training materials on climate change adaptation interventions for communities surrounding Tram Chim National Park.
1.2f	Training events - Vietnam	Cost of training communities living around Tram Chim National Park on climate-resilient agriculture, EbA and additional climate-resilient livelihoods.
1.2g	Climate change adaptation intervention inputs - climate-resilient agriculture	Input costs for the implementation of climate-resilient agriculture interventions in the communities living around Tram Chim National Park.
1.2h	Climate change adaptation intervention inputs - ecosystem-based adaptation	Input costs for the implementation of ecosystem-based adaptation interventions within Tram Chim National Park to maintain the supply of ecosystem goods and services to surrounding communities.
1.2i	Climate change adaptation intervention inputs - water management	Input costs for the implementation of interventions to improve water infrastructure and water management to reduce the negative impacts of floods and droughts in the communities living around Tram Chim National Park.
1.2j	Climate change adaptation intervention inputs - additional climate-resilient livelihoods	Input costs for the establishment of additional, climate-resilient livelihood options in the communities living around Tram Chim National Park.
1.2 k	National consultancy - Gender specialist	National consultancy to develop a gender action plan and ensure that gender considerations are included in the climate change adaptation intervention protocols.
1.3a	National consultants (Thailand) - researchers	National researchers to design and oversee long-term monitoring programme in collaboration with local research institutions. The researchers will also be responsible for providing training on M&E to national project staff during the first year ($5,000). National researchers will guide and assist intervention monitors to conduct monitoring within target communities. These national researchers will also be responsible for compiling annual monitoring report in association with project staff. Researcher's roles will also include compiling information for relevant regional outputs. $20,000 per year (from the second year) is allocated to national researchers for monitoring and the production of annual monitoring reports.
1.3b	National consultancy (Vietnam) - researchers	National researchers to design and oversee long-term monitoring programme in collaboration with local research institutions. The researchers will also be responsible for providing training on M&E to national project staff during the first year ($5,000). National researchers will guide and assist intervention monitors to conduct monitoring within target communities. These national researchers will also be responsible for compiling annual monitoring report in association with project staff. Researcher's roles will also include compiling information for relevant regional outputs. $20,000 per year (from the second year) is allocated to national researchers for monitoring and the production of annual monitoring reports.
1.3c	Intervention monitors (Thailand)	Stipend for local intervention monitors to conduct monitoring and research in target communities. Monitors will also assist national researchers in the collation of cost-effectiveness information generated through M&E plans (Activity 2.1.1). Stipend will cover transport, equipment and living expenses. Stipend per intervention monitor: $2,000 per year. 10 intervention monitors across the project intervention sites.
1.3d	Intervention monitors (Vietnam)	Stipend for local intervention monitors to conduct monitoring and research in target communities. Monitors will also assist national researchers in the collation of cost-effectiveness information generated through M&E plans (Activity 2.1.1).

#	Description	Budget notes
		Stipend will cover transport, equipment and living expenses. Stipend per intervention monitor: $2,000 per year. 10 intervention monitors across the project intervention sites.
1.4a	National consultancy (Thailand) - Awareness-raising firm	National awareness-raising firm in Thailand to design a locally appropriate national level adaptation knowledge sharing strategy. The firm will also be responsible for implementing the knowledge-sharing strategy in the communities surrounding the project demonstration sites in the Young River Basin. $50,000 is allocated to the design and implementation of the strategy during the first year of project implementation, and $25,000 for implementation per year thereafter. Total = $50,000 x 1 + $25,000 x 3 = $125,000
1.4b	National consultancy (Vietnam) - Awareness-raising firm	National awareness-raising firm in Vietnam to design a locally appropriate national level adaptation knowledge sharing strategy. The firm will also be responsible for implementing the knowledge-sharing strategy in the communities surrounding the project demonstration sites surrounding Tram Chim National Park. $50,000 is allocated to the design and implementation of the strategy during the first year of project implementation, and $25,000 for implementation per year thereafter. Total = $50,000 x 1 + $25,000 x 3 = $125,000
2.1b	International consultancy – Cost-effectiveness analysis	International consultancy to develop a GMS-specific cost-effectiveness analysis of climate change adaptation interventions that reduce the impact of floods and droughts.
2.1c	Consultations - cost-effectiveness analysis	Cost of interviews and consultations with stakeholders involved in climate change adaptation projects in the GMS on the cost-effectiveness of different climate change adaptation interventions.
2.1a 2.2a 2.4a 3.1a 3.2b 3.2c	Project adaptation specialist	Please see ToR at Annex VII
2.1d	Printing costs - cost-effectiveness analysis	Cost for design and printing of cost-effectiveness analysis.
2.2c 2.3a 2.5c 3.1f	Project knowledge coordinator	Please see ToR at Annex VII
2.2b	Printing costs - Policy briefs	Cost of printing and dissemination of the three policy briefs developed under Output 2.2.
2.3b	Travel - knowledge sharing	Travel costs for the presentation of M&E guidelines (Output 1.4), the cost-effectiveness analysis (Output 2.1) and policy briefs (Output 2.2) at three regional forums.
2.4a	International consultant - M&E specialist	International M&E expert to: i) collate and evaluate lessons learned from the implementation of M&E plans at project demonstration sites; ii) review M&E plans from other adaptation projects to identify design features that encourage cost-effective, simplified and comparable M&E systems; and iii) develop guidelines for the design and implementation of M&E systems for climate change adaptation (including EbA) projects in the GMS.
2.5a	National consultants - trainers	National consultants (specialising in training and adaptation; from each of the GMS countries) to develop and update training material on best-practice EbA interventions in the GMS (with assistance from the project knowledge coordinator – Budget note 2.5c). The initial development of training material will be conducted during the first year of project implementation, followed by the updating of this information annually until project termination. Training material must be developed taking into account lessons learned through the implementation of climate change interventions in Thailand (Output 1.1) and Vietnam (Output 1.2). It must also incorporate the findings of the cost-effectiveness analysis (Output 2.1) and M&E guidelines (Output 2.5). A module on conducting gender analyses and incorporating gender considerations into the

#	Description	Budget notes
		design of climate change adaptation interventions must also be presented. Trainers will also be required to conduct training at the training workshops.
2.5b	Training workshops - regional EbA training	Three regional training events on EbA in Beijing during the second, third and fourth years of project implementation for technical government staff from all GMS countries (including Cambodia, China, Lao PDR, Myanmar, Thailand and Vietnam). Four delegates from each country will be invited to attend each training event (24 delegates in total). $60,000 per workshop including venue hire, travel, accommodation and meals for delegates. Total cost = $60,000 per event x 3 events = $180,000
2.5d	Printing costs - EbA training material	Printing costs for training material for each training event, including translation into relevant regional languages. Total cost = $5,000 x 3 events = $15,000
3.1b	National consultants (Thailand and Vietnam) - Adaptation specialists	National adaptation specialists (one each from Thailand and Vietnam) to assist the project adaptation specialist in the development of a set of recommendations on regional cooperation on implementing climate change adaptation interventions. The national adaptation specialists will ensure that country-specific (Thailand and Vietnam) information generated through the project informs the recommendations. Once developed, the national consultants will present the set of recommendations at respective national climate change adaptation forums and dialogues (including the Thailand NAP stakeholder forum and Vietnam National Climate Change Strategy stakeholder forum). $10,000 is allocated to each of the national adaptation experts during the last two years of project implementation to develop and present the set of recommendations (including professional fees, travel, accommodation and meals).
3.1c	International consultant - Policy expert	International policy expert (familiar with policy across the GMS) to assist the project adaptation specialist in the development of a set of recommendations on regional cooperation on implementing climate change adaptation interventions. The international policy expert will ensure that the relevant policies of GMS countries are identified and taken into account. $20,000 is allocated to the international policy expert for his/her input into the development of recommendations over the last two years of project implementation.
3.1d	Printing costs - Recommendations	Cost of printing and dissemination of the set of recommendations for strengthening regional cooperation on implementing climate change adaptation interventions.
3.1e	Travel - Recommendations	Travel costs for relevant experts to present the set of recommendations at primary national and regional climate change adaptation dialogues and forums.
3.2a	Exchange visits	Exchange visits to project demonstration sites (Thailand and Vietnam). These visits will occur in years 2, 3 and 4 of the project's implementation period and will be organised and conducted by representatives from each project country (Thailand and Vietnam), supported by the project adaptation specialist. These representatives will also be required to generate reports which will include information and feedback on each of the exchange visits. Participants may include representatives of: i) national government institutions; ii) country offices of regional institutions like the LMC, MRC and ADB; iii) national project teams; and iv) national research institutions. Budget allocated to each set of exchange visits includes transport, accommodation and meals for participants. A total of 4sets of exchange visits will be organised.

Table VIII.2. Implementing Entity Fee.

Description	Total (US$)
Portfolio manager	100,000
Task manager	253,098

Financial management	22,000
Administration	12,000
Corporate services	25,000
Mid-term review	36,290
External audits	100,000
Total	**548,388**

Annex VII. Terms of References (ToRs) for key project members

Terms of Reference for national Project Managers (PM)

Scope of Work

The two Project Managers (PM) will lead the Thailand and Vietnam Project Management Units (PMU), respectively, and provide overall operational management for the successful execution and implementation of the project within the respective country. This position's responsibilities include the daily responsibility for management, coordination and supervision of the implementation of the project and delivery of the results in accordance with the full project proposal and work plans. In addition, the PM will be responsible for financial management and disbursements, with accountability to the government, and UN Environment. The PM will report to the Regional Policy Steering Committee (RPSC).

The responsibilities of the PMs will include the following.

- Oversee and manage project implementation, monitor work progress, and ensure timely delivery of outputs.
- Report to the NPD of the respective national designated executing entity (DWR-MoNRE for Thailand and DLA-MoNRE for Vietnam) and RPSC regarding project progress.
- Develop and facilitate the implementation of a comprehensive monitoring and reporting system.
- Develop and facilitate the implementation of a comprehensive stakeholder engagement plan.
- Ensure timely preparation of detailed annual work plans and budgets for approval by the RPSC.
- Assist in the identification, selection and recruitment of staff, consultants and other experts as required.
- Supervise, coordinate and facilitate the work of the administrative/technical team (consisting of the finance and procurement assistant, local community coordinators, and national and international consultants).
- Control expenditures and assure adequate management of resources.
- Establish linkages and networks with on-going activities by other government and nongovernment agencies.
- Provide input to management and technical reports, and other documents as described in the M&E plan for the overall project. Reports should contain assessments of progress in implementing activities, including reasons for delays, if any, and recommendations on necessary improvements.
- Inform the respective national designated executing entity and RPSC, without delay, of any issue or risk which might jeopardise the success of the project.
- Liaise and coordinate with UN Environment and UNEP-IEMP on a regular basis.

Qualifications

- Master's degree in environment, natural resources management, agriculture or a closely related field.
- A minimum of 10 years' relevant work experience.
- Demonstrated solid knowledge of environmental and ecological restoration, with an emphasis on water resources management.
- Demonstrated solid knowledge of climate change adaptation management techniques, practices and technologies.
- Experience in the public participation development process associated with environmental and sustainable development an asset.
- Experience in working and collaborating with governments and assets.
- Excellent knowledge of English, including writing and communication skills.

Reporting

The PM will report to the NPD of the respective national designated executing entity. The PM will work closely with the RPSC, CTA, UN Environment and UNEP-IEMP to ensure the availability of information on progress and performance in the implementation of the project.

Terms of Reference for Chief Technical Advisor (CTA)

Scope of Work

The CTA will develop the restoration and conservation agriculture protocols, as well as provide the PMs with technical guidance on the implementation of the AF project. The position of CTA is likely to be filled by an international consultant.

The responsibilities of the CTA will include the following.

- Assist/guide the development of climate change adaptation intervention protocols.
- Provide quality assurance and technical review of project outputs.
- Undertake a technical review of project outputs (e.g. studies and assessments).
- Assist in the drafting of ToRs for technical consultants and community coordinators.
- Supervise the work of consultants.
- Assist in monitoring the technical quality of project M&E systems (including annual work plans, indicators and targets).
- Conduct financial and administrative reporting, as well as the PPR.
- Provide advice on best suitable approaches and methodologies for achieving project targets and objectives.
- Provide a technical supervisory function to the work carried out by national technical advisors, and consultants hired by the project.
- Assist in knowledge management, communications and awareness-raising.
- Facilitate the development of strategic regional and international partnerships for the exchange of skills and information related to climate change adaptation.

Qualifications

- At least an advanced post-graduate at or above M.Sc. level, in a relevant discipline, including climate change adaptation, botany/forestry/soil science, environmental management, natural resources management, agriculture, water resources or a related discipline.
- A minimum of five years' experience in a senior technical leadership position with planning and management of environmental and/or natural resources management programmes in developing countries.
- A minimum of five years in a senior technical position involved in institutional strengthening and capacity building.
- Previous similar experiences in provision of technical support to complex projects.
- Experience working in the GMS would be an advantage.
- Good communication and computer skills.
- Fluent in spoken and written English.

Reporting

The CTA will report to the RPSC. The CTA will cooperate with the NPDs, PMs, finance and procurement assistants, staff of the national designated executing entities (DWR-MoNRE for Thailand and DLA-MoNRE in Vietnam) and UN Environment task manager to ensure the availability of information on progress and performance in the implementation of the project. In the implementation of his/her duties, the CTA will work in close collaboration with the UN

Environment task manager, specifically in consultation for implementation and decision-making of the project.

Terms of Reference for the Finance and Procurement Assistants

Scope of Work

The responsibilities of the Finance and Procurement Assistants will include the following.

- Standardise the finance and accounting systems of the project while maintaining compatibility with AF, government (Thailand and Vietnam) and UN Environment financial accounting guidelines.
- Prepare budget revisions of the project budgets and assist in the preparation of the annual work plans.
- Comply and verify budget and accounting data by researching files, calculating costs and estimating anticipated expenditures from readily available information sources, in particular, partner agencies.
- Prepare status reports, progress reports and other financial reports.
- Process all types of payment requests for settlement purposes, including quarterly advances to the partners upon joint review.
- Prepare periodic accounting records by recording receipts, disbursements – ledgers, cash books, vouchers, etc. – and reconciling data for recurring or financial special reports and assist in the preparation of annual procurement plans.
- Undertake project financial closure formalities, including submission of terminal reports, transfer and disposal of equipment, processing of semi-final revisions and support professional staff in preparing the terminal assessment reports.
- Assist in the timely issuance of contracts and assurance of other eligible entitlements of the project personnel, experts and consultants, by preparing annual recruitment plans.

Reporting

The Finance and Procurement Assistants will report to PMs.

Indicative Terms of Reference for Project adaptation specialist

A full-time **Project adaptation specialist** will be contracted to deliver technical products as well as to regularly work with the Project knowledge coordinator, international consultants and national teams of Thailand and Vietnam to provide technical input and advice into the knowledge and policy coordination products developed under Component 1, 2 and 3. Importantly, the specialist will work closely with the national teams of Thailand and Vietnam as well as the CTA to ensure that the knowledge and lessons learned generated through the project on-the-ground interventions and other national level products and activities under Component 1 will be incorporated in the regional products and vice versa. As this position will be based in Beijing, the specialist will also work with the CERN, CAS and LMEC to facilitate South-South technical learning and policy dialogue between China and the pilot project countries and beyond. The specialist will report to the Regional Policy Steering Committee.

Responsibilities

Output 1.1 and Output 1.2: On-the-ground climate change adaptation interventions, including EbA (Thailand and Vietnam)

- Regularly engage with the national teams of Thailand and Vietnam to obtain an insightful information on the concrete adaptation (including EbA) interventions, results, challenges, lessons, in order to further compile and analyse as input for the relevant regional deliverables as well as to ensure the linkages with the regional context and vice versa, wherever possible

Output 1.3: Monitoring programme

- Provide technical advice, along with the Chinese Ecosystem Research Network (CERN), on the design and implementation of the M&E plans for each of the demonstration sites to ensure the further applicability of their results for the project regional deliverables

Output 2.1: GMS-specific cost-effectiveness analysis

- Systematically collect the M&E data (from Output 1.3) on cost-effectiveness generated from the demonstration sites
- Support the international consultancy 'cost-effectiveness analysis' on the data from the demonstration sites and, as required, additional information on other climate change adaptation (including EbA) initiatives and stakeholders for consultation
- Oversee the work plan, stakeholder consultation plan, concept/content outline and the analysis developed by the international consultancy 'cost-effectiveness analysis' to ensure the quality of the product

Output 2.2: Policy briefs – and paper for the Lancang-Mekong Cooperation Outlook Report series

- Conduct comprehensive review of policy related to climate change adaptation topics in the GMS at national and regional levels and other regions/transboundary river basins through results and lessons learned from the project demonstration sites; good practices and challenges from other initiatives; and consultation with relevant stakeholders beyond the project, as appropriate
- Develop three policy briefs on the topics of: good practice in managing shared climate change impacts in the GMS; integrating climate change adaptation into transboundary water management; and (using the results of Output 2.1) cost-effectiveness of EbA for reducing vulnerability to climate change in the GMS

Output 2.4: Guidelines for the design and implementation of M&E systems

- Systematically collect and evaluate the lessons learned from the M&E plans of the project demonstration sites on, inter alia, key features of the M&E systems, their implementation lessons (science base, stakeholder engagement, gender inclusiveness, operation, success, failure/barriers, recommendations) with support from the national team of Thailand and Vietnam, CTA
- Support the international consultant 'M&E specialist' on the data from the demonstration sites and, as required, additional M&E related information from other climate change adaptation (including EbA) initiatives

- Oversee the work plan, concept/content outline and final guidelines developed by the international consultant 'M&E specialist' to ensure the quality of the product
- Facilitate the review and contribution from LMEC on the guidelines

Output 3.1: Policy recommendations for regional cooperation on the scaling up of climate change adaptation interventions

- Conduct a comprehensive policy review on strengthening regional cooperation and the scaling up of climate change adaptation interventions into national and regional planning processes based on the experience gained from the proposed project as well as lessons learned from other adaptation and transboundary resource management/river basin initiatives in the GMS and beyond
- Review the report produced by the national adaptation specialists (one each from Thailand and Vietnam) on recommendations of regional cooperation on implementing climate change adaptation interventions to ensure that country-specific (Thailand and Vietnam) information generated through the project informs the final recommendations
- Support the international consultant 'policy expert' by providing the data from the two previous points and others, as required
- Oversee the work plan, concept/content outline and the recommendations developed by the international consultant 'policy expert' to ensure the quality of the product
- Present the recommendations at regional climate change adaptation dialogues and forums, including Lancang-Mekong policy dialogues and the MRC regional stakeholder forum

Output 3.2: Regional cooperation and relationship building on climate change adaptation

- Design and organise the regional dialogues/exchange visits, with support from the national teams of Thailand and Vietnam, to learn about the project interventions as well as the issues and recommendation on regional cooperation
- Prepare report from each of the events with feedback from the participants
- Work with the national teams to produce and disseminate the media products on the project interventions, information generated from the project, lessons learned

Outputs

Develop one policy brief on good practice in managing shared climate change impacts (drought and floods) in the GMS.

• Develop one policy brief on integrating climate change adaptation into transboundary water management.

• Develop one policy brief on the cost-effectiveness of EbA for reducing vulnerability to climate change in the GMS.

• Overseeing the development of a set of recommendations on regional cooperation on implementing climate change adaptation interventions, working closely with the Thailand and Vietnam country teams and based on a review of all past and ongoing projects on regional climate change adaptation.

• Organising and conducting exchange visits to the project's adaptation demonstration sites in Thailand and Vietnam, including: i) site visits; ii) formal and informal community consultations; iii) knowledge-sharing events; iv) presentations by local project teams and v) policy discussions between high-level participants from the various GMS countries. The consultant will also be required to generate reports which will include information and feedback on each of the exchange visits.

Qualifications

- Advanced degrees (minimum Masters level) in environmental sciences, environmental policy, ecology, sustainable development, natural resource management or other relevant fields
- A minimum of 10 years' relevant work experience on climate change and adaptation policies and practices at regional level or in multiple countries, preferably in the GMS
- Demonstrated knowledge on policy process and transboundary management of natural resources in the Mekong or river basin organisations

- Excellent knowledge of English, including writing and communication skills, knowledge of GMS languages (particularly Thai and/or Vietnamese) an asset

Indicative Terms of Reference for Project knowledge coordinator

A full-time **Project knowledge coordinator** will be contracted to oversee the knowledge generation, knowledge dissemination, capacity building and awareness raising at regional level. The coordinator will regularly work with the Project adaptation specialist, national teams of Thailand and Vietnam (including the national consultants on capacity building and awareness raising) to provide technical input to those activities at the national and local levels as well as to ensure that the knowledge and lessons generated through the project on-the-ground interventions and other national level products and activities under Component 1 will be incorporated in the regional knowledge products and capacity building events and vice versa. As this position will be based in Beijing, the coordinator will also work with the CERN, CAS and LMEC to facilitate South-South technical learning and policy dialogue between China and the pilot project countries and beyond. Additionally, the coordinator will liaise with the UN Environment, including preparing the required documents for the regional components such as the project progress reports and annual workplan, and will report to the Regional Policy Steering Committee.

Responsibilities

Output 1.1 and Output 1.2: On-the-ground climate change adaptation interventions, including EbA (Thailand and Vietnam)

- Regularly engage with the national teams of Thailand and Vietnam to obtain an insightful information on the concrete adaptation (including EbA) interventions and capacity building/awareness raising activities in order to further extract the knowledge and lessons generated at the local and national levels as input for the relevant regional deliverables as well as to ensure the linkages with the regional context and vice versa, wherever possible

Output 2.2: Policy briefs – and paper for the Lancang-Mekong Cooperation Outlook Report series

- Conduct a preliminary review to identify possible topics to be covered in the paper on climate change adaptation in the GMS, especially regarding: concrete adaptation strategies (including EbA) for shared climate impacts; integrating climate change adaptation into transboundary water and river basin management; and regional coordination on climate change adaptation
- Consult with the LMEC to agree on the content and format of the paper
- Lead the brainstorming sessions with the project team members, particularly the Project adaptation specialist, CTA and the national teams of Thailand and Vietnam, on the input generated from the project at local, national and regional levels
- Organise consultations, as needed, with various groups of stakeholders from different levels, within and beyond the GMS, to obtain views and additional information
- Coordinate and oversee the development of the paper using all the obtained information plus additional comprehensive review
- Liaise with the LMEC to facilitate the review process for inclusion of the paper into the Lancang-Mekong Cooperation Outlook Report series

Output 2.3: Knowledge on EbA generated through the project shared on regional knowledge platforms and forums

- Discuss with operator of the identified regional online knowledge platforms to agree on the content and format of the knowledge to be shared, e.g. report extract, analysis, fact sheet, article, blog post
- Regularly develop the content, tailored to each of the platforms, on different knowledge topics generated from the project and submit to those portals
- Engage with the organiser of the identified regional forums to agree on the content and format of the knowledge to be presented: cost-effectiveness analysis (Output 2.1), policy briefs (Output 2.2), and M&E guidelines (Output 2.4), e.g. individual session, side-event,

presentation, exhibition

- Prepare the agreed format of presentation, along with publications to be distributed, present at the events and prepare report with feedback from participants on further application
- Actively share the knowledge products and project lessons to wider adaptation/EbA community, e.g. Friends of EbA, EbA community of practice, Adaptation Futures, as appropriate

Output 2.5: Regional training events on ecosystem-based adaptation

- Lead the team of national trainers, and in close consultation with CERN/CAS as well as the Project adaptation specialist, CTA and national teams of Thailand and Vietnam, to design the overall regional training events and specific topics for each of the training events
- Oversee the training course design and material preparation, developed by the national trainers and with substantial advice from the project team members and CERN/CAS, to ensure the knowledge and lessons (with gender consideration) generated from the local, national and regional activities as well as from the CERN/CAS will be incorporated
- Organise the training events annually in China
- Prepare report with feedback from the participants and knowledge evaluation score

Output 3.1: Policy recommendations for regional cooperation on the scaling up of climate change adaptation interventions

- Establish linkages and networks with other on-going adaptation (including EbA) initiatives at regional level within and beyond the GMS
- Gather information from other networks for the development of the paper.

Outputs

- An original paper for LMEC Environmental Outlook Report series on climate change adaptation in the GMS with special reference to: i) concrete adaptation strategies – including EbA – for shared climate impacts like droughts and floods; ii) integrating climate change adaptation into transboundary water and river basin management; and iii) regional coordination on adapting to climate change.
- Organising three regional training events on ecosystem-based adaptation for technical government staff from all GMS countries, including overseeing the development of training material for these events.

Qualifications

- Advanced degrees (minimum master's level) in environmental sciences, environmental policy, sustainable development, natural resource management or other relevant fields
- A minimum of 10 years' relevant work experience on climate change and adaptation policies, practices, capacity building, knowledge generation and awareness raising at regional level or in multiple countries, preferably in the GMS
- Demonstrated knowledge and skills on capacity building and stakeholder engagement on climate change adaptation and transboundary management of natural resources in the Mekong or river basin organisations, preferably with already established linkages and networks with other key organisations currently working on adaptation in the GMS
- Excellent knowledge of English, including writing and communication skills, knowledge of GMS languages (particularly Thai and/or Vietnamese) an asset

Annex VIII. List of endorsements and endorsement letters

i) Endorsement letter from Government of Thailand

URGENT
No. 0620/ 1999

Ministry of Natural Resources and Environment
92 Soi Phahol Yothin 7, Phahol Yothin Road,
Phayathai, Phayathai, Bangkok, 10400,
Thailand

28 August B.E. 2561 (2018)

To The Adaptation Fund Board

Subject: Endorsement for the Adaptation Fund Project Proposal on Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation

In my capacity as designated authority for Adaptation Fund in the Kingdom of Thailand, I confirm that the above (Mekong EbA) full project proposal is in accordance with the government's National and Regional priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Kingdom of Thailand, and the Greater Mekong Sub-region.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaption Fund. If approved, the project will be implemented by United Nations Environment Programme (UNEP), and executed by the Department of Water Resources, Thailand.

Yours sincerely,

W. Simachaya

(Mr. Wijarn Simachaya)
Permanent Secretary
Ministry of Natural Resources and Environment

The Adaptation Fund Board
C/O Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Endorsement letter from Government of Vietnam

SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

Ha Noi, 26... July 2018

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org

Subject: Endorsement for the Project Proposal on "Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation (GMS-EbA) in the Context of South-South Cooperation"

In my capacity as Designated Authority for the Adaptation Fund in the Socialist Republic of Viet Nam, I confirm that the above regional project proposal is in accordance with the government's priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Socialist Republic of Viet Nam, which is part of the Greater Mekong Sub-region.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by United Nations Environment Programme (UNEP) and executed in Viet Nam by Ministry of Natural Resources and Environment of Viet Nam supported by UNEP-International Ecosystem Management Partnership (UNEP-IEMP) and other national partners.

Yours sincerely,

Dr. Tran Hong Ha
Minister of Natural Resources and Environment
Socialist Republic of Viet Nam

Address: 10 Ton That Thuyet street, South Tu Liem district, Ha Noi, Viet Nam
Tel: +84 4 37956868, Fax: +84 4 38359221, E-mail: icd-monre@monre.gov.vn, Website: http://www.monre.gov.vn

Annex IX. Grievance mechanism

At the initial stage of the project implementation, the project management team will prepare an extensive stakeholders' engagement plan. The stakeholder engagement plan will ensure that right stakeholders are identified and actively involved in decision making and are able to voice concerns on the issues impacting them from project interventions.

Through the stakeholders' engagement plan, the project will ensure that information related to the project is shared at regular basis with the stakeholders as well as they are made aware of grievance mechanism.

Stakeholders engagement plan:

The project management team will prepare a detail stakeholders' engagement plan. The main objective of the stakeholders' engagement plan is to ensure participation of the stakeholders in decision making of the project to minimize the grievance and increase accessibility of the grievance mechanism to the local communities.

The stakeholders' engagement plan will include:

- Identify communities, groups, right holders that will be directly or indirectly impacts by project interventions.
- Project information will be disclosed with stakeholders at half yearly basis including objectives, proposed interventions and possible benefits and risk with the stakeholders.
- Discuss opportunities and challenges that can be influenced by the project.
- Share progress of the project with the stakeholders.
- The stakeholders will be involved in monitoring of the project interventions.
- Integrate the concerns of stakeholders in the implementation plan.
- Organize half yearly interaction programs to share the grievance mechanism with local communities.
- Translate the grievance mechanism of the implementing countries, UN Environment and Adaptation Fund Secretariat in local language.
- Effective communication and engagement modalities including e-communication as well as internet, SMS, phone.

Grievance Mechanism for the Mekong EbA South Project

Complaints regarding the project can be filed directly with the Adaptation Fund secretariat at the following address:
Adaptation Fund Board secretariat
Mail stop: MSN P-4-400
1818 H Street NW
Washington DC
20433 USA
Tel: 001-202-478-7347
afbsec@adaptation-fund.org

UN Environment has also established grievance mechanism that it applies to all its projects. Such a Stakeholder Response Mechanism is within the Environmental, Social and Economic Sustainability Framework to address compliance and grievance cases that arise from UN Environment projects. This Mechanism is coordinated and managed by the Independent Office for Stakeholder Safeguard-related Response. The operating procedures in the Stakeholder Response Mechanism inform and guide UN Environment staff, UN Environment implementing/executing partners, and people affected by UN Environment projects on bringing forward and responding to stakeholder concerns.

The Project Manager or the implementing/executing partners are usually the first point of contact for any project-related complaints from stakeholders. The Project Manager and project team should respond promptly and appropriately to a complaint with the goal of avoiding escalation to the Independent Office for Stakeholder Safeguard-related Response.

The Project Manager can direct the complainants to fill out the "UN Environment Project Concern Feedback Form" form and submit it to the Independent Office for Stakeholder Safeguard-related Response if the issues cannot be resolved at the project level. The Project Manager should advise complainants to provide complete information, so UN Environment can properly assess and address the complaint. The form and instructions on how to submit the complaint form are available on www.unep.org (under "Project Concern" in the "A-Z of UN Environment") or at www.unep.org/about/eses. The form is available in all UN official languages on the different language versions of the same sites.

If the Independent Office for Stakeholder Safeguard-related Response finds that the complaint is eligible, s/he forms a team composed of internal or external experts to investigate the case and propose options for the complainant to consider.

Compliance review vs. grievance redress
The Independent Office for Stakeholder Safeguard-related Response is responsible for both compliance review and grievance redress (dispute resolution) processes:

- **compliance review** is the process used, as appropriate, to review and respond to stakeholders' concerns that UN Environment may not be in compliance with its Environmental, Social and Economic Sustainability Framework

- **grievance redress** is a process providing people affected by UN Environment projects with access to appropriate and flexible dispute resolution procedures

The Stakeholder Response Mechanism is summarized in Table XI.1 below.

Table XI.1: Stakeholder Response Mechanism

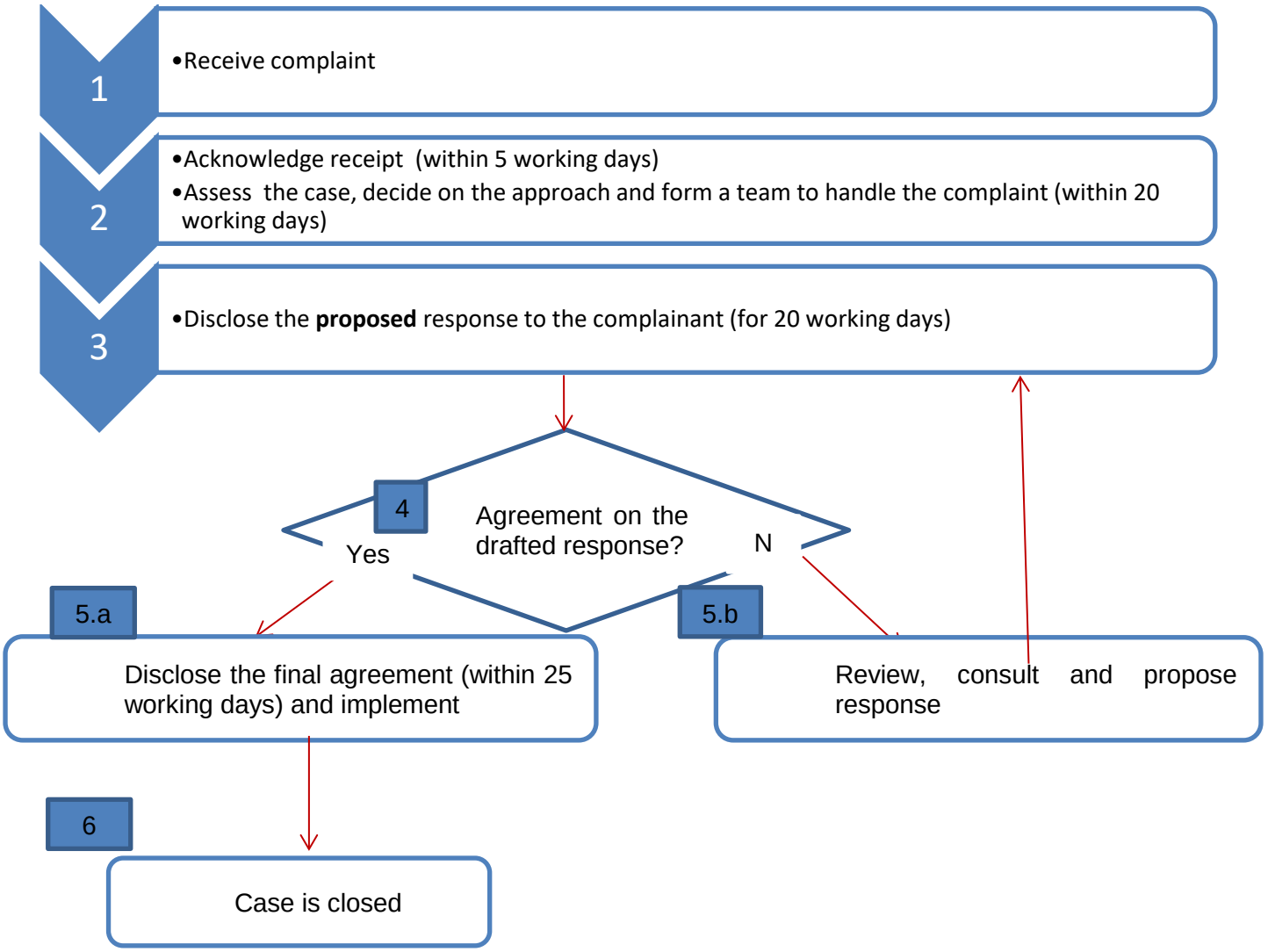
	Compliance review	Grievance response
Complainant	Any person or group of persons who may be affected by UN Environment-supported activities. While anonymous complaints will not be accepted, requests for confidentiality will be respected.	
Channel	Complainants can contact the Independent Office for Stakeholder Safeguard-related Response via mail, phone or email. Complainants should provide full details through the "UN Environment Project Concern" form to enable UN Environment to assess eligibility.	
Eligibility requirements	• The complaint is directly related to Environmental, Social and Economic Sustainability issues. • The issue concerns a proposed or on-going UN Environment project.	
Responsibility within UN Environment	Independent Office for Stakeholder Safeguard-related Response with support of relevant Regional Office and/or Divisions and/or thematic experts.	
Response	Independent Office for Stakeholder Safeguard-related Response investigates the complaint and reports findings and recommendations to the UN Environment Executive Director.	Independent Office for Stakeholder Safeguard-related Response explores mediation, negotiation, conflict resolution, and/or referral to

	UN Environment communicates the decisions and steps that UN Environment will take in response to the concerns.	another dispute resolution mechanism.
Possible results and follow up action	• Measures to minimize or mitigate negative impacts from project activities. • Revision and disclosure of the project. • Permanent suspension of the project.	• Proposed measures to address or compensate for negative impacts from project activities. • Resolution of issue. • Public disclosure of the case.

Internal process for handling stakeholder response cases

UN Environment has devised an internal process of how to handle stakeholder response case and this is articulated in Figure XI.1. Figure XI.1 below shows the detailed work-flow for the Independent Office for Stakeholder Safeguard-related Response under the Stakeholder Response Mechanism following a complaint.

Figure XI.1: Stakeholder response work flow



Annex X. UN Environment Environmental, Social and Economic Review Note (ESERN)

Identification	*Insert Project ID# from Programme Framework Table*
Project Title	Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation
Managing Division	Ecosystems
Type/Location	Regional
Region	Asia Pacific
List Countries	Thailand and Vietnam
Project Description	The proposed AF project will implement innovative, on-the-ground adaptation technologies and share implementation lessons across the GMS. Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand), and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts. These adaptation technologies will complement existing or planned interventions taking place in the upper reaches (China and Myanmar) as well as ongoing LDCF[238] and AF projects in Cambodia and Lao PDR. The proposed project will increase the resilience of beneficiary communities to the effects of droughts and floods by implementing a suite of adaptation interventions[239] – with a focus on EbA – including *inter alia*: i) living check-dams; ii) integrated home gardening; iii) agroforestry; iv) forest regeneration; v) water distribution canals; vi) NTFP-based and additional livelihood options; vii) climate-resilient crop varieties; and viii) natural resource-based community cooperatives. Additionally, knowledge-sharing and awareness-raising in local communities surrounding project beneficiaries will be accomplished through *inter alia*: i) knowledge-sharing days; ii) local field visits; iii) the dissemination of awareness-raising and training materials; iv) climate change centres at local schools[240]; v) grassroots adaptation sharing events; and vi) regional exchange visits. Comprehensive monitoring and evaluation, as well as small-scale research projects, will be conducted with local institutions to generate knowledge products[241] on context-specific lessons learned. The knowledge generated at the country level will be shared regionally on ways to combat drought and flood risk– specifically EbA – across the GMS in the different ecosystems of the GMS. Scaling up such measures at a Basin scale could reduce the impacts of climate change in the given country and downstream in the Mekong River Basin. Discussions on a scaling up adaptation strategy will be promoted under Component 3 linking the project experience with the available scientific information on climate change risks and the political processes in the GMS. An assessment will be undertaken to inform future decisions on the cost-effectiveness of EbA in the GMS under different socioeconomic and environmental conditions. Additionally, relevant knowledge to EbA in the GMS will be collated to produce policy briefs to inform the development and implementation of future adaptation projects and strategies across the region. These knowledge products, as well as the results of monitoring and evaluation at implementation sites, will be made widely available

[238] Least Developed Countries Fund.
[239] Guided by regional and national adaptation and development plans.
[240] Such as the Som Sa Ard School in Kuchinarai District, Kalasin Province, Thailand (please see Section 5.)
[241] E.g. EbA implementation guidelines.

	through existing online information platforms related to the GMS and climate change adaptation[242]. Knowledge-sharing and project coordination across the GMS – including China, Cambodia, Lao PDR and Myanmar – will be achieved through participation in regional climate change adaptation forums. The knowledge gained through the proposed project will be used to strengthen regional coordination on climate change adaptation, and will be incorporated into future versions of regional and national adaptation plans across the GMS[243] through: i) continuous sharing of information to national and regional stakeholders; ii) participation in adaptation planning and policy workshops; and iii) the provision of policy briefs and papers. The UN Environment-International Ecosystem Management Partnership (UNEP-IEMP) in Beijing, hosted by the Institute of Geographic Sciences and Natural Resources Research (IGSNRR) under the Chinese Academy of Sciences (CAS) will execute the knowledge-sharing and regional coordination aspects of the project. Coordinating the project from Beijing will provide strategic advantages to: i) facilitate the South-South exchange of knowledge between CAS and other GMS countries, particularly lessons learned from the Chinese Ecosystem Research Network[244]; and ii) strengthen engagement with the Lancang-Mekong Cooperation (LMC) [245] mechanism, also hosted in Beijing, and thereby promote regional coordination on climate change adaptation. Indeed, the China-ASEAN Environmental Cooperation Center (CAEC), which hosts the Lancang-Mekong Environmental Cooperation Center, has expressed their willingness to work with the proposed project and collaborate with the other GMS countries. Engagement with Chinese institutions is a highlight of the proposed project. For decades, the robust cooperation on transboundary resources management in the region has been limited to the middle and lower Mekong countries (Cambodia, Lao PDR, Thailand and Vietnam), through institutions such as the Mekong River Commission. Engagement with Chinese institutions in this proposed project will, therefore, facilitate engagement between upstream- and downstream countries that will enhance regional cooperation on climate change adaptation and promote South-South knowledge exchange.
Estimated duration of project:	48 months
Estimated cost of the project:	USD 7,000,000

II. Environmental Social and Economic Screening Determination

A. Summary of the Safeguard Risks Triggered

Safeguard Standard Triggered by the Project	Impact of Risk[246] (1-5)	Probability of Risk (1-5)	Significance of Risk (L, M,

[242] Including platforms operated by: i) the MRC; ii) ADB-GMS; iii) Lancang-Mekong Cooperation Mechanism; and iv) other regional projects, such as EbA South.
[243] Such as the MASAP and NAPs.
[244] This includes EbA interventions in Nabanhe National Nature Reserve in the Yunnan Province of southwest China
[246] Refer to UNEP Environment, Social and Economic Sustainability (ESES): Implementation Guidance Note to assign values to the Impact of Risk and the Probability of Risk to determine the overall significance of Risk (Low,

SS 1: Biodiversity, natural habitat and Sustainable Management of Living Resources	3	3	M
SS 2: Resource Efficiency, Pollution Prevention and Management of Chemicals and Wastes	2	1	L
SS 3: Safety of Dams	3	3	M
SS 4: Involuntary resettlement	3	2	M
SS 5: Indigenous peoples	2	1	L
SS 6: Labor and working conditions	2	2	L
SS 7: Cultural Heritage	1	1	L
SS 8: Gender equity	3	1	L
SS 9: Economic Sustainability	2	2	L
Additional Safeguard questions for projects seeking GCF-funding (Section IV)			

B. ESE Screening Decision[247] (Refer to the UNEP ESES Framework (Chapter 2) and the UNEP's ESES Guidelines.)

Low risk ☐ Moderate risk X☐ High r☐ Additional informat☐ required

C. Development of ESE Review Note and Screening Decision:

Prepared by: Name: Nicholas_Tye Date: 1 August 2018

Safeguard Advisor: Name: Yanae Yi_____ Date: 28 August 2019

Project Manager: Name: Moon Shrestha_____ Date: 29 August 2019

D. Recommended further action from the Safeguard Advisor:

It is likely a moderate risk project.

SS1: Biodiversity, natural habitat and sustainable management of living resources; Some communities selected for the project live near the Tram Chim National Park, which is a protected area. In addition, the project will be in the areas where alien invasive species are widely spread and carry out agroforestry, tree planting and water management activities, there are possible indirect and unintended impact. These risks should be assessed, and the management plan should be developed and managed throughout the project.

SS 2: Farming communities are affected greatly by the climate change and unpredictable rain pattern and availability of water. Climate resistant farming should be considered and promoted.

SS 3: The project plans construction of check dams, rehabilitate weirs, extend the water canal

Moderate or High).

[246] Refer to UNEP Environment, Social and Economic Sustainability (ESES): Implementation Guidance Note to assign values to the Impact of Risk and the Probability of Risk to determine the overall significance of Risk (Low, Moderate or High).

[247] **Low risk**: Negative impacts negligible: no further study or impact management required.
Moderate risk: Potential negative impacts, but less significant; few if any impacts irreversible; impact amenable to management using standard mitigation measures; limited environmental or social analysis may be required to develop a ESEMP. Straightforward application of good practice may be sufficient without additional study.
High risk: Potential for significant negative impacts, possibly irreversible, ESEA including a full impact assessment may be required, followed by an effective safeguard management plan.

and restore the bank. We should bring the experts for the technically sound approach for technically-sound construction and maintenance approach in safe manner. All national safety requirements should be complied to.

SS 4: The project plans to limit or discourage some types of illegal fishing activities and encroachment onto parkland. Are they mostly the marginalized or vulnerable people? While the project intends to control the natural resources that are approved, some potential issues for the restriction of natural resources should be carefully assessed and alternative options should be proactively explored.

SS 6: Labor and working conditions may be relevant for this project as it is likely to involve subcontractors and community laborers. Labor and working conditions should be according to national law, ILO standards, transparent, agreeable and duly complied to the contract conditions.

To avoid, minimize or mitigate indirect or unintended environment and socio-economic harms and elevate opportunities, the Safeguards Advisor suggests development of stakeholder engagement plan at each site in consultation with the affected local communities. The stakeholder engagement plans should i) identify local population, both duty-bearers and right-holders; ii) pay attention to marginalized and vulnerable communities; iii) lay out the engagement approaches, which include frequency, venues, language support, methods of engagement and the feedback mechanism; iv) state how they can engage in project management, monitoring and reporting; v) inform how they can get information on project and the stakeholder engagement plan implementation, and; v) also state grievance redress mechanism and related support available.

(Section III and IV should be retained in UNEP)

Precautionary Approach
The project will take precautionary measures even if some cause and effect relationships are not fully established scientifically and there is risk of causing harm to the people or to the environment.
Human Rights Principle
The project will make an effort to include any potentially affected stakeholders, in particular vulnerable and marginalized groups; from the decision-making process that may affect them.
The project will respond to any significant concerns or disputes raised during the stakeholder engagement process.
The project will make an effort to avoid inequitable or discriminatory negative impacts on the quality of and access to resources or basic services, on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups.[248]

Screening checklist	Y/N/ Maybe	Comment
Safeguard Standard 1: Biodiversity, natural habitat and Sustainable Management of Living Resources		
Will the proposed project support directly or indirectly any activities that significantly convert or degrade biodiversity and	N	The project will include activities that promote the conservation of

[248] Prohibited grounds of discrimination include race, ethnicity, gender, age, language, disability, sexual orientation, religion, political or other opinion, national or social or geographical origin, property, birth or other status including as an indigenous person or as a member of a minority. References to “women and men” or similar is understood to include women and men, boys and girls, and other groups discriminated against based on their gender identities, such as transgender people and transsexuals.

habitat including modified habitat, natural habitat and critical natural habitat?		biodiversity and restoration of degraded habitats through EbA interventions implemented at demonstration sites in Thailand and Vietnam (Outputs 1.1 and 1.2). It is not anticipated that the project will contribute to the ongoing degradation of ecosystems. During the design of the proposed project, DWR-MoNRE (Thailand), DLA-MoNRE and management of Tram Chim National Park (both Vietnam) were consulted to ensure that negative impacts on biodiversity and natural habitats are averted.
Will the proposed project likely convert or degrade habitats that are legally protected?	N	Although adaptation interventions (predominantly EbA) will be implemented in and surrounding Tram Chim National Park (Vietnam; Output 1.2), these interventions will be directed towards the restoration of previously degraded habitats, as well as to reduce further degradation. This will benefit biodiversity, as well as strengthen the supply of ecosystem goods and services.
Will the proposed project likely convert or degrade habitats that are officially proposed for protection? (e.g.; National Park, Nature Conservancy, Indigenous Community Conserved Area, (ICCA); etc.)	N	No adaptation interventions will be implemented in any areas officially proposed for protection.
Will the proposed project likely convert or degrade habitats that are identified by authoritative sources for their high conservation and biodiversity value?	N	Although adaptation interventions (predominantly EbA) will be implemented in and surrounding Tram Chim National Park (Vietnam; Output 1.2), these interventions will be directed towards the restoration of previously degraded habitats, as well as to reduce further degradation. This will benefit biodiversity, as well as strengthen the supply of ecosystem goods and services.
Will the proposed project likely convert or degrade habitats that are recognized- including by authoritative sources and /or the national and local government entity, as protected and conserved by traditional local communities?	N	As above.
Will the proposed project approach possibly not be legally permitted or inconsistent with any officially recognized management plans for the area?	N	During the design of the proposed project, DWR-MoNRE (Thailand) and DLA-MoNRE (Vietnam) were consulted to ensure that activities are aligned with national and local laws, as well as any relevant management plans. In addition, the management of Tram Chim National Park was consulted to ensure that any activities in or around the park adhere to Vietnam's national protected area management laws and are aligned with the park's management plan.
Will the proposed project activities result in soils deterioration and land degradation?	N	The proposed project will restore – and build the resilience of – degraded landscapes, as well as reduce soil damage and erosion using an EbA approach at selected demonstration sites during the

		implementation phase. Furthermore, EbA interventions will result in the restoration of topsoil and enhancement of soil organic matter and nutrient content over the long-term. Much of the degradation of the soils and landscapes where the project activities will be implemented is human induced (for example, through agriculture and deforestation).
Will the proposed project interventions cause any changes to the quality or quantity of water in rivers, ponds, lakes or other wetlands?	Y	Adaptation interventions implemented under Outputs 1.1 and 1.2 of the proposed project include flood and drought management interventions, such as the: i) construction of living check dams; and ii) rehabilitation of weirs and canals. These interventions will attenuate flooding during the monsoon season and improve water supply in drought periods. As a result, changes to the quantity of water in canals, reservoirs and storages ponds are expected.
Will the proposed project possibly introduce or utilize any invasive alien species of flora and fauna, whether accidental or intentional?	N	Flora species used for the restoration of ecosystems under the proposed project will be indigenous. In addition, the clearing of invasive alien plant species from Tram Chim National Park and its surrounding for use in the production of handicrafts will be promoted.
Safeguard Standard 2: Resource Efficiency, Pollution Prevention and Management of Chemicals and Wastes		
Will the proposed project likely result in the significant release of pollutants to air, water or soil?	N	No pollution will be generated through the proposed project's activities.
Will the proposed project likely consume or cause significant consumption of water, energy or other resources through its own footprint or through the boundary of influence of the activity?	N	
Will the proposed project likely cause significant generation of Green House Gas (GHG) emissions during and/or after the project?	N	Project activities are likely to reduce the atmospheric concentration of greenhouse gases at the project's EbA demonstration sites. This will be achieved by reforestation and the planting of multiple other tree species (e.g. by implementing agroforestry techniques). Consequently, carbon will be sequestered in soils and plant biomass.
Will the proposed project likely generate wastes, including hazardous waste that cannot be reused, recycled or disposed in an environmentally sound and safe manner?	N	
Will the proposed project use, cause the use of, or manage the use of, storage and disposal of hazardous chemicals, including pesticides?	N	
Will the proposed project involve the manufacturing, trade, release and/or use of hazardous materials subject to international action bans or phase-outs, such as DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Convention on Persistent Organic Pollutants or the Montreal Protocol?	N	

Will the proposed project require the procurement of chemical pesticides that is not a component of integrated pest management (IPM)[249] or integrated vector management (IVM)[250] approaches?	N	
Will the proposed project require inclusion of chemical pesticides that are included in IPM or IVM but high in human toxicity?	N	
Will the proposed project have difficulty in abiding to FAO's International Code of Conduct[251] in terms of handling, storage, application and disposal of pesticides?	N	
Will the proposed project potentially expose the public to hazardous materials and substances and pose potentially serious risk to human health and the environment?	N	
Safeguard Standard 3: Safety of Dams Do you have any infrastructure element to divert water and building of water distribution canal? If yes, do we need to consider safety of local during and after construction?		
Will the proposed project involve constructing a new dam(s)?	N	
Will the proposed project involve rehabilitating an existing dam(s)?	N	
Will the proposed project activities involve dam safety operations?	N	
Safeguard Standard 4: Involuntary resettlement		
Will the proposed project likely involve full or partial physical displacement or relocation of people?	N	
Will the proposed project involve involuntary restrictions on land use that deny a community the use of resources to which they have traditional or recognizable use rights?	N	
Will the proposed project likely cause restrictions on access to land or use of resources that are sources of livelihood?	N	
Will the proposed project likely cause or involve temporary/permanent loss of land?	N	
Will the proposed project likely cause or involve economic displacements affecting their crops, businesses, income generation sources and assets?	N	
Will the proposed project likely cause or involve forced eviction?	N	
Will the proposed project likely affect land tenure arrangements, including communal and/or customary/traditional land tenure patterns negatively?	N	
Safeguard Standard 5: Indigenous peoples[252]		
Will indigenous peoples be present in the proposed project area or area of influence?	N	
Will the proposed project be located on lands and territories claimed by indigenous peoples?	N	
Will the proposed project likely affect livelihoods of indigenous peoples negatively through affecting the rights, lands and territories claimed by them?	Y	The proposed project was developed through consultation with local communities (including any indigenous peoples) and in accordance with local belief systems. Additionally, all on-the-

[249] "Integrated Pest Management (IPM) means the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms http://www.fao.org/agriculture/crops/thematic-sitemap/theme/pests/ipm/en/

[250] "IVM is a rational decision-making process for the optimal use of resources for vector control. The approach seeks to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease-vector control. The ultimate goal is to prevent the transmission of vector-borne diseases such as malaria, dengue, Japanese encephalitis, leishmaniasis, schistosomiasis and Chagas disease." (http://www.who.int/neglected_diseases/vector_ecology/ivm_concept/en/)

[251] Find more information from http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/Code/CODE_2014Sep_ENG.pdf

[252] Refer to the Toolkit for the application of the UNEP Indigenous Peoples Policy Guidance for further information.

		ground activities will be community-based. The project will improve local communities' livelihoods by increasing the number of available climate-resilient income-generating opportunities.
Will the proposed project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	N	
Will the project negatively affect the development priorities of indigenous peoples defined by them?	N	
Will the project potentially affect the traditional livelihoods, physical and cultural survival of indigenous peoples?	N	
Will the project potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	N	
Safeguard Standard 6: Labor and working conditions		
Will the proposed project involve the use of forced labor and child labor?	N	The proposed project conforms to all national and international guidelines and laws regarding forced labour. Extensive community engagement will prevent the use of forced labour. In addition, all required labour – which will consist only of short-term employment for meeting specific objectives – will be provided through community engagement and will be remunerated in accordance with national law.
Will the proposed project cause the increase of local or regional un-employment?	N	No long-term change in local or regional employment rates as a result of project activities is anticipated. Alternative livelihoods based on the proposed project's EbA interventions will be developed at the demonstration sites, which will strengthen income generation and potentially provide employment opportunities.
Safeguard Standard 7: Cultural Heritage (Has there been research on possible existance of cultural heritage on the sites?)		
Will the proposed project potentially have negative impact on objects with historical, cultural, artistic, traditional or religious values and archeological sites that are internationally recognized or legally protected?	N	
Will the proposed project rely on or profit from tangible cultural heritage (e.g., tourism)?	N	
Will the proposed project involve land clearing or excavation with the possibility of encountering previously undetected tangible cultural heritage?	N	
Will the proposed project involve in land clearing or excavation?	N	
Safeguard Standard 8: Gender equity		
Will the proposed project likely have inequitable negative impacts on gender equality and/or the situation of women and girls?	N	The proposed project's targets will be monitored in gender disaggregated manner??– where applicable and will reduce the vulnerability of men and women based on their needs and roles. The project Will be gender sensitive within the socio-economic contexts.
Will the proposed project potentially discriminate against women or other groups based on gender, especially	N	Gender equality will be promoted under the proposed project, through the inclusion of women and

regarding participation in the design and implementation or access to opportunities and benefits?		men in project design and implementation, and will strengthen the access of women to related opportunities and benefits. Project beneficiaries are aimed to be gender balanced
Will the proposed project have impacts that could negatively affect women's and men's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services?	N	The development and protection of natural resources by both men and women will be supported under the proposed project. Furthermore, both men and women will be given equal access to environmental goods and services provided by project interventions.
Safeguard Standard 9: Economic Sustainability		
Will the proposed project likely bring immediate or short-term net gain to the local communities or countries at the risk of generating long-term economic burden (e.g., agriculture for food vs. biofuel; mangrove vs. commercial shrimp farm in terms of fishing, forest products and protection, etc.)?	N	Climate change adaptation (including EbA) options under the proposed project may provide short-term benefits, but are also designed to be economically sustainable in the long-term.
Will the proposed project likely bring unequal economic benefits to a limited subset of the target group?	N	How about indigenous people, ethnic minorities, different group of livelihood activities? Whom are we targeting? Do we know who they are on the project sites?

Annex XI. Synthesis report of Gender Assessment

(detail report is attached as Supplement document 3

Introduction. This synthesis report of Gender Assessment (see Supplement document 3) is an input to inform the design and implementation of this project. Given the objective of strengthened awareness and action of governments and communities in the GMS to climate change through ecosystems-based adaptation (EbA), and three expected outcomes (towards: managing climate change impacts; establishing regional cooperation, planning and implementation of EbA solutions in the GMS; and strengthening resilience opportunities), the proposed project holds the potential to strategically contribute to the gender baseline in Vietnam and Thailand.

The effects of a changing climate and environmental stressors present multiple dynamics for both men and women: including on livelihoods, health, migration, adaptation capacity, participation, and decision-making. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) notes that impacts on these aspects differ according to disproportions experienced among population groups – particularly deriving from gender and socioeconomic relations.

In the context of the project, existing empirical studies of the Mekong sub-region consistently show that women tend to lack access to and control over resources, productive assests and income – leading to gender needs and constraints undermined or unaccounted for in adaptation decision-making. Since the Mekong Delta has also been identified as a climate risk hotspot with expected losses around 30% of rural GDP[253] in the lower region, a gender mainstreaming perspective becomes imperative.

Baseline. Given the above rationale, studying existing gender relations will be fundamental to capture and effectively address cross-cultural variations in gender-specific needs and constraints[254] through EbA, which can be a cost-effective alternative strategy to traditional climate change adaptation methods, accessible to and inclusive of vulnerable groups such as women. EbA is a promising means of strengthening the role of women in climate change adaptation, as it can: firstly, support the integration and maintenance of traditional knowledge and cultural values into adaptation; and, secondly, generate multiple social, economic and cultural co-benefits for local communities.[255] A gender-responsive EbA intervention framework (see Methodology in Gender Assessment document), informed by organizational priorities of the Adaptation Fund and UN Environment[256], will be both necessary and relevant for the project to maximise its outcomes, particularly creating accessible capacities for tackling climate change impacts that cannot be avoided, and establishing institutional structures as

[253]Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.

[254] Deutsches Institute für Entwicklungspolitik (d.i.e.). 2009. "Climate Change Adaptation from a Gender Perspective". Discussion Paper.

[255] CBD Secretariat. 2009. Connecting Biodiversity and Climate Change Mitigation and Adaptation. Report on the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. CBD Technical Series No. 41.

[256] Gender mainstreaming and promoting women's empowerment, by delivering environmental results, have been prioritised by both the Adaptation Fund (AF) and UN Environment. Having approved its principles-based Gender Policy and its accompanying Gender Action Plan in March 2016, the Fund ensures that projects and programmes provide women and men with an equal opportunity to build resilience, address their differentiated vulnerabilities and increase their capability to adapt to climate change impacts. Further, the Fund stipulates the interrelated and mutually reinforcing mandates of the Gender Policy and the Environmental and Social Policy, ensuring gender equality and women's empowerment considerations are mainstreamed in project/programme planning and design through risk and impact analysis. UN Environment recognizes the role of gender equality as a 'driver of sustainable environmental development' to not only assuage the stresses on natural resources, impending climate risks and adopting adaptive and mitigating actions, but as well to increase the visibility and capacity of vulnerable and social groups in sustainable development and climate resilient policy- and decision-making. To that end, the organization has sought to formalise and bolster agency-wide gender mainstreaming efforts through its *Gender Equality and the Environment* policy, *Global Gender and Environment Outlook* research study, and inclusion of gender-responsive elements in preceding and upcoming projects, undertaken in conjunction with the AF.

well as broad-based political and socioeconomic coalitions to mobilise medium- and long-term EbA and resilience action.

Thailand. Thailand has made significant strides in closing gender gaps in certain sectors: primary school enrolment rates show gender parity; women outnumber men in secondary and tertiary education; maternal mortality ratio has steadily declined from 110 to 48 per 100,000 live births (2005 to 2010).[257] However, certain sectors (especially climate-vulnerable ones) have either stalled or not experienced equivalent progress rates: female participation in the labor market (65.5% as compared to 80.7% for men) and their representation in public decision-making and governance structures remain lower than men; vertical segregation in the market tends to concentrate women in low-paid, low-skilled jobs or in agricultural production; gender-based violence (GBV) remains high and underreported due to societal norms.[258] Thus, impacts of climate change, particularly increased intensity and frequency of floods and droughts, will have a dual effect on this baseline: hard-earned advances in closing the gender gap are likely to be undermined while existing inequities could be reinforced.

A study of climate change-related vulnerability, impacts and adaptation in Thailand[259] (Chiang Mai and Chiang Rai) shows that although men and women play significant but varied roles in agricultural production: control over water resources, for example, differ greatly. This generates livelihood-related challenges as well as water insecurity, and increases in women's unpaid workload or time poverty (defined as the long work hours and limited or none leisure time arising from labour-, time- and energy-intensive tasks, which create opportunity cost for productive or remunerative activities) for household water procurement. Climate change impacts, such as floods and droughts, exacerbates this situation by worsening water access and availability, and burdening existing levels of gendered time poverty.

Another study among Thai fishing communities[260] further corroborates how having gender differences in roles affected perceptions of climate-related risks among men and women. To elucidate, since women performed tasks such as feeding and taking care of the fish population, whereas men were more invested in physical activities (such as installing cages or harvesting cropes), the former showed greater levels of concern with climate impacts. Women also tended to classify risks as serious concerns (requiring risk management), as opposed to male counterparts who identified them as 'acceptable' risks (requiring no action).

Vietnam. Similar to Thailand, observable and empirical changes in Vietnam's gender baseline include positive trends: labor force participation rate stands at 83% for women as compared to 85% for men, high and near equal adult literacy rates, as well as robust political representation; and, the following gaps: ethnic minorities, especially women, have lagged behind, occuptional streaming especially for women in less skilled positions with scarce decision-making power, and gendered division of care and unpaid work (expected to increase with the rise of number of dependents in the household).[261] These gender equalities indicate and relate to the different ways in which climate change, particularly climate-induced and natural disasters (floods and droughts), can affect Vietnamese men and women differently.
A UN Vietnam policy brief[262], for example, finds that 64% of rural women and 53% of rural men are engaged in crop production and are highly vulnerable to loss from drought and uncertain precipitation. Climate change, in this scenario, adds to water insecurity: particularly increasing the workload (atop the burden of unpaid care work) of rural women involved in

[257] Asian Development Bank (ADB). 2013. Gender Assessment for the *Country Partnership Strategy (2013 – 2016)*. Report.
[258] *Ibid.*
[259] Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.
[260] Lebel, P., Whanchai, N., Chitmanat, C., Promya, P., & Lebel, L. 2015. "Perceptions of climate-related risks and awareness of climate change of fish cage farmers in northern Thailand" in *Risk Management* (Vol. 17, No. 1). Journal Article.
[261] Asian Development Bank (ADB). 2006. *Country Gender Assessment: Vietnam*. Gender Report.
[262] United Nations Vietnam (UN Vietnam). N.D. *Gender and climate change impacts in Vietnam*. Desk Review.

small scale farming, as they need to spend more time and effort on land preparation, fetching water, watering, and protecting crops from disease. Further, women and men experience threats on their ecosystems from floods and typhoons differently – especially since the former (in rural areas) are agriculture- and natural resource-dependent, in the absence of out-migration opportunities (mostly availed by men). The destruction and damage caused by typhoons and floods specifically impacts their livelihoods and compounds the vulnerability and marginalization they face.

Further, in central Vietnam, the integration of EbA into and strengthening the role of women in flood risk management is currently being explored under two projects of the Global Resilience Partnership Water Window (GRP).[263] The planned activities include: the joint implementation of EbA with women's groups and local authorities, capacity building for women, and a holistic valuation of the multiple benefits of EbA measures and research on the impact of floods on the well-being of women, both in an urban and coastal environment.

Reviewing existing empirical and qualitative studies on Thailand and Vietnam, as the above examples show, demonstrates the complexity and protracted nature of socioeconomic challenges and gender disparities in the two countries. The studies reveal a commonality, relevant for the purposes of the project: access to resources, assets and benefits (from ecosystem services) determine the capability of different population groups to incorporate EbA-based solutions and climate change adaptation practices.[264]

Sectoral Issues. To enhance the analysis, this section adopts a mixed methods approach to analyse the existing (secondary) data and information related to EbA and gender issues in the two countries. This approach will be informed by a concurrent triangulation design: quantitative and qualitative data has been compiled from secondary sources in tandem, and used to confirm, corroborate and cross-validate findings (see Annex XI for national aggregate statistics and indices – Table I). Using the findings, the analysis forays into sectoral issues (and specific/related data) and attempts to draw indicative conclusions regarding EbA and gender for the design and implementation of this project.

ISSUE	CURRENT BASELINE		RELEVANCE TO EBA & PROJECT OBJECTIVES
	THAILAND	VIETNAM	
Panel data analysis of Thai and Vietnamese rural households[265] reveal heterogeneity in poverty dynamics: *de facto* female-headed households (FHHs) tend to be consumpion richer, though more vulnerable to	The Climate Vulnerability Assessment conducted by UN Environment and the Ministry of Natural Resources and Environment (Thailand) in Young River Basin shows that household-based automonous adaptation is not uncommon. However, such practices are primarily the preserve of households with integrated farming systems of mixed crops and raising animals – households with farm areas <10 *rai* were	The Climate Vulnerability Assessment conducted by UN Environment and the Ministry of Natural Resources and Environment (Vietnam) in Tram Chim National Park shows that more households (20% more than the national average) tend to be below poverty line. Panel data analysis reveals that Vietnamese *de jure* FHHs are consumption poorer than MHHs, and *de factor* FHHs.[266] The former difference is due to both widow- and single-headed	Introducing heterogeneity in household-level data indicates the differences in intra-household distribution in access, consumption, income and other entitlements; relative dependence and dynamics among members; and problematises conclusions drawn unitary model of

[263] Global Resilience Partnership (GRP). 2017. Website: http://www.globalresiliencepartnership.org/news/2017/03/15/Water-Window-Challenge-Winners-Announced.
[264] Ethan Yang, Y. C., Passarelli, S., Lovell, R. J. & Ringler, C. 2018. "Gendered perspectives of ecosystems service: a systematic review" in *Ecosystem Services* (Vol. 31). Journal Article.
[265] Klasen, S., Lechtenfeld, T., & Povel, F. 2018. "What about women? Female Headship, Poverty, and Vulnerability in Thailand and Vietnam". Courant Research Centre: Poverty, Equity and Growth in Developing and Transitioning Countries, University of Göttingen. Discussion Paper (No. 76).
[266] *Ibid.*

poverty exposure (due to the lack of *ex-ante* and *ex-post* adaptation strategies) than male-headed households (MHHs); *de jure* FHHs (in Vietnam) are consumption poorer than MHHs, while in Thailand the data does not show statistically significant differences.	exposed to greater exposure impacts and income shocks from climate-related risks. Juxtaposing this finding with the following from the Plan International report – increase in FHHs due to male urban migration results in women being increasingly responsible for paid labour, unpaid household labour, as well as unpaid male village labour – shows us that climate change adaptation and ecosystems-based solutions can become dependent on the present levels of access, resources and entitlements of different households.	households whereas the latter is mainly driven by single-headed households.[267] Descriptive analyses of bivariate relationships from a gender perspective by a World Bank Vietnam Household Living Standard Survey Report[268] shows that the gender difference in the overall poverty rate is small, large disparities exist by region, ethnicity, and age. Men and women in rural areas, for example, are five times more likely than their urban counterparts to live in poverty (20% vs. 4%).[269] More than half of ethnic minorities still live in poverty, compared with only one out of ten Kinh/Chinese majority.[270]	household behaviour.[271] For EbA and broader climate change adaptation, adopting this approach is important to capture the different facets and levels of vulnerabilities, as well as the burdens faced by the population groups to overcome them. EbA opportunities and solutions, in a multidimensional scenario, can be dispensed effectively only with an in-depth knowledge of intra-household dynamics, access and resources.
Many empirical studies indicate greater agency and intra-household decision-making rights in recent times among Thai and Vietnamese households – however this may not reflect economic empowerment – women are increasingly burdened by time poverty due to domestic and economic commitments. Accrued time poverty, due to such social and livelihood dynamics, is often a hindrance in incorporating autonomous or technical ecosystems-	Shifting roles and responsibilities within the households of vulnerable Thai communities, as evinced particularly from studies of out-male migration, has not necessarily increased decision-making powers or resource access for women. In fact, this tends to compound pre-existing vulnerabilities for women by placing greater time burdens, as women must continue to fulfil their previous roles and compensate for lost male labour. For example, young women engaged in farming invariably handle work roles together with (rather than instead of) their more traditional roles of childcare and household maintenance.[272] Some women bring babies or young children to work and carrying them on their backs in lieu of childcare support, which increases the physical burden of manual work for women.[273] Women continue	Combining surveying and micro-simulation techniques, a World Bank report[274] finds that: high population growth, low productivity growth for unskilled agriculture workers, a relatively high share of jobs in agriculture (more than 33%) and low redistribution levels (less than 12% of GDP) are poverty-related factors that will the determine outcome of climate change impacts on households by 2030. Juxtaposing this finding with the conclusion from Klasen et al. (2018) study that: Vietnamese *de-jure* FHHs tend to be consumption poorer, more prone to lose assets during shocks or extreme scenarios, and have scarce access to viable coping strategies; it can be concluded that climate change will compound (especially when EbA alternative strategies are lacking) pre-existing vulnerabilities of certain households in the country. Women also tend to experience greater levels of high dependency burdens and economic immobility caused by	For the project's overall objectives and component, being cognizant of exisiting time-use patterns and resultant time poverty among women and men is crucial. This will help in designing interventions and activities that work harmoniously with current status quo, particularly eliminating the risk of burdening the beneficiaries further. Buy-in and incorporation of EbA measures among communities, especially across cross-culturally variegated households, can only be ensured when these are dispensed according to the existing capacities, assets and vulnerabilities among the communities.

[267] *Ibid.*
[268] The World Bank. 2006. A Gender Analysis of the Vietnam Household Living Standard Survey. Gender Report.
[269] *Ibid.*
[270] The World Bank. 2006. A Gender Analysis of the Vietnam Household Living Standard Survey. Gender Report.
[271] Boudet, A. M. M., Buitrago, P., Leroy de la Briere, B., Newhouse, D., Matulevich, E. R., Scott, K., & Suarez-Becerra, P. 2018. "Gender Differences in Poverty and Household Composition through the Life-cycle". The World Bank (Poverty & Equity Global Practice/Gender Global Theme). Policy Research Working Paper (No. 8360).
[272]Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.
[273] *Ibid.*
[274] The World Bank. 2016. "Modeling the Impacts of Climate Change on Future Vietnamese Household". (Environment and Natural Resources Global Practice Group). Policy Research Working Paper (No. 7766).

based adaptation solutions.	to also be the ones primarily responsible for household-related duties in homes that might inhabited by extended family members, young children, parents-in-law or elderly people, further increasing time poverty.	traditional norms of care and domestic work, particularly as FHHs, leading to a compromised position when technical adaptation strategies may be introduced in their vicinity.	
Climate-vulnerable sectors, particularly agriculture, are affected by extreme weather events and climate change impacts, in turn creating an aftermath for income, food and water security, etc. Women, particularly poor women, are actively engaged in and dependent upon agricultural incomes (such as: paddy cultivation,) in the Mekong region – leading to magnification of ecosystem risks[275]	Agricultural livelihoods, in Thailand, are increasingly threatened by climate impacts (such as: intensification and elongation of the dry season, erratic rain patterns). This is occuring in tandem with an increased amount of out-migration from rural areas, wherein younger women are left in charge of agricultural labour (and income), leading to earmarked exposure to climate-related risks. Lack of occupational multiplicity and livelihood diversity, low-input and labour-intensive agricultural practices, as well as existing domestic care work set these women back in access to knowledge and information, financial services, market and adaptation opportunities.	Rural and urban poor Vietnamese households are agriculture-dependent for income generation, and also spend a higher proportion of their income on food. Labour force participation rates show that women are primarily involed in agriculture or related activities, leading to greater exposure which requires urgent streamlined and targeted adaptation activities for these stakeholders. Women are also usually responsible for providing the family with basic nutrition, yet they rarely have access to and control over the resources required to fulfill this task when cultivation conditions deteriorate. Decreasing availability of clean water, decreasing agricultural production, decreasing access to crop residues and biomass for energy, and increasing risk of famine are all areas where women are primarily at risk of experiencing severe negative impacts.	There are significant limitations placed on the adaptive capacity of communities by their connectedness to complex and uncertain environmental, economic, and socio-political systems at macroscales.[276] EbA solutions offered in this context have to prioritise and target the communities, as well as the social groups and demographic trends within them, with entrenched vulnerabilities. This can be achieved through coordination with local governance, and streamlining project activities.

Gender Mainstreaming for Mekong EbA. The above analysis (see Gender Assessment document for details) shows that a gender-sensitive, inclusive and participatory approach to EbA is at minimum low-cost and no-regret, with the potential to contribute considerably to gender equality, social inclusion and community buy-in. As gender equality gains precedence in the work of the Adaptation Fund and UN Environment among other aid, climate finance and development organizations, the proactive gender approach of the proposed project, if implemented effectively (see Gender Assessment document for policy environment, legal frameworks and potential stakeholders), has the potential to become a good practice to shed light to other climate resilience projects in Thailand, Vietnam and the rest of the Greater Mekong sub-region, as well as globally.

[275] Lien, T. T. K. & Brown, K. 2018. "Perspectives from a Participatory Vulnerability Assessment in Mountainous Rural Vietnam" in *Handbook of Climate Change Resilience.* Deutsche Gesellsschaft für Internationale Zusammenarbeit (GiZ), GmBH, Ha Noi, Viet Nam.

[276] Bennett, N. J., Dearden, P., Murray, G., & Kafdak, A. 2014. "The capacity to adapt? Communities in a changing climate, environment, and economy on the northern Andaman coast of Thailand" in *Ecology and Society* (Vol. 19; No. 2).

Annex XII. Regional Consultation: April 26, 2018, Beijing, China

Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation

Participants:

1)	Dr. Heng Chanthoeun	Department of Climate Change, Ministry of Environment, Cambodia
2)	Mr. Sakounsit Sengkhamyong	Department of Climate Change, Ministry of Natural Resources and Environment, Lao PDR
3)	Mr. Kyaw Myo Linn	Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation, Myanmar
4)	Dr. Ekarut Archeewa	Department of Water Resources, Ministry of Natural Resources and Environment, Thailand
5)	Dr. Vithet Srinetr	United Analyst and Engineering Consultant Co. Ltd., Thailand
6)	Dr. Wongwit Wongwitwichote	Nijord Company Limited, Thailand
7)	Mr. Phan Tuan Hung	Department of Legal Affairs, Ministry of Natural Resources and Environment, Vietnam
8)	Dr. Nguyen Sy Linh	Institute of Strategy and Policy for Natural Resources and Environment, Ministry of Natural Resources and Environment, Vietnam
9)	Dr. Yan Feng	Lancang-Mekong Environmental Cooperation Center, China
10)	Ms. Qian Guan	Lancang-Mekong Environmental Cooperation Center, China
11)	Ms. Jessica Troni	UN Environment
12)	Ms. Moon Shrestha	UN Environment
13)	Mr. Nicholas Tye	C4 EcoSolutions
14)	Prof. Linxiu Zhang	UNEP-IEMP
15)	Ms. Guoqin Wang	UNEP-IEMP
16)	Ms. Tatirose Vijitpan	UNEP-IEMP
17)	Dr. Jialin He	UNEP-IEMP
18)	Dr. Chao Fu	UNEP-IEMP
19)	Dr. Dagne Mojo	UNEP-IEMP
20)	Ms. Diwen Tan	UNEP-IEMP
21)	Dr. Li	UNEP-IEMP
22)	Mr. Huaping Long	UNEP-IEMP
23)	Mr. Spencer Hagist	Centre for Chinese Agricultural Policy, Chinese Academy of Sciences

Objectives:

The regional consultation has overall objectives to:

1) Introduce the project overview, background and latest status on the full proposal development;

2) Discuss on the design of the regional components for benefits of individual country and the region as a whole.

Summary:

The regional consultation brought together representatives from the Greater Mekong Sub-region countries, as well as the key strategic regional partner – the Lancang-Mekong Environmental Cooperation Center, to discuss about the project design. The overall frame of the project is transboundary water management with a focus on concrete on-the-ground adaptation interventions.

At the consultation, the project design and components, as well as the pilot countries (Thailand and Vietnam), were presented at the beginning to inform the meeting on the overall project and its latest progress. After that, the Lancang-Mekong Environmental Cooperation Center presented about the Lancang-Mekong Cooperation mechanism and its relevance to the proposed project. Then, details of the regional components on regional knowledge sharing and regional cooperation, as outlined in the endorsed concept proposal (in October 2017), were presented in order to verify with the participants on any relevant significant development since the time of project endorsement until present to adjust those details in the full proposal. It was noted that the concept proposal was developed based on several rounds of consultations and latest information at that time. Afterwards, the country representatives presented their views on the regional components as well as additional information relevant to the proposed project. In the afternoon, the consultation opened the floor for discussions, then the participants brainstormed on regional outputs' activity design and conclusion on the details to be provided in the full proposal.

Key discussion points are listed as follows:

1) The presentation from the county representatives provide valuable information, including on existing EbA activities within each country that the proposed project will further make use of, e.g. for cost-effectiveness analysis of EbA activities in the GMS, papers for LMEC outlook.
2) In order to make it feasible to upscale EbA projects, lessons learned and practices can be shared in the form of 2-way communication, in other words – interactive way of knowledge transfer. However, EbA is context-specific; therefore, replication or upscaling would be more promising at local level than provincial level, for example. Knowledge exchange should, thus, consider the appropriate level, e.g. community, provincial, national levels. In any case, in order to facilitate upscaling, baseline study is essential to be developed before the project starts as well as to monitor the activities and measure the results. In addition, there is interest from non-pilot countries to learn from the project pilot sites in order to upscale or replicate in their EbA ongoing and upcoming activities.
3) In the GMS, policies that are related to EbA include poverty reduction, biodiversity conservation, water use, ecotourism, land use planning, hydrological infrastructure development. These could be considered in the policy coordination component.
4) For EbA uptake and mainstreaming, it is important to document the project in an interesting way and create interactions with people outside the project. It should use concrete good EbA case with influential ambassador. Besides, not only practitioners/communities but also government officials are crucial for knowledge sharing, since they facilitate EbA uptake and mainstreaming process.
5) Regarding knowledge dissemination and technology transfer, since EbA relies on ecosystem services, which are specific to the same ecosystem types, the project may showcase certain types of technology rather than the whole package. In this regard, the 'why' and 'how to' matter more. In addition, EbA practices could be initiated from local knowledge, and it is important to enhance the local knowledge – partly by learning from other communities.
6) Exchange visits should also include farmers and youth groups. Media products (e.g. cartoon) may also be produced for awareness raising purpose. In Vietnam, farmers' association can be a platform for knowledge transfer and the project may include training programme or curriculum on EbA for high school. Inclusion of farmers and

local level in knowledge exchange will promote on-the-ground replication and upscaling.

7) M&E system in Thailand should be in charge by local institution for sustainability and continuation of long-term EbA monitoring (on ecosystem dynamics beyond the project duration), with prize or recognition (e.g. for river conservation). In ecosystem monitoring 'how you do things' as well as 'what you do' knowledge is important to avoid or minimize trial and error (e.g. appropriate height for living check dam). It is important to firstly identify appropriate institution that can regularly conduct M&E during and beyond the project period.
8) China will host the Asia Pacific Climate Change Adaptation Forum (under the Asia Pacific Adaptation Network) in 2020. The project may consider sharing experience at the event.
9) The project would create a difference if it could mainstream ecological monitoring indicators into private sector regulation e.g. to come up with relatively standardized method of monitoring (at least to identify a couple of the most important themes to monitor, then test them and include the results in the M&E guideline) and finally take these into regulation. This would create national evidence base for the use EbA (where it works, how it works) that could be transferred across the whole region.

At the end of the workshop, the consultation was concluded with the recap of the key points discussed today and next steps. The full proposal would be submitted in August 2018 to the Adaptation Fund.

Annex XIII. Social and Environmental Action plan (SEAP) and Indicative ToR to prepare ESA, GAP and ESMP

iI Social and Environmental Action Plan (SEAP)

UN ENVIRONMENT
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT OF THAILAND
MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT OF VIETNAM

SOCIAL AND ENVIRONMENTAL ACTION PLAN (SEAP) FOR THE REGIONAL PROJECT:
Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation

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1. INTRODUCTION

This social and environmental action plan (SEAP) has been prepared in a consultative manner in support of a project proposal on "Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation". This SEAP provides an explanation of the process of identifying and dealing with potential social and environmental risks.

Overview of Proposed Project

The proposed AF project will implement innovative, on-the-ground adaptation technologies and share implementation lessons across the GMS. Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand) and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts. The proposed project will increase the resilience of beneficiary communities to the effects of droughts and floods by implementing a suite of adaptation interventions[277] including *inter alia*: i) climate-resilient agriculture interventions ii) interventions to improve drought and flood management; and iii) additional, climate-resilient livelihood options.

The overall objective of the proposed project is to strengthen awareness and action of governments and communities in the GMS to adapt to climate change using EbA.

This objective will be achieved through three complementary outcomes:

1. Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods.
2. Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.
3. Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

Objectives of Social and Environmental Action Plan

The objective of the SEAP is to identify social and environmental impacts and risks associated with the project activities. This will allow the project implementation and management units (at both regional and national level) to identify and implement appropriate risk mitigation measures. In addition, the SEAP aims to:

- encourage good management practices through planning, commitment and continuous improvement of social and environmental practices;
- comply with all applicable laws, regulations and standards for the protection of the environment,
- adopt the best practicable means available to prevent or minimise environmental and social impact;
- describe all monitoring procedures required to identify the environment and social impacts; and
- provide an overview of the obligations of the relevant stakeholders with regard to environmental and social obligations.

The SEAP will be updated periodically by the UNEP and the partner countries to incorporate changes in the inception phase of the proposed project. The SEAP will continue through the

[277] Guided by regional and national adaptation and development plans.

lifespan of the proposed project to comply with the AF environmental and social policy and all other relevant laws and policies.

Relevant National and Regional policies and legislations

There are number of national and regional policies, instruments and laws that guide the implementation of this SEAP. These policies and laws have been identified (see Section Part II:E and Part II:F of the project proposal) and will be used to guide the implementation of proposed project and the implementation of this SEAP.

2. ENVIRONMENTAL AND SOCIAL ASSESSMENT PROCEDURES

Social and environmental risks associated with the project activities have been identified during the development of this project proposal (see Part II:L, Part III:B, Part III:C and Annex X). Mitigation actions for these risks, including responsible parties and monitoring and evaluation arrangements, are detailed in this SEAP.

Acknowledging that baseline conditions may change and that activities will be further detailed during the development of detailed implementation protocols (Output 1.1 - Activity 1.1.1 and Output 1.2 - Activity 1.2.1 – see Section II:A), the proposed project has also included additional procedures to further identify and mitigate potential environmental and social risks. The following procedures will be followed during the initiation phase of the project.

Environmental and Social Assessment (ESA)

A SESA will be carried out to identify and predict impacts of proposed project activities. National and regional environment and social risk assessment operational procedures, as stipulated by relevant laws, will be followed. The process will include: i) impact screening; ii) scoping; iii) prediction and mitigation; iv) management and monitoring; and v) evaluation. The SESA will also define the degree to which the benefits of the potential future project activities will be distributed in an equitable manner across the targeted population and examine opportunities to enhance social inclusion, social accountability, strengthen social cohesion, increase social capital, and build ownership as per AF principles.

ESA procedure

ESAs will be carried out by appropriately qualified consultants (see Annex XIII (i) in the proposal package for indicative terms of reference) during the development of detailed implementation protocols for the climate change adaptation interventions (Output 1.1 - Activity 1.1.1 and Output 1.2 - Activity 1.2.1 – see Section II:A). This will be done with the assistance of regional project implementation unit, national project management units and relevant local government.

The purpose of the screening process is:

- to determine whether project activities are likely to have potential negative environmental and social impacts;
- to determine appropriate mitigation measures for activities with adverse impacts;
- to incorporate mitigation measures into the detailed implementation protocols; and
- to monitor environmental parameters during implementation;
- Collect baseline data to track the situation along the project implementation period. This will enable tracking to help manage and monitoring the safeguard risks (e.g., presence of invasive species, headwater forest condition, changes in river hydrology and sedimentation, key biodiversity indicators, key livelihood indicators and any other

conditions identified as potential safeguard risks may be some of the areas where data need to be collected.

Environmental and Social Management Plan (ESMP)

After conducting the ESAs, a detailed ESMP will be developed in each site. The ESMP will be the backbone for the implementation of safeguards during project implementation and operation. Each ESMP shall include the following components: i) mitigation plans; ii) monitoring plans; iii) institutional arrangements; iv) capacity building; and v) associated costs.

Gender Action Plan

Based on the findings of the gender assessment conducted during the project preparation phase (see Annex XI), ESA, and ESMP, a Gender Action Plan will be developed for each site. The gender action plan will ensure that project activities are gender-sensitive, inclusive and contribute to gender equality, social inclusion and community buy-in.

Indigenous Peoples Plan

No indigenous peoples were identified at the project intervention sites during the project development phase. However, if indigenous peoples are identified during the ESA and ESMP development processes, an Indigenous Peoples Plan will be prepared at each project site. Part of the Indigenous Peoples Plan will be a Free, Prior and Informed Consent (FPIC) process, which will allow identified communities to give or withhold consent to project activities that may affect them or their territories.

Environmental and Social Impact monitoring

The regional project implementation unit and both national project management units will be responsible for monitoring and evaluating the implementation of this SEAP and the developed ESMP at each site. Appropriate environmental and social indicators will be developed within each ESMP.

Monitoring and evaluation will take place at least biannually for the on-the-ground adaptation interventions implemented in Thailand and Vietnam. This will be undertaken by relevant extension officers and local government officials at each of the project intervention sites. In addition, members of the national project management units will evaluate the activities at the mid-term and the end of the proposed project. During the ESA process, the proposed project will develop and build the capacity of project implementers to monitor and evaluate environmental and social impacts.

Evaluation of monitoring and evaluation results

The evaluation of results of environmental and social mitigation will be carried out by the project implementation/management unit comparing baseline data collected in the planning phases with targets and post-project situations.

3. INSTITUTIONAL ARRANGEMENTS

UN Environment

UN Environment will ensure that all social and environmental risks identified in this SEAP and subsequent ESMP are monitored by the relevant institutions. UN Environment, in line with the AF guidance on compliance with the AF Environmental and Social Policy, will report on the monitoring results to the Fund in the mid-term, annual, and terminal performance reports.

Regional Project Implementation Unit (PIU)

The regional PIU will be responsible for identifying, monitoring and mitigating all potential social and environmental risks associated with activities under Outcome 2 and 3 of the proposed project. That will include implementing relevant mitigation actions identified in this SEAP. In addition, the PIU oversee the national project management units and ensure that the necessary ESA and subsequent ESMP procedures are carried out during project implementation. The PIU will prepare brief, consolidated monitoring reports of environmental and social risks and mitigation on annual basis for submission to UN Environment.

PCU will monitor the reports from the National Project Teams on a quarterly basis. They will rely on a bottom up feedback system; from the ground by going through the monitoring reports and making regular site visits to inspect and verify for themselves the nature and extent of the impacts and the success or lack thereof, of the mitigation measures. The PCU will prepare brief consolidated periodic monitoring reports for submission to IEMP and UNEP.

National Project Management Units (PMU)

The national PMUs will be responsible for implementing relevant mitigation actions identified in this SEAP as well as coordinating the completion of a ESA (one in each country) during the project inception phase. The PMUs will also work with consultants and local authorities to develop the relevant ESMP for each of the project intervention sites. Each PMU will then provide overall coordination in monitoring environmental and social risk indicators including coordinating of training on the collection and analysis of monitoring data for data collectors (e.g. local community coordinators in Thailand and Tram Chim National Park Management Board in Vietnam). Each PMU will also be responsible for analysing all social and environmental monitoring data, as well as maintenance of all baseline data. Finally, each PMU will be responsible for compiling social and environmental monitoring reports for submission to UN Environment and the national implementing entities.

Local Communities and contracted implementing partners

Local communities and contracted implementing partners will assist with the monitoring of social and environmental risks and mitigation measures. Local communities in the project intervention areas will receive training on implementing and monitoring climate change adaptation interventions (Output 1.1 – Activity 1.1.2 and Output 1.2 – Activity 1.2.2).

4. SOCIAL AND ENVIRONMENTAL RISKS AND MITIGATION ACTIONS

Risk	Risk Rating	Mitigation Actions	Responsible Entity	Expected Results
EbA interventions implemented within Tram Chim National Park cause adverse environmental effects, such as loss of biodiversity or degradation of natural habitats.	Low-moderate	• All of the activities proposed to take place within Tram Chim National Park are, and will continue to be, aligned with and identified in the current park management plan. The PMU in Vietnam will ensure regular communication with Tram Chim National Park management and keep abreast of any amendments to this management plan to ensure alignment throughout the project. • Only habitat restoration interventions to increase the supply of ecosystem goods and services will be implemented within the national park. The project will not construct small-scale water infrastructure that may damage natural habitats within the national park. • Only indigenous species native to the national park will be used in the habitat restoration interventions. No known alien invasive species will be utilised. • Detailed implementation protocols will be developed during project implementation to guide all EbA interventions and ensure that they do not cause negative environmental impacts.	MoNRE Vietnam Tram Chim National Park Management	EbA interventions implemented within Tram Chim National Park enhance biodiversity and restore natural habitats.
Certain community members, particularly vulnerable and marginalised groups, may not benefit from the project's climate change adaptation interventions.	Low-moderate	• Comprehensive stakeholder mapping will take place through Outputs 1.1 and 1.2 as detailed implementation protocols are developed. This will allow for the identification of marginalised and vulnerable groups and provision of alternative livelihoods for those losing out from project activities. • Each PMU, together with local authorities, will ensure that transparent and consultative selection criteria are developed for the selection of project beneficiaries during the inception phase of the project. The criteria developed will include gender equity considerations and target vulnerable groups. • A Gender Action Plan will be developed to ensure that gender-focused activities will include raising awareness in the region to *inter alia*: i) acknowledge women for their contribution as an income-generating individual in the household; and ii) highlight their role in climate change adaptation. This will enhance the value of women within their communities, as well as promote their equitable participation in the planning, implementation, monitoring and evaluation of the project.	MoNRE Thailand MoNRE Vietnam	Benefits are equitably shared among targeted communities including vulnerable and marginalised groups.

Risk	Risk Rating	Mitigation Actions	Responsible Entity	Expected Results
The implementation of adaptation interventions on private land limits access of certain community members to essential services.	Negligible	• All infrastructural development (such as small-scale water infrastructure development) will take place on public lands. Each PMU will ensure that, during the development of the detailed implementation protocols, all infrastructural intervention sites are situated on public land.	MoNRE Thailand MoNRE Vietnam	All community members are able to access interventions that provide communal benefits.
Community members are unwilling to implement household-level climate change adaptation interventions on their private land.	Minor	• Beneficiary communities will be trained on climate change adaptation and the benefits of ecosystem-based adaptation and climate-resilient agriculture. • Local implementing partners will ensure that individual landowners provide written consent for interventions (such as climate-resilient agriculture) to take place on their land.	MoNRE Thailand MoNRE Vietnam Local implementing partners	Community members are aware of the benefits of the proposed climate change interventions and are willing to implement these interventions on their land.
Community members may be exposed to the risk of accidents or poor labour practices while implementing the proposed project's interventions.	Negligible	• An ESMP will be developed and followed throughout project implementation to ensure that risks to community members during the implementation of climate change adaptation interventions are minimised. • During implementation, the national PMUs will ensure respect for international and national labour laws and codes, for any work that may be carried out in relation to the project. This includes the eight International Labour Organization Convention (ILO) core labour standards related to fundamental principles and rights of workers, as well as ILO Convention No. 169 which concerns rights of indigenous and tribal peoples. • Positive discrimination in favour of women may be used to provide fair and equal opportunity to women to seek employment as labourers. All forms of negative discrimination in respect of employment and occupation will be eliminated. The proposed project will not engage in child labour in any of its activities. All forms of forced or compulsory labour will be eliminated.	MoNRE Thailand MoNRE Vietnam Local implementing partners	Climate change adaptation interventions are implemented safely and according to all international and national labour laws.
Indigenous peoples do not have access to the project's resources and benefits.	Negligible	• Comprehensive stakeholder mapping will take place through Outputs 1.1 and 1.2 as detailed implementation protocols are developed. This will confirm whether or not there are indigenous peoples living at the project intervention sites. • If indigenous peoples are identified during the stakeholder mapping, ESA or ESMP development processes, an Indigenous	MoNRE Thailand MoNRE Vietnam	If indigenous people are present at the project intervention sites, they will be participating in the project and have access to project resources and

Risk	Risk Rating	Mitigation Actions	Responsible Entity	Expected Results
		Peoples Plan will be prepared at each project site. Part of the Indigenous Peoples Plan will be a Free, Prior and Informed Consent (FPIC) process, which will allow identified communities to give or withhold consent to project activities that may affect them or their territories.		benefits.
Adaptation interventions involving hard infrastructure (for example, the lengthening of canals and construction of living check dams) result in the disturbance of small areas of natural habitat or the loss of biodiversity.	Low-moderate	• An ESMP will be developed and followed throughout project implementation to ensure that adaptation interventions have minimal impact on natural habitats. • All activities will adhere to the EIA regulations of the relevant country. • Detailed implementation protocols will be developed for all adaptation interventions (including hard infrastructure) during the inception phase of the project to ensure that they will not result in significant adverse impacts on natural habitat.	MoNRE Thailand MoNRE Vietnam	Adaptation interventions involving hard infrastructure have minimal impact on natural habitats and biodiversity.
Construction of interventions to improve water infrastructure and water management (Activity 1.1.5 and 1.2.5) have negative impacts on hydrology, (particularly of Tram Chim National Park) sediment transport or fish movement.	Minor	• An ESMP will be developed and followed throughout project implementation to ensure that adaptation interventions have minimal impact on natural habitats. • All activities will adhere to the EIA regulations of the relevant country. • Detailed implementation protocols will be developed for all adaptation interventions (including hard infrastructure) during the inception phase of the project to ensure that they will not result in significant adverse impacts on hydrology, sediment transport or fish movement. • Interventions to improve water infrastructure and water management (Activity 1.2.5) will be small-scale and restricted to canals/channels that do not affect the hydrology of Tram Chim National Park. The interventions will also be designed to allow appropriate sediment transport and not restrict fish movement. If required, fish ladders will be added to the design of small-scale living check dams.	MoNRE Thailand MoNRE Vietnam	Construction small-scale water infrastructure improves water availability and management while having minimal impacts on hydrology, sediment transport and fish movement.
Implementation of the projects climate change adaptation interventions negatively impacts physical or cultural heritage.	Negligible	• The participatory approach to project design included the use of local knowledge to ensure that physical and cultural heritage will not be negatively affected by on-the-ground adaptation activities. • The location of physical and cultural heritage sites will be considered during the development of detailed implementation	MoNRE Thailand MoNRE Vietnam	The project climate change interventions have minimal impact on physical and cultural heritage.

Risk	Risk Rating	Mitigation Actions	Responsible Entity	Expected Results
		protocols during the project inception phase to reduce the likelihood of negative impacts related to project interventions		
Climate-resilient agricultural interventions result in soil or environmental degradation.	Negligible	• An ESMP will be developed and followed throughout project implementation to ensure that adaptation interventions have minimal impact on natural habitats. • Detailed implementation protocols will be developed for all adaptation interventions (including climate-resilient agriculture) during the inception phase of the project to ensure that they will not result in significant adverse impacts on soils or the environment. • No known alien invasive species will be utilised by the project. • Agroforestry and organic farming techniques will be promoted during the implementation of climate-resilient agricultural techniques (Activity 1.1.3 and 1.2.3) to improve soil and environmental conditions.	MoNRE Thailand MoNRE Vietnam Local implementing partners	The climate-resilient agriculture interventions implemented by the project improve soils and the surrounding environment.

Risk Rating	Definition
Negligible	No adverse environmental or social impacts predicted.
Minor	Very limited impacts in terms of magnitude (e.g. small affected area, very low number of people affected) and duration (short), may be easily avoided, managed, mitigated.
Moderate	Potential for significant adverse environmental or social impacts that are for example diverse, widespread, and irreversible.
Severe	Likely to have significant adverse environmental or social impacts that are for example diverse, widespread, and irreversible.

Indicative Terms of Reference for a consultancy to undertake an Environmental and Social Assessment (ESA) and prepare a Gender Action Plan (GAP) and an Environmental and Social Management Plan (ESMP)

1) Background

See Project background and context

2) Principles and objectives of the consultancy

2.1 Principles

The work and deliverable required in this contract includes the development of a ESA towards a GAP and an ESMP. These activities will support the mainstreaming of gender-relevant activities and concerns and also the integration of social and environmental safeguards into the implementation of the Mekong EbA South project. A key overarching principle for this consultancy is that the outputs need to be generated in an integrated manner in tandem with the other Mekong EbA South processes, including the development of detailed implementation protocols for the climate change adaptation interventions, including EbA, to be implemented in the Young River Basin and Tram Chim National Park. There needs to be close coordination with the project implementation units and project steering committees, and depending on the specific activities, cooperation in planning, undertaking and analyzing the results with designated stakeholders.

2.2 Objectives

The core of this consultancy is the ESA that will assess the potential environmental and social risks and impacts with particular attention to gendered vulnerabilities, both positive and negative, of the proposed climate change adaptation interventions. The ESA makes use of a variety of tools and can be defined as “a range of analytical and participatory approaches that aim to integrate environmental and social considerations into policies, plans and programs and evaluate the inter linkages with economic, political, and institutional considerations”.

The identification of negative impacts and formulation of adequate mitigation measures will be integrated in the preparation of other components of the project, as a means of ensuring that the Adaptation Fund Environmental and Social Safeguards are incorporated from the onset to avoid, limit and/or mitigate harm to people and the environment and strive to achieve benefits instead. The ESA protocols will comply with the Adaptation Fund Environmental and Social policy as well as the Adaptation Fund Gender Policy (these are expected to work in tandem and supplement each other’s goals according to the latest compliance rules stipulated by the Fund – see AFB/B.32-33/7).

The ESA aims to:

- Critically analyse the projects climate change adaptation options from a social and environmental point of view, with the aim of minimizing risks. This will include the development of criteria/indicators for the identification and prevention of social and environmental risks;
- Propose measures to mitigate environmental and socio-economic risks and impacts during project implementation; and
- Develop a multi-stakeholder engagement approach (that will be part of the Consultation and Participation Plan) to minimize risks and adverse impacts, as well as allow gender-responsive access to project benefits.

The outcome of abovementioned assessments will lead to the development of mitigation, risk management and capacity building measures that will be defined in the Environmental and Social Management Plan (ESMP).

3) Tasks and responsibilities

Task 1: Stakeholder analysis and final workplan development

This phase builds on the consultations carried out during the Mekong EbA Project formulation. Firstly, the consultants should carry out a stakeholder gap analysis to identify any relevant stakeholders that might not have been considered during the formulation phase. This would especially target beneficiary communities, the private sector, women and youth representatives, and government and non-governmental agencies working in the environmental sectors. Since this is part of the early phase of the contract, it is understood that most of this analysis can be based on document review and discussions with project implementation units. Secondly, the consultants should facilitate the development of an inception report that contains a detailed work plan and budget for the ESA, GAP, and ESMP. This will be carried out following a participatory consultation processes with relevant stakeholders.

The output of this step is a draft Inception Report with a detailed work plan and budget covering all safeguard related products including a revised consultation and participation plan.

Task 2: Situational Analysis

The aim of this step is to collect and analyze baseline information that is necessary to identify existing environmental and social issues related to the implementation of climate change adaptation interventions, including EbA, and key stakeholders that are associated with these issues/gaps identified.

The consultants should undertake the following activities:

- Assessment of existing information, policies, regulations, procedures and institutional structures that are supporting the implementation of environmental and social safeguards in Thailand and Vietnam.
- Assessment of existing land tenure and land rights, conflict resolution mechanisms, and equitable distribution of benefits including benefits for the resource owners and other indirect and co-benefits.
- Assessment of key stakeholders including a gender assessment on key issues.
- Assessment of current progress in Fiji with regards to addressing social and environment risks relating to EbA.

The output of this step is a report on the situational analyses on the social and environmental issues relating to climate change adaptation implementation in Thailand and Vietnam.

Task 3: Identification of key environmental and social issues

Following from the situational analysis above and through the application of appropriate analytical tools, this step aims at identifying environmental and social risks and impacts associated with the

proposed climate change adaptation interventions in the Mekong EbA project. The ESA consultants should conduct this analysis using spatial analysis, case studies and participatory rural appraisal methods.

Task 4. Development of the ESA

Based on the results of the scoping report from Task 3, consultations will be undertaken with all relevant stakeholders to identify environmental and social priorities. The consultants will synthesize the results from the stakeholder consultations and prepare a ESA report. This report will be presented for discussion at a national stakeholder consultation workshops in Thailand and Vietnam. The objective of the workshop is to discuss the synthesized results of the target group consultations and to agree on a common set of environmental and social priorities.

The output of this step is a ESA report which will be presented at national stakeholder consultation workshops in Thailand and Vietnam.

Task 5. Development of the GAP and ESMP
The Purpose of the ESMP

The Gender Action Plan (GAP) and Environmental and Social Management Plan (ESMP) will be developed from results of the ESA. The GAP will be an implementation input towards gender mainstreaming through the project's results framework, and ensuring that the project provides accessible benefits for different demographic groups within the vulnerable communities. The ESMP is an instrument to manage safeguards risks and impacts The ESMP will help minimize and mitigate any potential negative safeguard risks and impacts of climate change adaptation interventions carried out by the Mekong EbA project as well as ensure its social and environmental integrity. The ESMP will lay out the processes, procedures and/or requirements though which activities under the Mekong EbA project shall undergo to ensure compliance with safeguards.

In terms of engagement of all stakeholders, the GAP and ESMP will take the outcome of the stakeholder mapping exercises from the earlier ESA activities into consideration and give specific consideration to the protection of special and/or vulnerable groups of stakeholders. An assessment will be made of the capacity required to develop, implement, and administer the ESMP and potential shortfalls will be remedied with a capacity development program

The GAP and ESMP will incorporate procedures for:
- In-depth voluntary consultations with concerned stakeholder groups based on the free prior and informed consent to seek their broad support;
- Culturally-appropriate capacity building measures;
- Environmental and social impact screening, assessment, and monitoring; and
- Grievance redress.

The ESMP also specifies the inter-institutional arrangements for the preparation of time-bound action plans for managing and mitigating adverse impacts related to the project activities.

Contents of the ESMP

The Consultant will prepare drafts of the GAP and ESMP suitable for public consultations that includes the following:
- Introduction

- Project description
- Gender baseline conditions / Environmental and social baseline conditions
- Legal and institutional framework, including a review of the countries existing legal and institutional framework for environmental and social safeguards
- Applicable gender mainstreaming activities/ safeguard polices
- Stakeholder engagement, including the results of the stakeholder mapping undertaken during the ESA
- A list and description of the potential environmental and social risks and impacts for each anticipated project activities;
- Mitigation measures to reduce the potential negative impacts of the potential environmental and social risks identified
- Institutional arrangements to implement the GAP/ESMP
- Monitoring and reporting requirements for the GAP/ESMP

The deliverable for these activities will be a draft and final ESMP.

4) Qualifications and experience

The consultancy should ideally have/comprise the following mix of competencies:

- proven expertise and in-depth knowledge of climate change and adaptation policies and practices in Thailand and Vietnam;
- knowledge of the environmental sector in Thailand and Vietnam, especially in relation to matters such as technical requirements, necessary permits and procedures;
- knowledge of, and experience working in, the project implementation areas;
- knowledge of, and experience working with, the communities living within the project implementation area;
- 10 years of experience conducting ESAs, developing ESMP, gender analyses, environmental analyses or research in the field of environmental impacts and climate change;
- at least 5 years proven experience working on climate change-related projects, especially developing ESMp for climate change-related projects;
- should hold advanced degrees (minimum Masters level) in their respective areas of expertise (social sciences, ecology, environmental sciences, environmental policy, sustainable development, natural resource management or other relevant fields);
- familiarity with the Adaptation Fund policies and procedures;
- ability to speak and write clearly and effectively;
- ability to communicate effectively with audiences of various levels of seniority and technical knowledge, tailoring language, tone, style and format appropriately;
- ability to communicate with various stakeholders in politically sensitive situations with diplomacy and tact; and
- fluency in oral and written English

- Annex XIV: Stakeholders and their role and responsibilities

Stakeholder	Roles and responsibilities	Rationale for involvement
Chinese Academy of Sciences (CAS)	• Institute of Geographic Sciences and Natural Resources Research (IGSNRR) under CAS hosts UNEP-IEMP – the executing entity for regional activities. • Contribution of knowledge on EbA and other climate change adaptation interventions. • Involvement in South-South knowledge-sharing activities under Output 2.5. •	The CAS, through its various research programmes and institutes, has generated knowledge on designing, implementing and monitoring climate change adaptation interventions. Involving scientists from CAS in the regional knowledge-sharing events will promote South-South knowledge exchange between this organisation and other Mekong countries.
Chinese Ecosystem Research Network (CERN)	• Contribution of knowledge on EbA and other climate change adaptation interventions. • Technical input into the design of monitoring programmes under Output 1.3. • Involvement in South-South knowledge-sharing activities under Output 2.5. •	CERN is a technical partner of the UNEP-IEMP, which is the main project executing agency for the regional outputs. CERN has generated long-term scientific information on ecosystem restoration, ecosystem monitoring and ecosystem-based adaptation. Involving scientists from CERN in the regional knowledge-sharing events will promote South-South knowledge exchange between this organisation and other Mekong countries. Scientists from CERN also have extensive experience designing ecological monitoring programmes, and therefore may contribute to the design of monitoring programmes under Output 1.3 and monitoring guidelines under Output 2.4.
Lancang-Mekong Cooperation (LMC) mechanism	• Recipient of knowledge on EbA and other climate change adaptation interventions which may contribute to the Lancang-Mekong Cooperation Outlook Report series on managing climate change impacts and integrating climate change into transboundary water management. • Recipient of recommendations for regional cooperation on scaling up of climate change adaptation interventions.	The LMC mechanism is an emerging instrument working across all six countries of the GMS on topics that include transboundary water management and climate change adaptation. The LMC mechanism is, therefore, well positioned for fostering coordination on adapting to shared climate impacts relating to transboundary water resources across all six countries of the GMS, and will be involved in the regional knowledge-sharing and cooperation activities under Outcome 2 and 3.
Mekong River Commission (MRC)	• Host of MRC data portal, where knowledge on EbA collated and generated through the project will be shared. • Recipient of knowledge on EbA and other climate change adaptation interventions. • May be engaged to strengthen cooperation on climate change and transboundary water management through existing platforms and as part of Component 3 activities. •	Mekong River Commission (MRC) is finalising the *Mekong Adaptation Strategy and Action Plan* (MASAP) for the portion of the GMS covering Cambodia, Lao PDR, Thailand, and Vietnam, and have a track record in convening countries of the middle and lower reaches of the Mekong Basin. They are therefore an important institution to involve in the knowledge sharing and regional cooperation activities implemented by the proposed project under Outcome 2 and 3.
Local research institutions in Thailand and Vietnam	• Development and implementation of monitoring strategy to collect information on the cost-effectiveness of project	Local research institutions in Thailand and Vietnam are well-positioned to design and implement a monitoring strategy for the project interventions as they have experience

	interventions in different socio-economic contexts.	conducting monitoring research relevant to the local context at each project intervention site. As such, they will be involved in activities under Output 1.3 of the proposed project.

Annex XV: Letter of clarification regarding role of IEMP

Institute of Geographic Sciences and Natural Resources Research, CAS
中国科学院地理科学与资源研究所

To whom it may concern

From: Professor Quansheng Ge
Director General
Institute of Geographic Sciences and Natural Resources Research
Chinese Academy of Sciences

Subject: Letter of clarification

Dear Sir/Madam,

I am writing to clarify that the United Nations Environment Programme – International Ecosystem Management Partnership (UNEP-IEMP), is a collaborating centre on ecosystem management between Chinese Academy of Sciences and United Nations Environment Programme. It is housed at the Institute of Geographic Sciences and Natural Resources Research (IGSNRR), having its office at No. 11A Datun Rd. Beijing 100101, China. As a unit of the IGSNRR, UNEP-IEMP is financially and administratively managed by the IGSNRR.

The director of UNEP-IEMP has the authority to sign any collaborative agreements and projects between UNEP-IEMP and other parties within and outside China. In this regard, UNEP-IEMP also uses the IGSNRR account for purposes of project fund transfers.

Please do not hesitate to contact me if you have any questions.

Sincerely yours,

Quansheng Ge

January 1, 2019

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ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regional Full Proposal

Countries/Region: **Thailand and Viet Nam**
Project Title: **Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem based Adaptation in the Context of South-South Cooperation**
Thematic Focal Area: **Transboundary water management**
Implementing Entity: **United Nations Environment Programme (UNEP)**
Executing Entities: **UN Environment-International Ecosystem Management Partnership (UNEP-IEMP), Ministry of Natural Resources and Environment of Thailand, Ministry of Natural Resources and Environment of Vietnam**
AF Project ID: **ASI/MIE/WATER/2016/1**
IE Project ID: Requested Financing from Adaptation Fund (US Dollars): **7,000,000**
Reviewer and contact person: **Saliha Dobardzic** Co-reviewer(s):
IE Contact Person: **Ms. Moon Shrestha**

Review Criteria	Questions	Comments	Response
Country Eligibility	1. Are all of the participating countries party to the Kyoto Protocol?	Yes.	
	2. Are all of the participating countries developing countries particularly vulnerable to the adverse effects of climate change?	Yes.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	The letters of endorsement from Viet Nam and Thailand have been provided. CAR 1: Please provide a letter of no-objection from China in order to ensure that the execution for the regional components that are being undertaken	CAR 1: Process to obtain No-objection letter from China is ongoing.

		by IEMP, as per page 88, “Executing Entity – Regional Activities” are acceptable to the host country.	
	2. Does the length of the proposal amount to no more than Fifty pages for the project/programme concept, including its annexes; or One hundred pages for the fully-developed project document, and one hundred pages for its annexes?	Yes.	
	3. Does the regional project / programme support concrete adaptation actions to assist the participating countries in addressing the adverse effects of climate change and build in climate resilience, and do so providing added value through the regional approach, compared to implementing similar activities in each country individually?	Yes. The project contains a mix of on-the-ground interventions in Thailand and Viet Nam, along with supporting activities, and a knowledge-generating and capacity-building regional components that would benefit other countries of the Greater Mekong Sub-basin as well.	
	4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy of the Fund?	Yes, the project is expected to confer a number of economic, social, and environmental benefits, such as improved food and water security, more resilient livelihoods, forest restoration and other.	
	5. Is the project / programme cost-effective and does the regional	Yes.	

	approach support cost-effectiveness?		
	6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments? If applicable, it is also possible to refer to regional plans and strategies where they exist.	Yes.	
	7. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	Yes. This information has been provided in Annex III.	
	8. Is there duplication of project / programme with other funding sources?	No. CAR2: However, please add language that clarifies that the China and Myanmar planned or existing interventions, mentioned on p.6 and p. 24, do not refer to the interventions to be financed by AF through this project.	CAR 2: Additional text has been added in the mentioned para in p. 6 and p. 24 to have better clarity.
	9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Yes.	
	10. Has a consultative process taken place, and has it involved all key stakeholders, and	Yes.	

	vulnerable groups, including gender considerations?		
	11. Is the requested financing justified on the basis of full cost of adaptation reasoning?	Yes.	
	12. Is the project / program aligned with AF's results framework?	Yes.	
	13. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	Yes, as per page 78-79.	
	14. Does the project / programme provide an overview of environmental and social impacts / risks identified?	Yes. However, it is still not clear why the project is proposed to be classified as category C. This is not substantiated, particularly considering the nature of the interventions described in the supplement documents I and II (e.g. restoration/rehabilitation of 900 ha of grasslands/forests and introduction of fish eggs in a national park, canal constructions and rehabilitation, dredging of water reservoir, construction of check dams and irrigation systems etc, as per supplement documents I, Tables 2&3, and II, p. 27-31). CAR3: Please consider revising the categorization of the project to B, or provide justifications concerning infrastructure investments.	CAR 3: We appreciate the feedback from the Secretariat. The ESERN has been revised to category B. Please refer to Page 85, amendments to Table 18, Annex X and Annex XIII
	15. Does the project promote new and innovative solutions to	Yes.	

	climate change adaptation, such as new approaches, technologies and mechanisms?		
Resource Availability	1. Is the requested project / programme funding within the funding windows of the pilot programme for regional projects/programmes?	Yes.	
	2. Are the administrative costs (Implementing Entity Management Fee and Project/ Programme Execution Costs) at or below 20 per cent of the total project/programme budget?	Yes.	
Eligibility of IE	3. Is the project/programme submitted through an eligible Multilateral or Regional Implementing Entity that has been accredited by the Board?	Yes.	
Implementation Arrangements	1. Is there adequate arrangement for project / programme management at the regional and national level, including coordination arrangements within countries and among them? Has the potential to partner with national institutions, and when possible, national implementing entities (NIEs), been considered, and included in the management arrangements?	Yes. In addition to the Implementing entity (UNEP) and the Executing Entities (MoNRE Thailand, MoNRE Vietnam, UNEP-IEMP) a variety of other stakeholders, primarily institutions based in China, will be involved in the implementation/execution of the project, directly or indirectly (e.g. CAS, CERN, LMC, LMEC, MRC, local research institutions for output 1.3). The proposal now provides a brief description and roles of each of these institutions in implementation/execution of the proposed project, and a rationale for their involvement.	

	2. Are there measures for financial and project/programme risk management?	Yes.	
	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy of the Fund? Proponents are encouraged to refer to the Guidance document for Implementing Entities on compliance with the Adaptation Fund Environmental and Social Policy, for details.	An Environmental and Social Management Plan is not provided. A terms of reference for a ESMF, for managing the risks related to the USPs, is provided. The monitoring, reporting and evaluation arrangements for the ES risks management are not clearly described. The gender analysis has been provided. The grievance mechanism is provided and is comprehensive. There should be an Environmental Social Management Plan that shows risk mitigation measures for each risk identified. In case of unidentified sub-projects (USPs), there should be an Environmental Social Management Framework or System, that clearly demonstrates the process of what would happen should the sub-project trigger risk to any of the AF's ES principles. How do the sub-projects go through the process of risk screening, assessment, devising mitigation measures and following up on those (Monitoring, Reporting, Evaluation)? CAR 4: Please provide an ESMP including a ESMF for the USPs, including the budget, M&E arrangements, and responsibilities	CAR 4: Social and Environment Action Plan (SEAP) has been prepared and attached as Annex XIII (i). The SEAP has identified social and

		or CR1: Please justify the delay for the preparation of the ESMF and please provide the reason for ESMP not being in place, including the M&E for the ES risks management.	environment impact and risk associated with the project activities that will lead to development of an environmental and social assessment (ESA), an Environmental and Social management Plan and Gender Action Plan, during inception phase of the project. Please refer to Annex XIII (ii) for indicative ToR for the consultant who will prepare ESA, ESMP and GAP.
	4. Is a budget on the Implementing Entity Management Fee use included?	Yes.	
	5. Is an explanation and a breakdown of the execution costs included?	Yes.	
	6. Is a detailed budget including budget notes included?	Yes.	
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators?	Yes.	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	Yes.	

	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	Yes.	
	10. Is a disbursement schedule with time-bound milestones included?	Yes.	

Technical Summary	The overall objective of the proposed project is to strengthen awareness and action of governments and communities in the Greater Mekong Sub-region (GMS) to adapt to climate chance using an ecosystem-based approach (EbA). This objective would be achieved through three complementary outcomes: 1. Climate change adaptation interventions implemented by vulnerable communities in Thailand and Vietnam to manage climate change impacts, particularly droughts and floods. 2. Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS. 3. Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS. The proposal needs to address issues related to the absence of ESMP for the identified activities and ESMF for the unidentified sub-projects (USPs), to provide a letter of no-objection from China and clarify the source of finance of activities in China and Myanmar referenced in the proposal. The document needs to be revised accordingly. A number of issues were raised through the initial review, as reflected in the Corrective Action Requests (CAR) and Clarification Requests (CR) that were raised.
Date:	8/26/2019

Supplement Document 1:

1. Inception report of Thailand
2. Climate Vulnerability Assessment and Adaptation Strategy in the Young River Basin NE Thailand
3. Validation workshop report of Thailand

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1. Inception Workshop Report

Background and Rationale

United Nation Environment Programme– (UNEP) recognizes the impact and importance of climate change. Because of climate changes, communities in many parts of the world are affected on their livelihoods. Changes in terrestrial and aquatic ecosystems, in particular, the Greater Mekong sub-region (GMS), one of the world's major natural resources, greatly affects communities in the Mekong sub-region which depends on natural resources.

The temperature of MRB region has risen about 0.14-0.20°C per decade, coupled with high rainfall variability, this result in drought and flooding. Communities in the Mekong sub-region has been affected by water resource shortage, decrease in crop yields, soil erosion and landslides, damages to properties and livelihoods. and lifestyle in affected. Thus, it is necessary for the community to adapt to climate changes.

Many countries in Mekong sub-region has developed a Master Plan for Adaptation to Climate Change. However, the implementation of such lacks integrity and coordination to cover many aspects of the local communities to deal with the climate changes.

The northeast of Thailand has a land area of 169,000 km^2 located in Lower Mekong Basin (LMB) and comprises of three main river basins in this area; Mekong, Chi and Moon, with 80 sub-basins of cultivated land. The population of the northeast region is 26 million, or one-third of the country's total population. The water run-off volume is 57,220 million m^3 per year whereas the water demand is approximately 10,933 million per year. However, the region is often faced with severe water shortages due to mostly sandy loam that has less moisture content. During the dry season, the region experiences severe water stress due to climate change impact with minimal rainfall intensity and fewer raining days resulting many sub-basins in this area dry up and Young river basin is most critically vulnerable to climate impact in the northeast region.

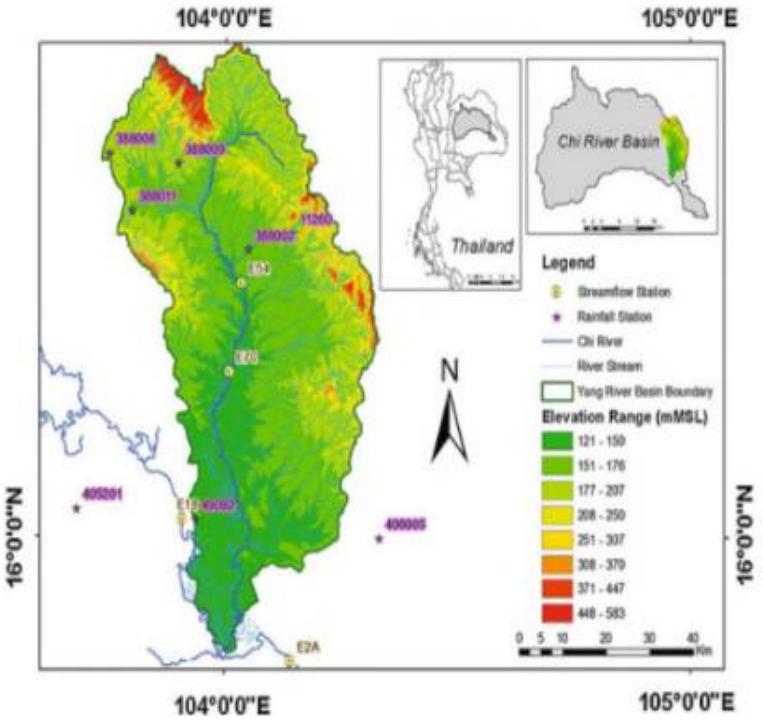

Figure 1 Location map of Young River Basin, Thailand

United Nations Environment Programme together with the Ministry of Natural Resources and Environment of Thailand thus, focused on the implementation of knowledge, research, and development activities on adaptation to climate change by ecosystems (Ecosystem-Based Adaptation - EbA). The project will focus on the area where most critically vulnerable to climate impact and continuation from previous activities.

The Young river basin is a tributary of the Chi river basin (Figure 1), has a land area of 0.005 km^2 covering 5 provinces (Mukdahan, Yasothon, Roi Ed, Kalasin and Sakon Nakhon), 23 districts, 107 sub-districts and 864 villages. It has a drainage area of approximately 4,145 km^2 which accounted for 8.38 % of Chi basin area. Most of Young river basin is located in Kalasin and Roi Ed provinces.

In the past, the upper catchment at Kalasin province experiences a much longer period of drought annually while the lower catchment faces with heavy flood during the monsoon period. Young river basin was selected as a local demonstration project under MRC Climate Change and Adaptation Initiative (CCAI) by Chi RBO Committee since 2015. From the prior demonstration project, it was designed to engage community leaders and local, provincial and sub-national government officers to work cooperatively in all project activity and fostered the learning process through the exchange of knowledge and experiences between stakeholders.

Figure 2 Climate Change Impact in Young River Basin, Thailand

However, currently both upper and lower catchments still struggle with severe drought and flood problems (Figure 2). The development of adaptation to climate changes in Young river basin, supported by the Department of Water Resources, Ministry of Natural Resources and Environment since 2015 leads to adaptations in both upper- and lower- Young river basin. At the household level, many groups of households show good ecosystem-based adaptation examples such as Living Check-Dam, integrated farming or agriculture, restoration of forest resources, etc. Such operations and activities need coordination from local government agencies, districts, educational institutes, and community organizations on several levels.

Objectives

The overall objective of the proposed project is to reduce vulnerability to climate change in Thailand and based on three complementary outcomes:

- Climate change adaptation interventions, particularly EbA, implemented by vulnerable communities in the GMS to manage climate change impacts, particularly droughts and floods.
- Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in GMS.
- Strengthened reginal cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

1. Reviews

1.1. Relevant information on Climate Change Adaptation (CCA) in Thailand

Climate change and variability have recently received much attention from Thai government sectors, institutions and non-profit organizations. The example of ecosystem-based adaptation project relating climate change adaptation in Thailand is preliminary gathered and summarized in Table 1.

Table 1 The project study / activities relating CCA in Thailand

No.	Project Title	Year	Working Team
1	Risk, Vulnerability, and Community Adaptation Assessment in the	2011	Dr. Yanyong Inmuang et al.

No.	Project Title	Year	Working Team
	Demonstration Area for Climate Change Adaptation in Young River Basin, Thailand		
2	Risks and Vulnerability of the Repeated Drought and Flood Devastated Areas in Chi-Mun River Basin to the Climate Change and Variation	2011	Chula Unisearch, Chulalongkorn University, Funded by Natural Research and Environmental Policy and Planning
3	Effects of Future Sea Level From Climate Variation and Changes to the Eastern- and Western- Southern Coastal area	2011	Chula Unisearch, Chulalongkorn University, Funded by Natural Research and Environmental Policy and Planning
4	Climate Changes and the Livelihood : Examination of Impact and Adaptations of Rice Farmers in Songkla Lake Basin Area	2015	Environmental Management Committee, Songklanakarin University
5	Improving Community Potentials and Ecosystem security by Strengthening Participatory Water Resources Management in Wetland Ecosystems : Adapting and Building Resilience to Climate Change in Chi and Songkhram River Basin	2011 to 2014	WWF
6	Community Empowerment and Strengthening Program for Water Resources Management and Restoration of Lower Mekong River Wetland Ecosystems Nakhon Phanom Province	2014 to 2017	WWF
7	Climate Change Adaptation Pilot Projects	On going	Earth Net Foundation, funded by Thai Health Promotion Foundation

The description of each projects is summarized as follows;

2.1.1 The Risk, Vulnerability, and Community Adaptation Assessment in the Demonstration Area for Climate Change Adaptation in Young River Basin, Thailand

Study Area : Na-Kuh district in Kalasin and Selaphum district in Roi-et, Thailand

This study focuses on community's adaptation to climate change and having key project activities (Figure 3) ;

- conducting stakeholder meetings to inform and consult with key informants regarding project activities
- designing community climate change vulnerability-risk-adaptation survey tools
- conducting community surveys, using the inventory tools for identifying the nature and magnitude of climate impacts, as well as household coping and adaptation strategies

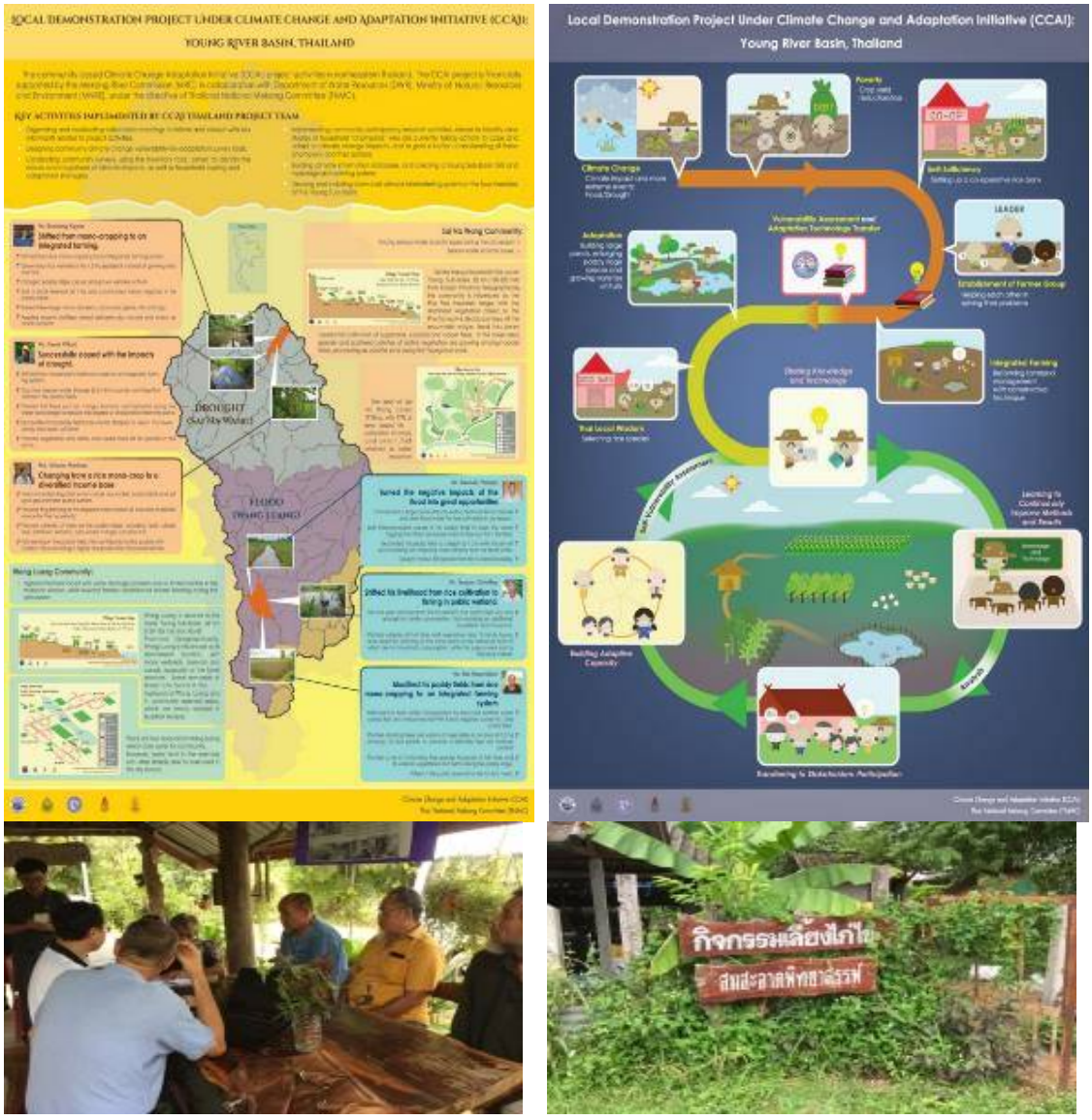

Figure 3 Community's adaptation to climate change in Young Basin River

- implementing community participatory research activities, which aim to identify case studies of household 'champions' who are currently taking actions to cope with and adapt to climate change impacts, and to gain a better understanding of them and their actions
- building climate information database and creating a Young River Basin GIS, hydrological, and agriculture modelling system
- devising and installing a low-cost climate telemetering system at four riverside stations of the Young River Basin.

2.1.2 Risks and Vulnerability of the Repeated Drought and Flood Devastated Areas in Chi-Mun River Basin to the Climate Change and Variation

Study Area : Si Samran sub-district, Khon-Sawan in Chaiyaphum, Lao Oi sub-district, Rong-kham in Kalasin, Pho-Si sub-district, Pho-Chai in Roi-et, Thung-Luang sub-district, Suwannaphum in Roi-et

This study focuses on community's adaptation and having some example of adaptation activities (Figure 4) such as;

- changing rice planting to off-season paddy field in dry season instead of rainy season, with the use of diversion irrigation and "Monkey's cheek" in the area
- changing crops planting time, methods and plots
- using of drought resistant species, e.g. tapioca, corns etc.

Figure 4 Example of adaptation activities in Chi-Mun river basin

2.1.3 Effects of Future Sea Level From Climate Variation and Changes to the Eastern- and Western- Southern Coastal area

Study Area : Khlong Pra-song sub-district, Muang in Krabi (represent the Western-side of south coastal area) and Ko Tao sub-district, Ko Pha-Ngan, Surat-Thani (represent the Eastern-side of south coastal area)

This study evaluates the risks and vulnerability of coastal areas for the risk of sea level rise, coastal erosions, changes in the weather pattern and floods in the near future and having some example of adaptation activities (Figure 5) such as;

- Reinforced concrete dam near coastal area and campaign promoting the plantation of *Avicennia alba* to reduce erosion
- Bamboo wall to reduce rip current and erosion
- Establishing local organic farming organization
- Low carbon village demonstration establishment
- Sea water prevention dike
- Fresh water reservoirs and watershed forest

Figure 5 Example of adaptation activities in south coastal area

2.1.4 Climate Changes and the Livelihood : Examination of Impact and Adaptations of Rice Farmers in Songkla Lake Basin Area

Study Area : Ranot district in Songkla and Khao Chaison, Muang, and Khuan Khanun district in Phatthalung

This study focuses on impact and adaptation of farmer groups in Songkhla Lake. Data were collected from 4 districts of Songkhla and Phatthalung provinces. The adaptation strategy was composed of 2 strategies, namely main strategies and support strategies: change of rice varieties, change of rice agricultural method, change soil nutrient, and change of rice agricultural pattern.

2.1.5 Improving Community Potentials and Ecosystem security by Strengthening Participatory Water Resources Management in Wetland Ecosystems : Adapting and Building Resilience to Climate Change in Chi and Songkhram River Basin

Study Area : Ban Pai and Ban Hat, Khon Kaen province

This study aims to improve community potentials and ecosystem security by strengthening participatory water resources management in wetland ecosystems to cope with and adapt to the impacts of climate change in the watershed. War and Watershed War This will lead to a policy of planning, supporting, conserving and restoring the ecosystem of the watershed. Wetland in the Mekong region. This is consistent with the sustainability of local communities. That will reduce the risk and fragility and prevent the effects of climate change.

Figure 6 Example of adaptation activities in south coastal area

2.1.6 Community Empowerment and Strengthening Program for Water Resources Management and Restoration of Lower Mekong River Wetland Ecosystems Nakhon Phanom Province

Study Area : Si Songkhram and Tha Uthen sub-district, Nakhon phanom

This study aims to assess the impact of climate change on the watershed. The quality of water and the amount of water that can be used, protect the freshwater ecosystems in the watershed, support the implementation of water management activities. And to improve the quality of life of the community publish the lesson and experience Water Management from Pilot Area to Policy Level and having some example of adaptation activities such as;

- Support for water quality monitoring and surveillance system in the project area together with the school, community leaders for water resource database
- Support the establishment of community forests.
- Support forest planting activities to restore ecosystems.
- Establishment of Provincial Wetlands Committee
- Support for the establishment of an aquarium (fish nursery)
- Support sustainable agriculture, using organically fermented fertilizers
- Soil conservation training

2.1.7 Climate Change Adaptation Pilot Projects

Study Area : Pilot project area in Patthalung, Trung, Chiang Mai, Chachoengsao, Chiang Rai, Nakhon Ratchasima provinces

This project is preliminary set up pilot project in some communities located in north, south, central and northeast region of Thailand such as;

- Rice cultivation project in the flooded area of Tha Chang community
- Adaptation pilot project in Ban-Mod-Ta-noi: The community with climate surveillance and marine warning system
- The experimental plowed field, rice drop method adaptation to the climate change
- Food storage in the community for food security under climate change and fluctuation
- The knowledge for community adaptation in Mountain area to cope with the climate change of Doi Mae Win community
- Municipality Support Program to handle climate change and fluctuations in Chiang Rai Municipality
- Adaptation Program to Reduce the Impact of Climate Changes and Variations, Bua Yai Villagers Organization, Bua Lai district, Nakhon Ratchasima

2. Engaging stakeholders at Inception Workshop

The inception workshop for adaptation direction and measures using Ecosystem-based Adaptation to climate change was held on April 20, 2018 at Avani Hotel, Khonkaen province, Thailand. The objectives of this workshop are giving basic knowledge on EbA and exchanging experiences on climate change adaptations based on the ecosystem-based adaptation method and Propose ecosystem-based adaptation measures to counteract the effects of climate changes in the Young river basin in community level and the work shop schedule and participant name list is presented in Appendix A. The picture of inception workshops is presented in Figure 7.

Participants registration

Workshop opening speech

Government and UNEP Representatives

Speakers and specialists

Group photo of the participants

Figure 7 Present of inception workshop atmosphere

Participants attending the workshop

Brainstorming and Discussion session

Figure 7 Present of inception workshop atmosphere (cont.)

2.1. Participant stakeholders

The total participants from various sectors; community, government and institution, of 76 persons participated in this workshop (Appendix A). The number of each participant stakeholder group are detailed below and its breakdown is presented in Table 2.

1. Community representatives from upper-, middle-, and lower- Yang river basin (39 persons)
2. Related local government representatives in Kalasin, Khon Kaen and Roi-Et (29 persons)
3. Representatives from related local association and educational institutions (3 persons)
4. Representatives from Department of Water Resources, and Policy and Planning Bureau Natural Resources and Environment (3 persons)

Table 2 Breakdown of participant stakeholder

No.	Groups	Number of participant (persons)			
		Male	Female	Children	Total
1	Representative from Upper Nam Young river basin	10	1	0	11
2	Representative from Middle Nam Young river basin	9	2	2	13
3	Representative from Lower Nam Young river basin	5	9	0	14
4	Related local government representatives (Kalasin, Khon Kaen and Roi Et.)	22	7	-	29
5	Representatives from related local association and educational institutions	2	1	-	3
6	Representatives from Department of Water Resources, and Policy and Planning Bureau Natural Resources and Environment	2	1	-	3
7	Representatives from related local private sectors	1	0	-	1
8	Representative from UNEP	0	2	-	2
Total number					**76**

2.2. Lesson learnt & gaps identified

During workshop, lessons learnt from those stakeholders in Young river basin on their coping strategies and agricultural adaptation practices in response to the climate change impacts is collected and summarized as follows;

- The study results also indicated that the household-based autonomous adaptation to the climate change impacts contained highly valuable information. The climate adaptation activities illustrated climate farming resilience practices using:
    - Integrated farming
    - Smart water management in the paddy
    - The application of animal manure instead of the chemical fertilizer
    - Cultivation using native seed that is tolerant to climate disruption
    - Farmland resource cycling
    - Agroforestry pilot area (planting fruit and standing trees to conserve soil moisture content)
    - Raising fish and poultry in the paddy pond
    - Living check dam

Smart water management in the paddy field

Agroforestry pilot area

Living Check Dam construction

Integrated farming

Figure 8 Current activities in Young River Basin

Eco-based Agriculture on levee of paddy field

Seed storage site and network building

Figure 8 Current activities in Young River Basin (cont.)

- The community-based activities organized by the fieldwork team created a learning platform for community members as well as local and provincial government officers. The experiences, provided by the demonstration project information, have been further developed. As a result, many farmer groups within the province and from other provinces visit the farmland of the climate champions and learn from them.

2.3. Key Outcomes

The results from workshop and data collected from each stakeholder are summarized as follow;

- All stakeholders have acknowledged a common understanding of ecosystem-based adaptation to climate change.
- The overall comments and proposals from stakeholders were collected and summarized separately by area (upper-, middle-, lower- and throughout Yang river basin)

Table 3 Example of proposed project in Young Basin

Project area	No.	Activities / Proposed projects
Upper Young River Group 	1	Construction of emergency canal and water gate and dredging Huay Mano reservoir
	2	Construction of waterway from Sai Na Wang Subdistrict Administrative Organization to Nong Kung Ban Na Kra Dao
	3	Development of drainage canal for Upper Young river basin
	4	Rehabilitate the Huai (creek) Kud Mek
	5	Construction of check dam in Huai Kud Hae
	6	Restoration of Community forest in Nong Kung, Ban Na Ra Dao

Table 3 Example of proposed project in Young Basin (cont.)

Project area	No.	Activities / Proposed projects
Middle Young River Group 	7	Restoration and conservation of river bank ecosystem, local species, cultures, and species
	8	Development of eco/cultural/organic agricultural-tourism areas
	9	Construction of irrigation system to help relief drought in community forest area using solar power
Lower Young River Group 	10	Conservation of Local plant species, and development of product production processes of local crops and produces
	11	Local water resource management initiative
	12	Promotion and development of alternative skills for extra source of income and improving quality of living
	13	Promotion and development of Young river basin for ecological tourism area
	14	Development of sustainable agriculture in local area

Project area	No.	Activities / Proposed projects
Throughout Young river basin area 	15	Development of farmers capability for community leadership, indigenous knowledge for robust local administration
	16	Using of King's Philosophy (Sufficiency economy) 1. Construction of living check dam 2. Sufficiency planting pit 3. Three level of market (Community, Local, Nationwide)
	17	Environmental protection kids initiative
	18	Conservation of Local biological species
	19	Restoration of watershed forest area and area surrounding river bank

2. Climate Vulnerability Assessment and Adaptation Strategy in the Young River Basin NE Thailand

Background:

This report aims to complement the works done by the international and national researchers under that project 'Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation' which will be planning to implement in the young river basin Thailand.

The report focuses on identifying climate and vulnerability assessment as well as exploring adaptations strategy of the Young river basin while contributing the findings to the planning of EbA activities in the pilot sites within the basin. This work is supplementary to what the Department of Water Resources, Ministry of Natural Resources and Environment, Thailand, have been recently done in 2011, and 2017 in the young river basin.

Climate change scenario within the Young river basin, the researcher compiles mainly key information from published articles and the Mekong River Commission's reports. Likewise, the climate impact and vulnerability assessment the researcher reviews of published articles and related official reports as well as referencing to the latest study results done in Young river basin.

The climate adaptation strategy the researcher reviews those recommendations as done recently in the basin which collectively proposed by local stakeholders. It is found that those recommendations are still incomplete while the inception stakeholder workshop on 20 April 2018 at Avani Hotel, Khon Kaen, Thailand can add more detailed information of the proposed adaptation strategy and actions. The latest proposed adaptation interventions proposed by the stakeholders focus mainly on water resource management actions which reflecting the flood and drought impacts occurring within the basin in recent years. There are also the proposed actions on natural resources conservation and capacity building of the upper, middle and lower communities of the Young river basin.

The Young River Basin:

The proposed Mekong EbA South intervention sites are located in the Young river basin northeast Thailand. The Young has an area of 414,500 ha extending to cover 23 districts in 5 provinces of Kalasin, Rio-Et, Mukdahan, Yasothon, and Sakolnakorn. The upper basin is mostly forest reserve headwater with an elevation as 500 msl while stretching to the cultivation lowland areas as 130 msl. The annual average rainfall is 1,384 mm with a maximum precipitation in August 295 mm, as different landscape altitude during monsoon season the basin facing flash floods almost every year. The forestland which located mainly upstream during 2002-2015 started to decline significantly from 37% to 23% with its conversion to cultivated lands. The only main river runs across the basin is the Young river with receiving run-off yearly 1,336 million cu.m with peak in September month 308 million cu.m. In recent years, rainfall in Young river basin has varied significantly particularly since 2010 both at the upper at Kalasin Province and lower basin area at Roi-Et Province, Figure 1.

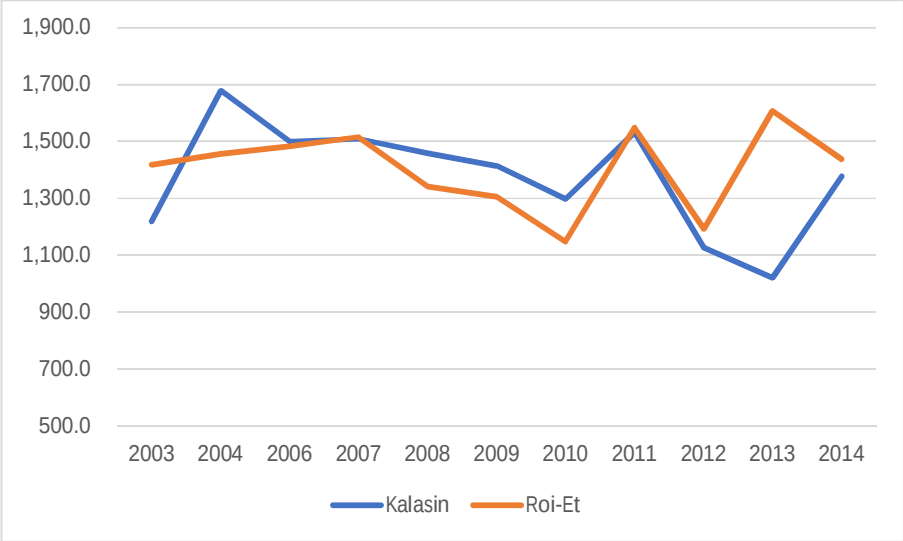

Figure 1. Rainfall variation in the Young river basin (Department of Meteorology, 2018).

The soil quality of the Young river basin are mostly sandy loam 34% and sandy soil 33% while the fertile land suited for rice farming is only 31%. Most of the land in the Young river basin 69% is mainly used for cultivation and 23% of forest land while 2% of water storage and wetlands. Most of cultivated lands are rice and cassava farms, Figure 2, which relying on rainfed while only 0.65% is under government water irrigation project, Table 1.

Table 1. Land-use and key crops of the Young river basin.

Key crops	Areas (ha)	%
Irrigated rice	2674	0.65
Rainfed rice	207,176	49.98
Crocus	672	0.16
Integrated farms	4,080	0.98
Cassava	71,760	17.31
Rubber	1,328	0.32

Sugarcane	455	0.11
Fruit trees	671	0.16
Standing trees for commercial	600	0.14

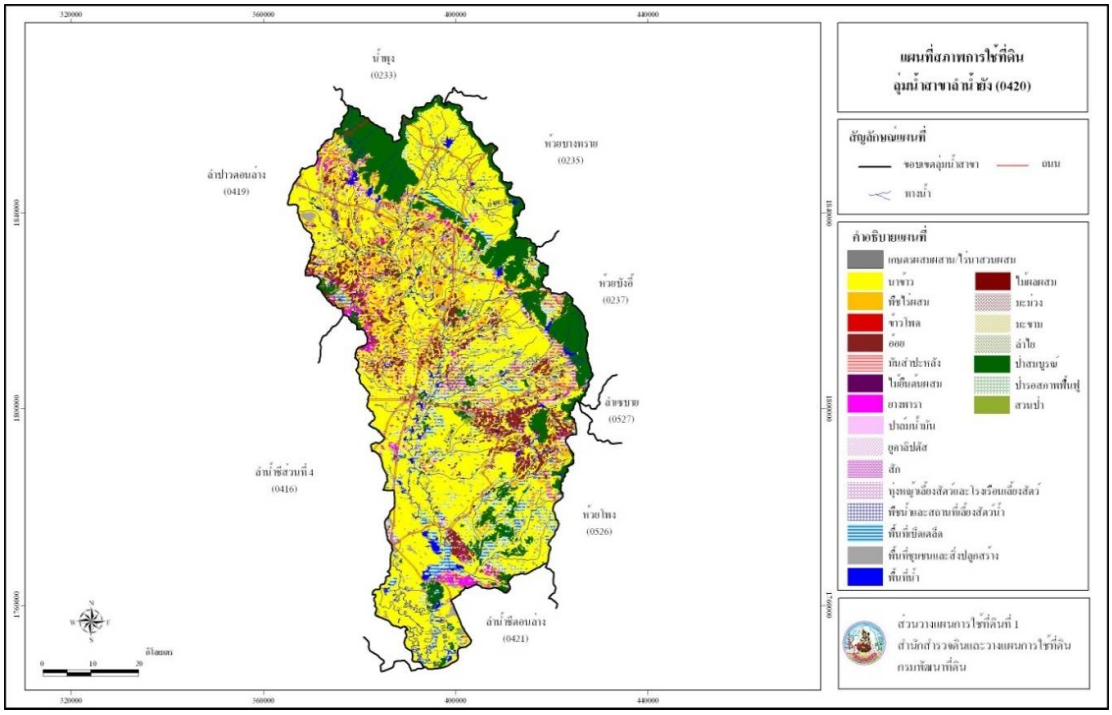

Figure 2. Land-use in the young river basin, the yellow color represents rice farm and the red dot is sugarcane while the green belt is forest land.

The farmers grow both sticky rice for household consumption and jasmine rice for export. The rice production per an area is relatively low with 350 kg per rai (1 rai=0.16 ha) as the soil quality much degraded. At present, as infertile soil condition some farmers started to grow more cassava and sugarcane instead of rice as suffering from much contrasting wet-dry extreme climate impacts. Another group of farmers also transformed their farmland into integrated farming by growing mixed plants and raising animals these practices are well proved resilience to climate impacts.

The population of the Young river basin is 0.54 million with a density of 125.6 per sq km while 55% are females. There are 79,747 households (4.21 persons per household) while 65,082 families are relying farming with their average farm area of 19.11 rai per household. The income per household per month is relatively low with an average of 15,452 Baht while of the country is 26,194 baht. The households have an average monthly expense 12747 Baht per month or 82% of the income and most families have debt with an average of 131,557 Baht. The residents of the Young finished primary school 60.1%, secondary school 20.8%, high school or vocational education 18.2% and the rest with small proportion completed university.

Past government and community efforts in tracking of the climate change impacts:

The Young river basin community in recent years faces much impacts from erratic rainfalls and intermittent drought during wet season. In dry season, the community is suffering from

water scarcity by lacking of drinking water as well as water for household consumption. In 2010, with the support of Department of Water Resources, Ministry of Natural Resources and Environment (DWR-MONRE) the community formulated the Young River Basin Committee (RBC) aiming to do management and planning of water resources across the basin. The Young RBC has formulated its development strategies by; (i) restoring headwater forest, (ii) conserving land resource and soil quality, (iii) managing water quality, and (iv) improving watershed management. However, the RBC has limited financial resources supported from the central and provincial governments while those proposed development strategies remain largely unsuccessful.

In 2011, the DWR-MONRE viewed that the Young RBC was an active community-based organization to work on river basin management it then proposed to be the demonstration site to launch a regional Mekong pilot project on Climate Change Adaptation Initiative (CCAI). The DWR-MONRE supported the community with 100,000 USD to work on climate adaptation activities. The CCAI team later worked with community leaders of Sai Na Wang of Kalasin Province and Wang Luang of Roi-Et Province to; (i) survey communities on climate vulnerability and impact, (ii) explore any households or 'model families' that were already well aware and started to adapt to the climate impacts, and (iii) organize community workshops to explore collective ways to adapt to the climate impacts.

The CCAI team and community leaders did household survey using questionnaire and in-dept interviews and found that key community vulnerabilities of both upper and lower Young basin households were water, food, income, and farming system. The households at upper basin faced water shortage in summer months leading to; lack of available surface water sources for drinking and cultivating rice and vegetables, not sufficient income but got more debt by lending money from the bank and private agents, the rice monocrop farming system was unfruitful and devastated. The lower basin community was encountered severe flood during monsoon season. The flood made a large areas of rice field inundated almost every year during monsoon months. Th households had to buy food from outside community while lacking any income from farming business and that forced them to be migrant workers.

The household survey and key informant interviews also showed that the majority of families with their farm areas less than 10 rai with only rice farming practice were severely suffering from climate impact while those of integrated farming system with mixed crops and raising animals were more resilient to the climate change. This suggested that the integrated farming could be 'good practice model' for other local farmers who got heavily impacted from climate uncertainty. The community workshop results suggested to establish a community group to deal with the water management as well as being a learning center for integrated farming practices[1].

In 2012, in response to the finding above, the Sai Na Wang Sub-District Organization (Local Government) of Kalasin Province, its council has agreed to establish the Sai Na Wang Sub-District Water Resources Management Committee. The Committee has played a key role in development of local water resources strategies. They sought local resources to explore ways to manage surface waters by; (i) mapping water resources available locally, (ii) exploring ways to conserve water resources, (iii) developing a mixed use of surface and groundwater strategy, and (iv) negotiating with district, provincial and central governments to seek support to sub-district water management plan. Achievement so far, the Committee has completed mapping local water resources infrastructure, identifying needs to develop a more sustainable water resource management strategies, doing pilot farms on mixed use of surface and groundwater with dripping irrigation and demonstrating on-farm integrated

[1] Inmuong, et al., 2012, Summary Report on Climate Change Adaptation Initiative Project, The CCAI Report Submitted to Department of Water Resources, Ministry of Natural Resources and Environment, Thailand.

farming with water saving technology in three households[2]. This initiative is viewed as an early stage made by local government in development of sustainable water resources management by local communities however it still needs more resources to support such plan of activities.

Since then, the Sai Na Wang community of Kalasin Province and Wang Luang community of Roi-Et Province have attempted to establish many community interested groups to initiate climate resilience related activities, for examples setting the groups of; organic farms, local seed varieties, community forest, we love Wang Luang etc. These groups are local efforts to tackle of climate impacts while up to present they seek supports from government and international organizations.

Recent study on climate change, vulnerability and adaptation options:

In 2017, the DWR-MONRE envisioned that what the CCAI team and the community leaders did an action research in 2012 was still incomplete while needed more insight information on climate scenario, household vulnerability assessment, and adaptation options which proposed by the upper and lower Young communities. The DWR-MONRE then selected and assigned Mahasakham University (MSU) research team to conducted more detailed study on climate change, vulnerability assessment, and adaptation options of the Young river basin.

The MSU research team led by Yanyong Inmuong studied on the change of regional climate and of the Young river basin by reviewing published articles and related Mekong River Commission's (MRC) reports. The DWR-MORE Thailand also requested the research team to try using the SimCLIM[3] Program to test whether the precipitation of the Young river basin agreed with the results to what the literature documented.

Climate change, vulnerability and impacts of the Young river basin:

As the Young river basin is located within the Lower Mekong Basin (LMB) and there is limited climate change study within the Young, the researchers thus reviewed present and future climate risk of the Young with reference to the LMB. The LMB is expected to face much climate uncertainty in the future while the MRC[4] recently documented that the LMB temperature is projected to rise with the annual range from 0.4°C to 3.3°C by 2060. The mean annual temperature of the LMB by 2060 is 25.5°C under RCP2.6, 26.5-26.6°C under RCP 4.5 and 27.9-28.1°C under RCP 8.5. The LMB rainfall may either increase or decrease depending on the model selected which projected to vary between -23% to +23% by 2060.

MRC[5] also reported that at present up to 2026 the LMB households and communities remain vulnerable to shocks, particularly droughts and floods which will have severe impact on their livelihoods. The projected impacts of climate change on crop yields are negative for both rice and maize while the impacts on fisheries are positive or negative depending on the scenario. Extreme climates particularly of flood and drought will markedly reduce the rice yields. The MRC[6] produced a drought risk map while showing most northeast region of Thailand faces moderate to severe drought risk, Figure 3, and the Young river basin is much vulnerable to drought impacts, Figure 4.

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[2] Sai Na Wang Sub-District Organization, 2013, An Annual Report on Development Activities, Office of Permanent Secretary of Sai Na Wang Sub-District Organization, Na Khu District, Kalasin Province.

[3] http://www.climsystems.com/simclim

[4] Mekong River Commission, 2017, Climate Change and Adaptation Initiative: Summary of the basin-wide assessments of climate change impacts on water and water related resources in the Lower Mekong Basin, June 2017.

[5] MRC, 2017, Mekong Adaptation and Strategy Plan, November 2017.

[6] MRC, 2017, Drought Management Strategy for the Lower Mekong Basin 2019-2023, December 2017.

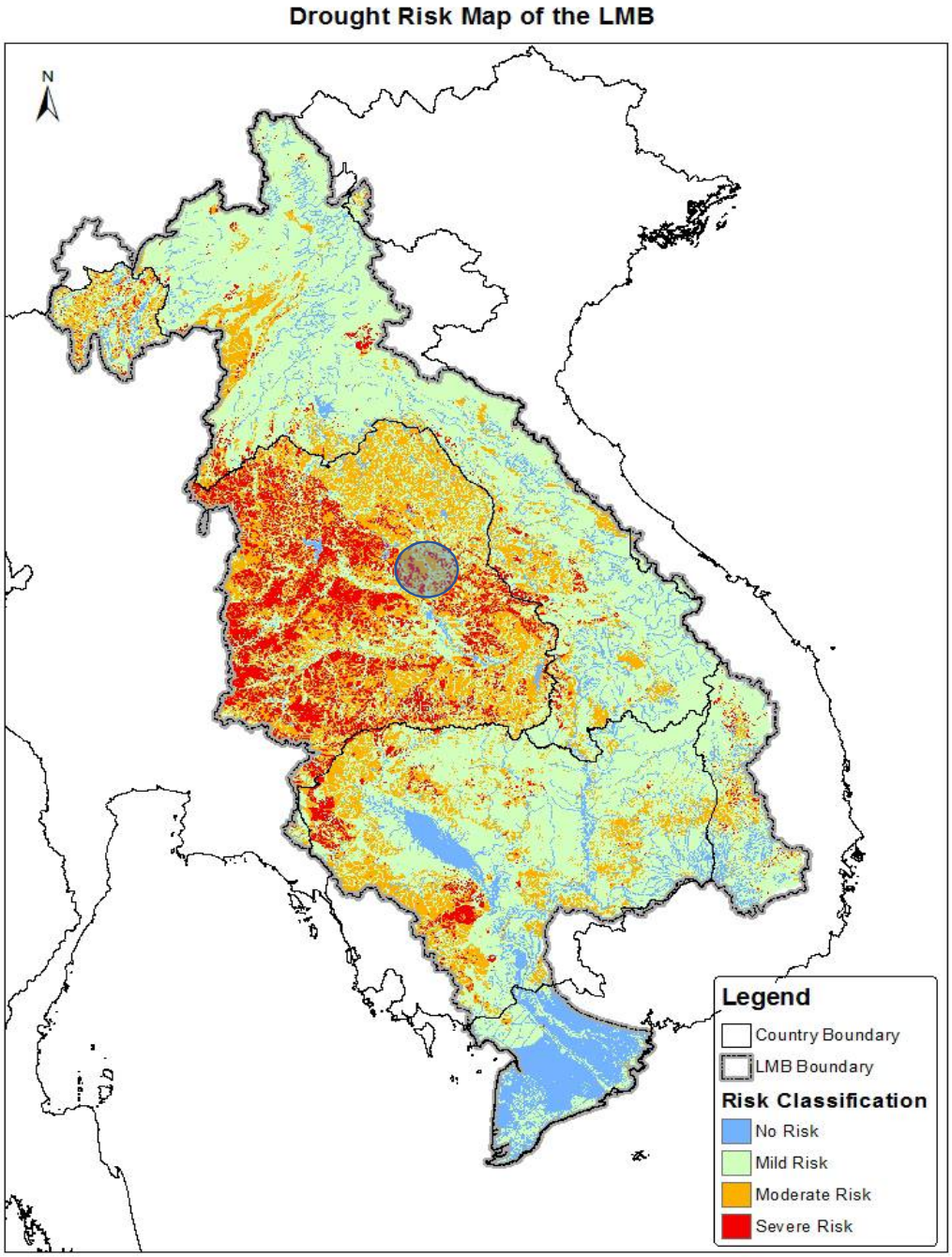

Figure 3. Lower Mekong drought risk map (circle representing the proposed project site).

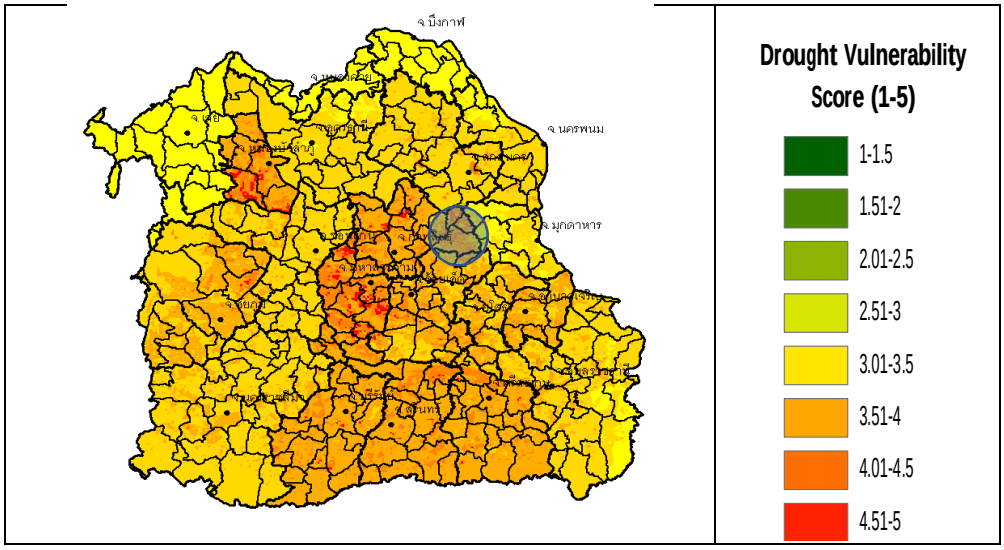

Figure 4. Northeast Thailand drought vulnerability score (circle representing the proposed project site).

The Young river basin is also located within the Chi river basin or 5T assigned sub-basin area of the MRC while the MRC[7] reported that the flood will increase impact on the 5T area by 7% (140,880 ha) of moderate climate change and 17% (365,264 ha) if the extreme change to happen in 2060. Based on the MRC Chi river basin flood map, the Young river basin is much vulnerable to flood in the future, Figure 5.

[7] MRC, 2017, Enhancement basin-wide Flood Analysis and Additional Simulations under Climate Change to provide datasets for Impact Assessment and MASAP preparation, Final Report August 2017.

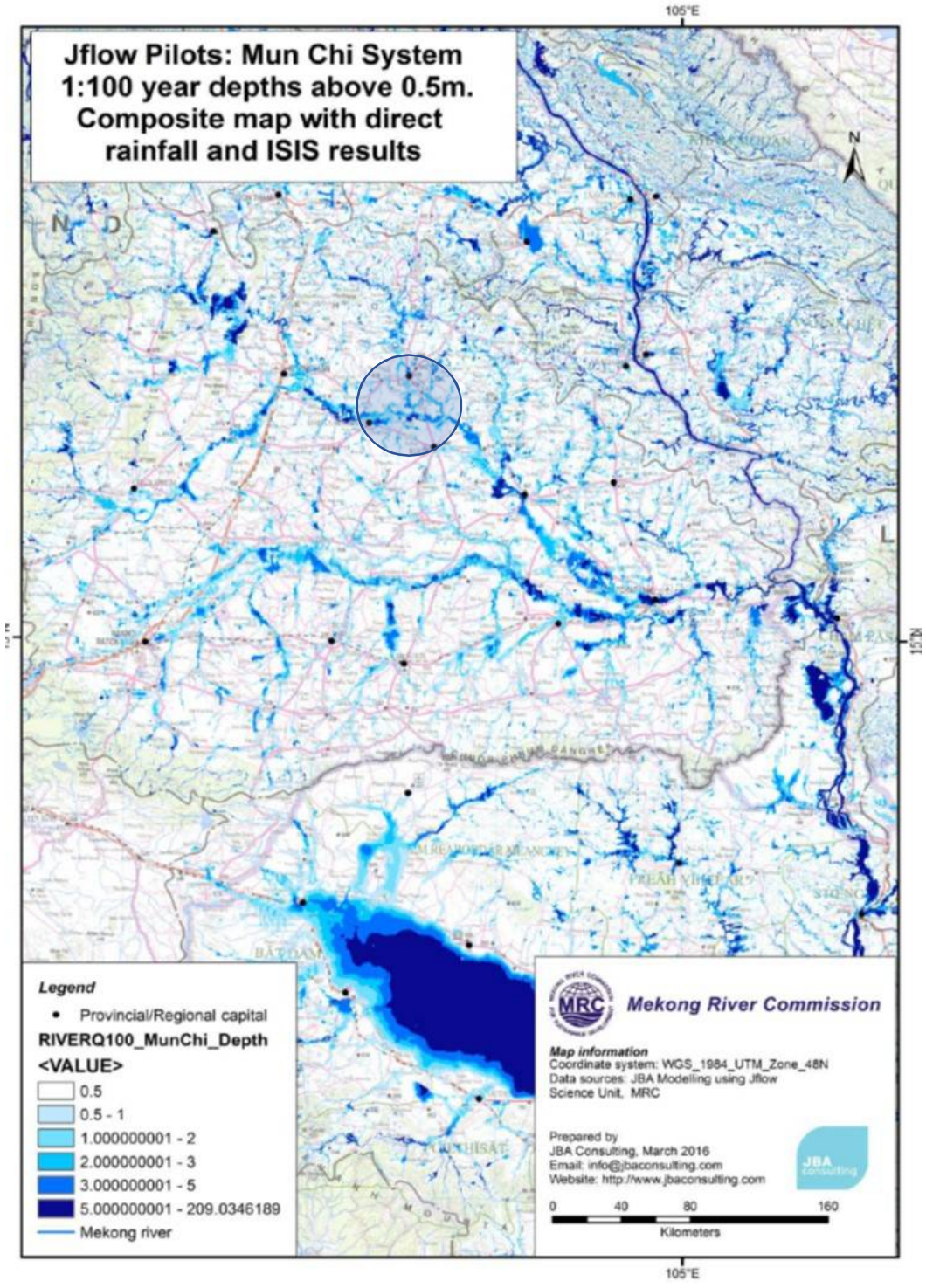

Figure 5. Projected flood map of the Mun Chi river basin, the circle represents the Young river basin area.

The projected future rainfall for northeast Thailand[8] where the Young river basin located is increasing while the annual maximum daily rainfall varied and expected to increase till 2099,

[8] Artlert, K., Chaleeraktrakoon, C., and Nguyen, T.V., 2013, Modeling and analysis of rainfall processes in the context of climate change for Mekong, Chi, and Mun River Basins (Thailand), Journal of Hydro-environment Research, 2-17.

Figure 6. Likewise, the annual maximum number of consecutive dry days is also to increase, Figure 7. It could be inferring here that the Young river basin will face a contrasting future of more rainfall in monsoon months and severe drought in summer.

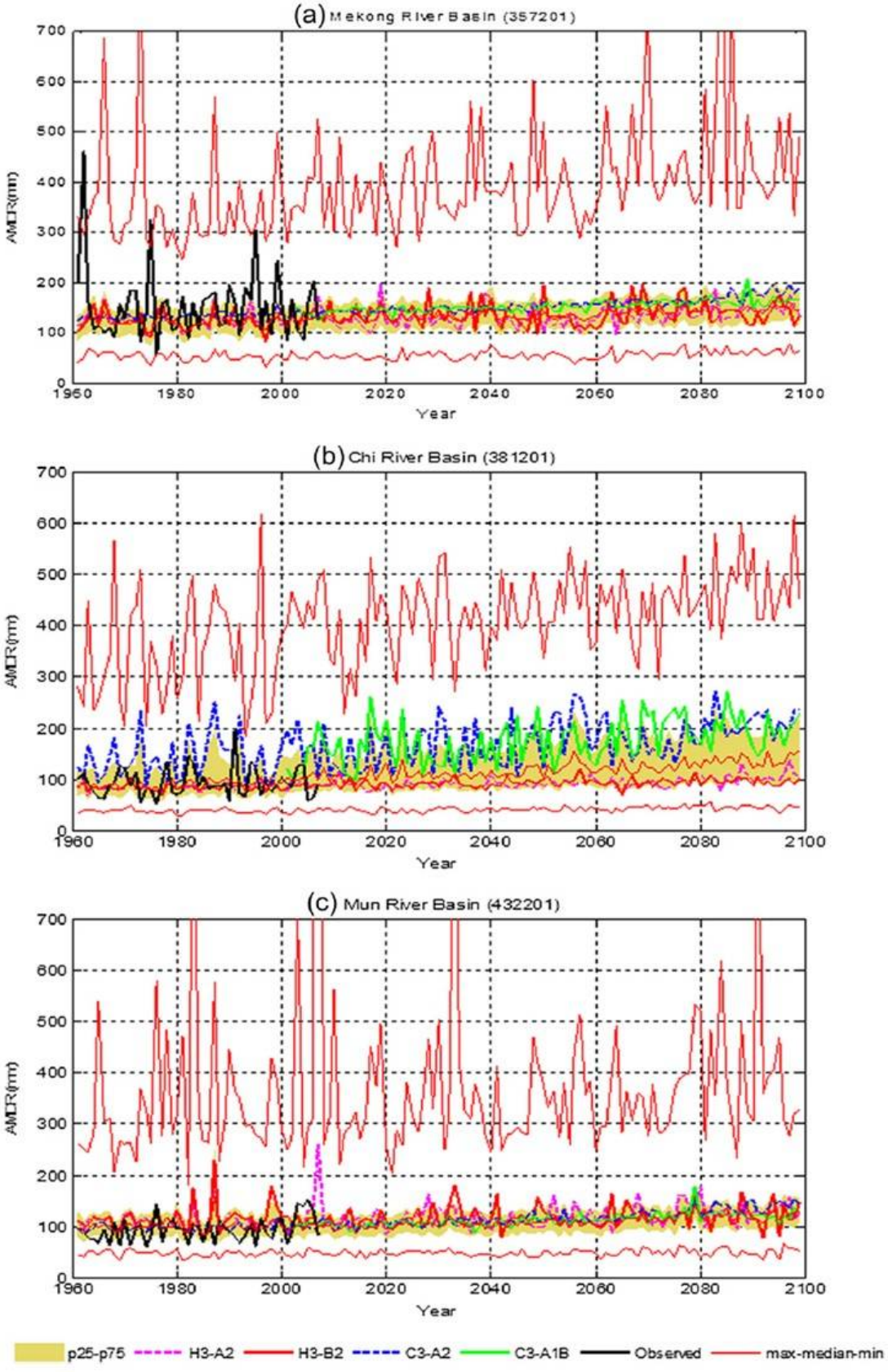

Figure 6. Projected annual maximum daily rainfall northeast Thailand.

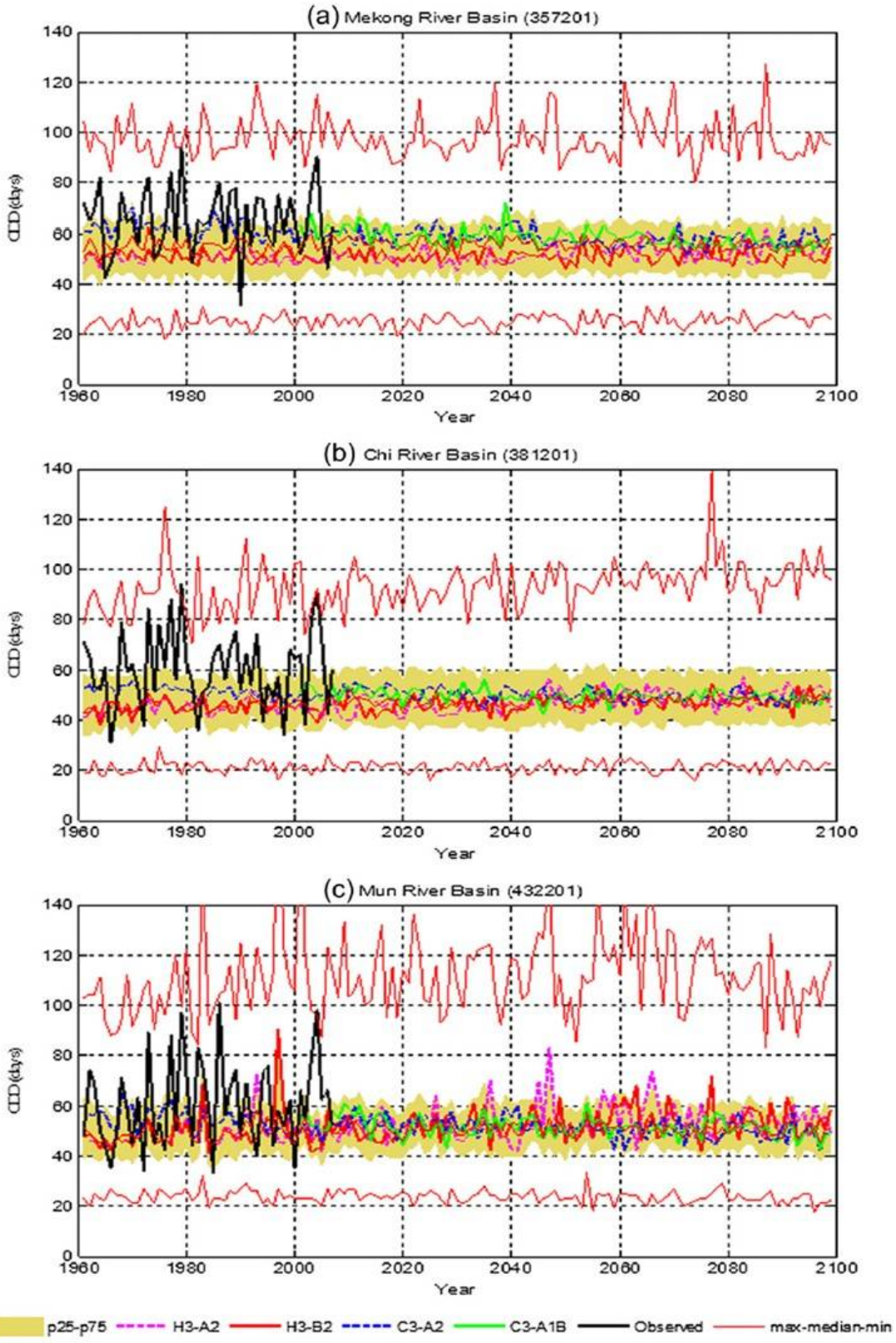

Figure 7. Projected annual maximum number of consecutive dry days northeast Thailand.

There was a case study on rainfall scenario in 2040s of the Lao-oi sub-district, Kalasin Province which located within the Young river basin done by Chinvanno[9] who reported that the precipitation will increase by10-20% when compared with 1990s, Figure 8. He also noted that the rainfall trend in the basin will be higher in rainy season with longer warmer in summer. Most Lao-oi sub-district families grew rain-fed jasmine rice as main source of income while the community has often experienced flooding in eight of the past ten years. The study also found that the flooding has destroyed approximately 40% of the total rice production with an area of 3,200 ha over a decade. The study also documented that the communities even some adapt themselves by shifting growing rice in dry season while still experiencing drought risk and pest attack. He also stated that as the country has not developed any climate adaptation or resilience policy and program the community merely relied on the government compensation of farming loss with small payment and that some moving out as migrant labor to other cities.

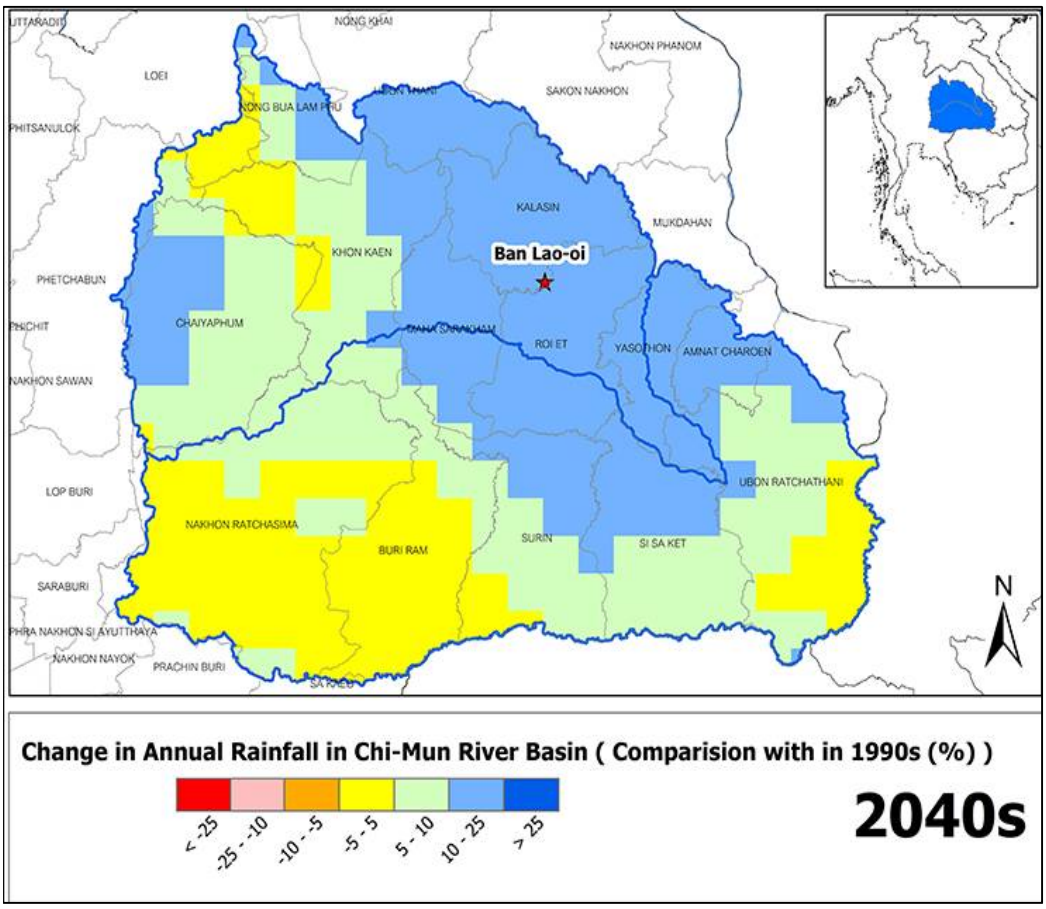

Figure 8. The expected precipitation of the Chi-Mun including the Young river basin in 2040s.

[9] Chinvanno, S. and Kerdsuk, V., 2013, Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand, Adaptation Knowledge Platform, Partner Report Series No. 5. Stockholm Environment Institute, Bangkok.

There was a simulation study on jasmine rice (KDML105) yield against the climate change impact in three provinces northeast Thailand including Roi-Et province located in the young river basin. Babel et al[10] found that the rice yields will decline significantly to17.81%, 27.59% and 24.34% in the 2020s, 2050s and 2080s, respectively. Shrestha et al[11] also simulated the water demand for growing KDML-105 and RD-6 rice varieties under the future climate conditions which found the increases ranging from 56.5 to 92.2% and 27.5 to 29.7% respectively for the future period under RCP 4.5, and 71.4 to 76.5% and 27.9 to 37.6%, respectively under RCP 8.5. Aruntara et al[12] recently studied soil organic carbon (SOC) in Roi-Et Province of the Young river basin and found that the predicted rising temperature as the climate change will decrease SOC. The highest decreased SOC is a 32% decline under RCP8.5 in the very far future. These researchers have agreed on future decline of rice yields under future climate conditions by suggesting the need on adaptation measures in exploring of new rice genotypes tolerant to the climate change, nutrient management, and finding new agriculture practices.

Predicted precipitation trend in the Young river basin done by the MSU research team

As the DWR-MONRE assigned the MSU research team to use the SimCLIM to predicted change in precipitation of the Young river basin. The team collated historical rainfall data and finally run the SimCIM program which found in 2030 the precipitation is to increase 4.32%, Figure 9, and in the year 2060 to increase 7.79%, Figure 10.

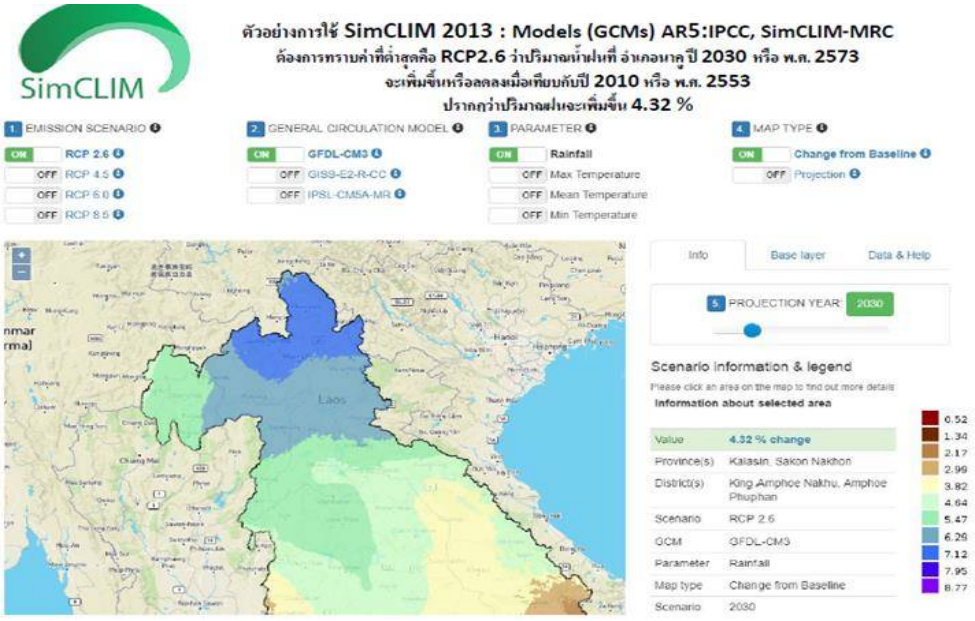

Figure 9. Predicted precipitation in the young river basin in 2030.

[10] Babel, M.S., Agarwal, A., Swain, D.K., Herath, S., 2011, Evaluation of climate change impacts and adaptation measures for rice cultivation in Northeast Thailand, Climate Research, 46 (137–146).

[11] Shrestha, S., Chapagain, R., Mukand S. and Babel, M.S., 2017, Quantifying the impact of climate change on crop yield and water footprint of rice in the Nam Oon Irrigation Project, Thailand, Science of the Total Environment (599–600): 689–699.

[12] Arunrata, N., Pumijumnonga, N., and Hatanob, R., 2018, Predicting local-scale impact of climate change on rice yield and soil organic carbon sequestration: A case study in Roi Et Province, Northeast Thailand, Agricultural Systems, 164(58-70).

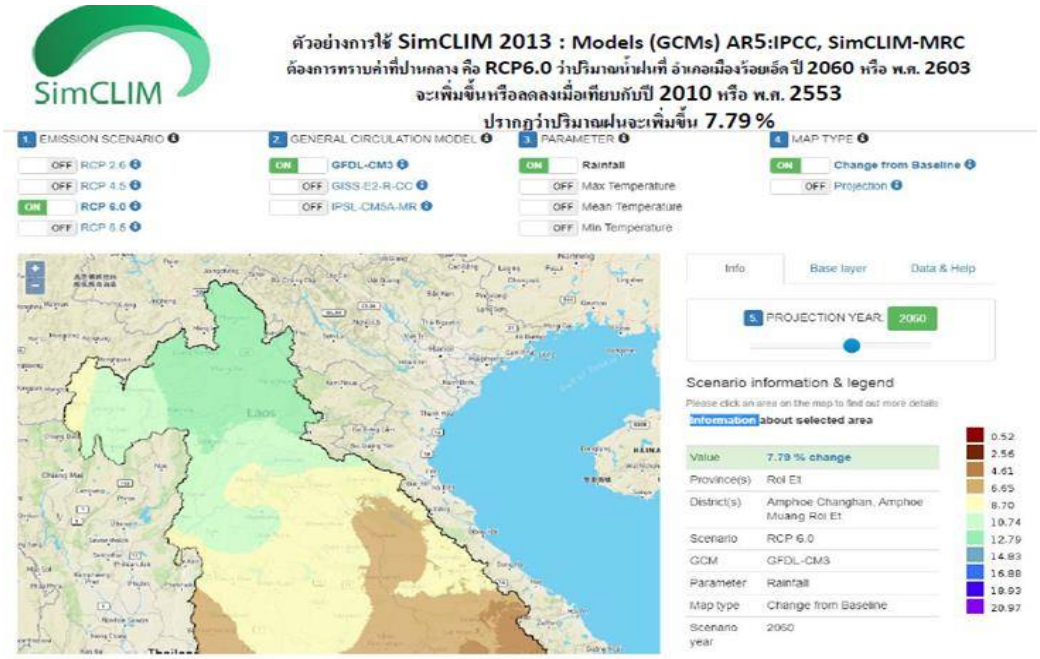

Figure 10. Predicted precipitation in the young river basin in 2060.

Community vulnerability assessment and adaptation strategy

Under the DWR-MONRE Project 2017, the MSU researchers conducted community vulnerability assessment and adaptation strategy at the Young river basin during August-October 2017. The researchers were assigned by the DWR-MONRE to apply mixed methods in identifying community vulnerability and adaptation assessment in the Young river basin. The DWR-MONRE also assigned two target communities in the Young river basin to be investigated; Sai Na Wang of the upper and Wang Luang of the lower Young river basin.

The study approaches included; (i) organizing community consultation meetings of the two sites aiming to achieve climate adaptation strategies proposed by the communities, (ii) surveying households of Wang Luang for their climate vulnerability, (iii) organizing the participatory community action research (Tai Bann Research) as to explore any existing climate adaptation practices done by local farmers, and (iv) conducting a field trip by brining Wang Luang community representatives to visit Sai Na Wang as to experience and learn some model farmers who could adapt to the climate impact.

Community consultation meeting results

Sai Na Wang

There were 70 participants including community leaders, provincial-district-sub-district government officers, youth group leaders participated a one-day meeting on 22 August 2017 at Sai Na Wang community center. The discussed their vulnerability and impact of the climate uncertainty while they reached some key points as following:

- Contrasting wet and dry episodes in recent years make their livelihood suffered from adjusting much change of the climate.
- Heavy flood and drought caused much difficulty of their farming business by heavy rice yield loss.
- Shortage of water for both agriculture and household consumption in summer are their main vulnerabilities.
- Lack of policy and planning in adaptation to the climate impact of the country-provincial-district governments is another vulnerability.
- Last, limited knowledge and experience in coping with and adapting to the climate impact particularly of the agriculture practice is also their vulnerability.

They also finally agreed to propose some adaptation actions that they would seek for supports from the government as following:

1. Conserve and plant trees in the farmlands to store water and reduce soil erosion.
2. Dredging the waterway and building consecutive weirs at each 1 km of the river length.
    2.1 Lam Pra Young from Ban Nong Huo-Ban Krainoon with the length of 3 km.
    2.2 Huay Mano from Ban Nakradao-Lam Nam Young with the length of 5 km.
    2.3 Huay Yang from Ban Kood Takrai Moo 4- Nogn Hang with the length of 3 km.
    2.4 Huay Na from Ban Kood Takrai Moo 7- Lam Pra Young with the length of 6 km.
3. Expanding the concept and practice of model farmers for Ban Kood Ta Krai Moos 4 and 7 to be another model farming practice targeting 30 households.

4. Building network and expanding concept of best practice farmers to another households in 5 Sub-districts:
    4.1 Nong Puea Sub-district
    4.2 Srapang Thong Sub-district
    4.3 Don Jai Sub-district
    4.4 Na Khu Sub-district
    4.5 Poo Lan Chang Sub-district
5. Mapping and planning for diversion water from Huay Mano reservoir left-side channel to farm ponds.
6. Organizing the meeting to establish the systematic water management committee for Na Khu District, Kalasin Province.
7. Building bore well and farm ponds to reserve water for use during dry season.

Wang Luang

There were 74 persons participating the consultation meeting on 15 September 2017 at the Wang Luang Community Center including community leaders, women group leaders, youth leaders, and government officials. They discussed and reached some key points on their climate vulnerability and adaptation planning as followings:

- Heavy flood caused much rice yield loss while some households shift their cultivation to dry season which still experienced water shortage.
- Water, agriculture, and family livelihoods were their main climate vulnerabilities.
- Conservation of water during dry months and diversifying their livelihoods were their main actions to cope with the climate impacts.

They proposed their climate adaptation actions while sought supports from the government as follows:

1. *Dredging Kood Ngong reservoir as to store more water for public use for agriculture activities.*
2. *Excavating the canal inking between Ban Krai Noon-Bueng Krea, Kood Ngong-Ban Bak, and dredging Nong Bo which has an area of 227 rai to retain rain water for farming purpose as well as to use as a retention wetland (monkey cheek) receiving flooding water, and dredging canal from Ban Bao-Na Sang-Huay Luang.*
3. *Building bored well and farm pond.*
4. *Building the Young water gate while making a road on top so as to helping transportation of farmland products.*
5. *Expanding the bridge across Huay Luang reservoir which extended 60 m in length.*
6. *Developing and exploring ways to store rice seed and short-life plant for stock and exchanging knowledge on growing crops with less water uses.*
7. *Developing and exploring knowledge on careers that adapting to flood and drought.*
8. *Establishing a group or network committee among water users of the Young river consisting of upper- middle- lower community representatives, these groups should have a regular meeting on water management of the Young river at least 2 occasions a year (April and October yearly).*

9. *Managing information on water uses between industry groups and River Basin Committee.*
10. *Establishing the water telemetering system for implementing a surveillance of flood and drought of the Young watershed.*
11. *Promoting the households to have adequate water for agriculture and family consumption.*
12. *Building small water infrastructure or retention reservoir (monkey cheek) within community for retaining excess water during flooding period and for use in dry months.*
13. *Developing the demonstration organic rice farm with complete production chain.*
14. *Developing the demonstration farms with integrated agriculture system, diverse plants, mixed-crops farming with livestock, and including management of soil and water within the farm scale.*
15. *Establishing the demonstration farms linkage with market cycle and including product communication via the new business model (Thailand 4.0).*
16. *Promoting on use of technology for product processing, as to add more value by linking with rice mill, starch processing factory etc.*
17. *Fostering community water management by establishment the water bank both of surface and groundwater.*
18. *Promoting technology on use of dripping irrigation.*
19. *Supporting in growing crops during post-harvesting period.*
20. *Building water gates and weirs along the Young river.*

Community vulnerability assessment: Household survey

The DWR-MONRE assigned the MSU researchers to conduct survey on climate risk, vulnerability and adaptation practices of Wang Luang community, Roi-Et Province. The research team has developed a questionnaire by applying and modifying the questionnaire invented by the MRC tool SIMVA 2011[13] and Jumnongsong[14]*. The structure of the questionnaire included key data of the households, for examples, on water, food, occupation, income, flood-drought experiences/impacts, crop loss, adaptation practice etc.*

The research team have consulted with the villagers and community leaders in planning for household survey while those leaders suggested the target villages and population groups should be those are high risk and vulnerable to flood and drought. Eventually, they suggested to select four villages; Ban Don Kaew Moo 9 with 75 households, Ban Nong Kham Moo 10 with 84 households, Ban Tah Bo Moo 1 with 90 households, and Ban Nong Kham Moo 10 with 74 households, these made a total population of 323 households while the sampling target 30% which was 97 households to survey. The sampled households were done proportionately which were of Ban Don Kaew with 23 households, Ban Nong Kham Moo 10 with 25 households, Ban Tha Bo with 27 households, and Ban Nong Kham Moo 18 with 22 households. The research team was then doing random sampling from the house number registered while until meeting the target of each village with a total of 97 households. 41 (43%) of the interviewees were women.

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[13] Mekong River Commission, 2014, Social Impact Monitoring and Vulnerability Assessment 2011, MRC Technical Paper No 52, August 2014.

[14] Jumnongsong, S., 2015, Final Thailand National Report, Social Impact Monitoring and Vulnerability Assessment)SIMVA(Survey 2013-2014 on Shocks and Trends in the Lower Mekong Basin Corridor, November 2015, MRC-TNMC.

The household survey results on risk, vulnerability, and impact relating to flood, drought, and the climate change were summarized as follows:

1. *Farmland impacted from flood: 86.6% of households faced flood damage while 48.5% of the households replied that happened every other year. The retained flood water in the farmland; 40.2% responded 2-3 weeks while 29.9% stated one month. The cultivation period that affected by flooding, 59.8% responded during seedling time. The extent of damage of flood on farmland, 47.6 replied heavy loss while 45.4% stated about the half of the cultivated field.*
2. *For financial debt from flood; 39.2% responded with moderate debt while 37.1% reported with heavy debt. Flood solving, 64.9% stated no action just waiting for the water decreasing, 19.6% stopped growing rice in wet season and shift to dry season, 5.2% stated pumping water from the paddy. For compensation, 47.4% stated received financial compensation from the government while 44.3% reported do not receive any.*
3. *For drought impact; 44.3% reported facing much drought problem, and 46.4% stated the drought frequency occurred every other year. Since last year 52.6% of the households stated drought impact during seedling while 48.5% faced the loss by half and 32.0% experienced heavy damage. For financial debt due to drought, 39.2% responded the drought causes moderate family difficulty while 21.6% reported with heavy debt. Solving the drought problem, 47.4% responded have no action while 18.6% stated building the farm pond and 14.4% drilled groundwater. Alleviation to drought problem from the government measures, 35.1% responded they do not have any assistance, 33.0% stated they received compensation and 27.8% reported they get some part.*
4. *Worry to flood; 60.8% of households stated they are much anxiety about, 34.0% they feel as moderate. For drought, 44.3% feel much worried and 53.6% they are anxiety with flood than drought while 35.1% reported they are worried with flood and drought at the same scale. Flood impacts on food sources, 47.4% stated that affects much while 44.3% responded as few. Drought effects on food source, 51.5% reported minimal while 36.1% stated the impact is very high.*
5. *Anxiety of households of the climate change impact such as rising temperature, increasing precipitation, seasonal shift, and prolong drought etc.; 46.4% stated feeling moderate while 40.2% stated they are much worried. Household preparedness for flood, drought, and the climate change, 55.7% stated they follow media and information and started to prepare for such impacts, 28.9% reported they merely follow the news and media and being aware of preparing, only 3.1% responded that they started to get preparation for those impacts. Expectation of households for supports, 37.1% stated they need local agencies to support them, 24.7% seeking supports from District and Provincial agencies, and 19.6% responded they need the Central Government agencies to help them. For supporting measures, 63.9% stated they need helps of knowledge and information, 29.9% seeking supports from skill development and training, and 99.0% reported they need the government agency to help them developing the adaptation plan to flood, drought, and the climate change.*

Participatory action research (Tai Ban research)

The research team has consulted the Wang Luang community leaders and they suggested doing the Tai Ban research activities by exploring the development activities done by Mr Rob Kaewnakorn, Mr Somnuek Praipana, and Mr Sanguen Singhathep. They reasoned that those

three families face many problems of flood and drought while they attempt to do some adaptation activities and that the three families could be case studies for Wang Luang.

Case study-1: Mr Rob Kaewnakorn's adaptation practice

Farmland management

Mr Rob's farmland has an area of 20 rai with rectangular in size while the south bordered to Huay Wang Luang reservoir, the farm soil is mostly sandy. He divided his farmland into four parts, rice field (16 rai), remnant forest, fruit and vegetable garden, and homestead.

Crop variety management, he grows jasmine rice 105 and sticky rice Ko Kho 6, and a small plot of black rice for sweet dish. Amid the farmland with an area of 2 rai there are remnant standing trees of key plants; yang, ebony, tak, and neem. There are also native Yang standing across the farmland area over 16 rai. Mr Rob also planted the standing trees on the paddy ridge; paga, cork, and olive. He even plants grass for animal feed while around the fruit plot he grows vegetables and herbs mixed with fruit trees such as ginger, galingale, mango, crescent, papaya, and sesbania. The galingale in particular he could sell to the market to have more income. At his home yard, he uses not only for living but also to store equipment and farm products. After harvesting period, Mr Rob grows short-life plants such as corn and bean, as supplement food for his family.

Water management on farmland, Mr Rob pumps water from Huay Wang Luang reservoir to his farm plot via the canal which he built 13 years ago for dry season rice growing, the canal has 1 m wide 0.5 m depth and length 100 m while the pumping station has been elevated higher than the farm ground level. He even made a network of small canals to drain excess water from the paddy field. The pumping station is also used to draw water from the reservoir for the farmland whenever facing shortage of water during rainy season. Growing rice in dry season, Mr Rob also pump water from another reservoir Nong Bo whenever the Huay Luang reservoir dried up. Prior to growing dry season rice, Mr Rob will estimate the water volume in Huay Luang and Nong Bo reservoirs whether those retained waters sufficient for growing rice once found minimal he will change from growing rice to other crops with less water uses such as corn, bean, and cassava.

For groundwater, he has four wells with 16 m depth even these provide not much water volume but he still maintains that as for uses during emergency especially in dry months. Mr Rob has planned to submit a water-use issue to the community meeting while he wishes to establish the Municipality Regulation of growing rice in dry season of each family not exceeding than 20 rai to avoid community conflict of water uses that abstracted from the reservoirs.

Case study-2: Mr Somnuek Praipana's adaptation practice

Mr Somnuek Praipana has been cultivating rice all year round during January-May in dry months he will pump the water from the farm pond for seedling and he uses his own variety. After harvesting the dry month rice he will prepare for the wet season cultivation by also applying animal manure as fertilizers with minimal use of the chemicals. Mr Somnuek also plants mixed vegetables in his backyard such as luffa, sweet basil, lemongrass, eggplant, and onion. These vegetables could reduce household expenses.

Mr Somnuek's farm faces serious flood problem almost every year while he transformed his farmland for dry season cultivation by dividing his farm into four parts, rice field 3 plots with a total of 10 rai, farm pond, ridge, and living area. He built farm pond by using an area of 3 rai with 3 m depth. This pond serves water for dry season cultivation and also for monsoonal period if the rainfall varies intermittently. He also built the three canals drawing the pond water to the three farm plots. On the farm ridges, he planted eucalyptus trees and grasses for feeding cows. He grew sticky rice Ko Kho 6 for household consumption and jasmine rice for both consumption and selling. For dry season rice, he grew rice Chainat 1 and this year (2017) his rice farm has been inundated while he has only rice from the highland farms and that stock can provide him all year round of household consumption.

Case study-3: Mr Sanguen Singhathep adaptation practice

Mr Sanguen has a farmland area of 9 rai while he divided it into two parts; rice field 8. 3 rai with three plots, and the water pond 0. 2 rai with its size 8x10 m. This pond also attracts fish during harvesting period whenever the water level dropped. During dry season Mr Sanguen will pump water from the pond as to catch fish which can be sold around 3,000 baht annually. He also brought the pond sediment to cover the pond ridge where growing a variety of vegetables and fruit trees. He even collected the tummy-wood at the wetlands to plant around the farmland as fence and its young leave can be eaten, he reasoned that at present the tummy-wood is declining and he wishes to conserve it.

Field trip results

The research team has discussed with Sai Na Wang community leaders what are the best model farmers who adapting to the flood, drought, and the climate change impact. They eventually proposed three model farmers that could be representing a successful adaptation practice; Mr Bumroong Kayota, Mr Amnat Wilasri, and Mrs Wasana Homhuan. For the field trip best time, they proposed on 10 November 2017.

The lessons learnt after visiting those three model farms revealed by Wang Luang representatives are as follows:

Lesson learnt from Mr Bumroong's farm visit

Mr Bumroong has applied the sufficiency economy principle to develop his farming practice. He also makes use of the ecology principle to guide his mixed crop plantation and raising livestock. These two principles make his farmland immunized and tolerable to the impacts of flood, drought, and the climate change.

Growing crops with native species and raising indigenous piggery are the starting stage of nutrient recycling within his farmland. He uses organic fertilizer and feeds the fish and native pigs with vegetable wastes, these could generate his family income. The nutrient-rich water from the fish pond is also used for vegetable garden. Mr Bumroong widens the paddy ridge for planting fruit trees and being a road, this also reflects the efficient land area management. Whenever emerging extreme flood and drought events his farm get less effect from those impacts as his ecological farming system is immune to the climate change impacts.

Lesson learnt from Mr Amnat's farm visit

Mr Amnat's farm located in a rather high landscape with sandy soil and thus he firstly attempts to build the fish pond with a depth of 2 m while in dry season very few water volumes retained not sufficient for watering plants. He solved the problem by dredging the pond deeper with 1. 5 m and till making his pond depth up to 3. 5 m which meeting the clay substrata. This makes new rebuild pond could store water in dry season and for use all year round.

Mr Amnat also dug and ploughed his paddy deeper 1 m than normal form as to store water rapidly and timely while he found it is working well. This makes him growing plant species maintaining soil fertility during dry season without using any water from other sources. He also grows vegetables along the paddy and pond ridges, mixed vegetable garden with livestock, building a groundwater drill with a depth of 30 m and connecting the plastic water pipe distributing water to an area of 5 rai while pumping groundwater for 2 days per once occasion. Mr Amnat stated that in the past the rice production in 8 rai would yield 500 gallons per year while after conserving soil and water the soil becomes more fertile and that could yield up to 900-1,100 gallons per rai.

Success factors that enabling Mr Amnat's to achieve the climate adaptation goal

1. *Use the biodiversity principle to conserve soil and water and also apply the integrated farming practice, the target goal is to build food security for the family first.*
2. *Hard-working and continuous endeavour and building common understand among family members with later extending to community.*
3. *Need to manage adequate water efficiently and systematically in the farmland.*
4. *Finely select seeds and animal breeds which suitable to local condition and specially that needs to sustain long-term bio-relationship and ecosystem services.*
5. *Conserve soil and water continuously by applying both local knowledge and modern technology.*

Farm practices of Mrs Wassana are as follows:

1. *Mrs Wassana has a paddy field with 11 rai for planting rice for family consumption and selling as income source, she uses green and animal manures to conserve the soil and applying herbal plants to protect the pest.*
2. *Farm pond with a capacity of 28,500 cu.m to store rain water for use all year round and raising frog and fish as family food source and selling for household income.*
3. *Mixed vegetables and flowers garden with plantation rotary all year round; such as guizhou, long bean, chili, sweet basin, ginger, lemongrass, and galangal, these are sold for family income. She grows marigold and pandanus for selling every Buddhist holy day as well as lalang for sell as used for making the pen roof.*
4. *Mixed fruit plot, she plants mixed fruit trees along the fence, pond and paddy ridges while those trees provide fruits all year round such as mongo, coconut, papaya, olive, guava, sugarcane, and jatropha.*
5. *Animal husbandry, Mrs Wassana is raising free-ranging chicken for family food and selling and rearing frog and fish within the paddy field and in the baskets.*

6. *Homestead, she used her house as living and a place for training visitors which consisting of sala, learning hub, composing case, kitchen, toilet, and charcoal incinerator.*

Success factors leading Mrs Wassana coping with the climate impact

1. *Participating the integrated farming program organized by the Sai Na Wang Sub-District Administration while receiving inputs, agriculture techniques, planning knowledge, and including direct experiences from learning at Mr Amnat's farm.*
2. *Continuous endeavour, Mrs Wassna's family are hard-working and they like integrated farming career and they all believe they can do that.*
3. *Water management, this is of prime importance that has to manage properly even her farmland located nearby the irrigation canal and natural stream while building pond and management of water flow within the paddy is the key.*
4. *Exploring the products that meeting the market demand, this is for example the marigold which much helps raising family income in every Buddhist holy day and even applying that to attract the pests. Cultivation of mushroom, rearing fish, and planting vegetable garden all of which community residents have to buy every day, these products become main source of family income. In addition, the family also reduces the expenses by making organic fertilizers, natural extracted liquid for pest control and making fish feedlot.*
5. *Applying animal manure as organic fertilizer and making use of fish-pond water with nutrient rich to irrigate plants.*
6. *The integrated farming system is flexible and high immune to the impact of climate change, which eventually the family has earned more secured income with good quality of life and could send family members to study in university.*

EbA climate resilience activities proposed by the communities

The Mekong EbA South Project supported the DWR-MONRE to organize an inception stakeholder workshop on 20 April 2018 at Avani Hotel, Khon Kaen, Thailand. There were 76 participants including community leaders of upper-middle-lower Young river basin and concerned government officials. The workshop was supporting to the latest activities done by the MSU researchers under the DWR-MONRE Project 2017 by focusing to achieve more details on the interventions proposed by the stakeholders. The stakeholders collectively was agreed and planned to do the EbA interventions at upper, middle, and lower Young river basin sites, Figure 11.

Upper Young river basin

The proposed EbA intervention site at upper Young river basin located in Kalasin province while the population is classified and ranked at the top ten poverty province of the country. The per capita income per year is 44,339 Baht well below the country average of 135,281 Baht per capita per year. With the total of population of the Kalasin province 30% of the total population (982,578 population, 489,436 males and 493,142 females) is under poverty line. The household income is mainly from agriculture production while their livelihood is vulnerable to the climate impact and the world crop price fluctuation. Most local residents finish primary school with 61% while high school 23%.

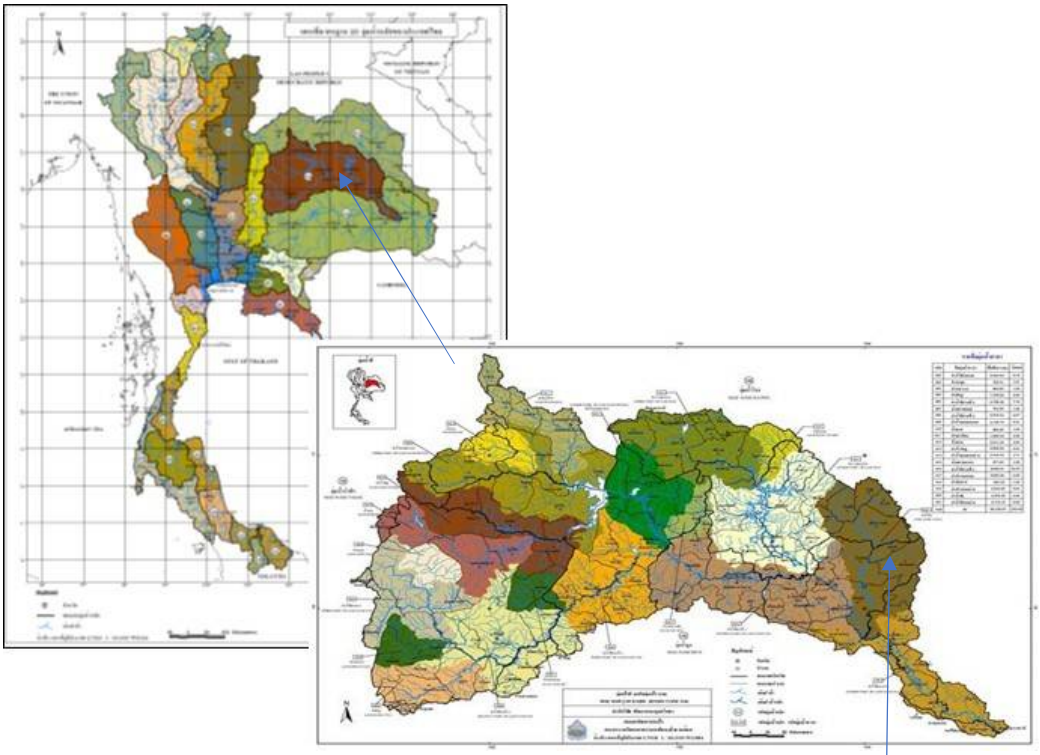
The local household livelihood mainly relies on income from rainfed rice cultivation while the irrigated lands account for only 2.3%. There are many nature-based water creeks and ponds across the landscape but most were dried up during summer months particularly during recent much climate variation since the past five years. Many local residents with low income have to live on natural resources while seeking food and vegetables from the forest remnants located nearby their villages and catch fish for protein diet from the large public reservoirs. The dependency and overuse of natural resources of the inhabitants across the province making those forestland and wetland resources much degrading. The households use rainwater which stored in the big jar or concrete cistern as main source of drinking water 79% and make us of firewood for their family cooking 55%.

The Kalasin province faces both drought and flash flood impacts during recent years. The highland villages are suffering from water shortage in summer months while also facing flash flood in wet season. The degradation of forest resources and the water related infrastructure both natural and man-made causing almost 20% of the population migrate out seasonally for works in big cities.

At present, there is no government intervention on climate adaptation plan in the province while it is merely the small project of DWR-MONRE which piloted in Sai Na Wang. The Sai Na Wang received much attention from the DWR-MONRE as the community groups are active and responsive for development activities. The Sub-district Water Resource Management Committee and the Community Conservation Group, for examples, are key drivers in the upper Young river basin.

Middle and lower Young river basin

The proposed EbA intervention sites are located mostly in Roi-Et province. The province has a total of 1,309,708 (653,903 males and 655,805 females) while 79% of their livelihood are depending on rice farming. Similar to Kalasin, most rice farms are rainfed while facing much climate uncertainty in recent years. The per capita income per year is 67,231 Baht even higher than Kalasin but it is still much below compared to the country average. Most of population finish primary school with 61% while complete high school 12%.



Upper Young River Basin: Na Khu District of Kalasin Province

Middle Young River Basin: Kuchinarai District of Kalasin Province, Pontong District of Roi-Et Province

Lower Young River Basin: Selapoom District of Roi-Et Province

Figure 11. Map of area showing location of proposed intervention sites, the Young river basin is a sub-basin of the Chi.

There is no climate adaptation action in Roi-Et province except at Wang Luang where the DWR-MONRE provided a small financial resource to support the community in exploring of their vulnerability and adaptations strategy which is still at early stage.

The proposed EbA interventions, Tables 2-4, by the stakeholders on 20 April 2018 meeting are mainly related to improvement of water resources management and natural resources conservation activities. The lower Young river basin groups also bring in eco-tourism and sustainable development related activities for the consideration.

Table 2. Proposed EbA interventions by upper Young river basin community.

Topic	Interventions	Beneficiaries	Estimated costs (Baht)
1	Extending water canal connecting Huay Ma No reservoir distributing to 5 villages Aim: Allocate water to households and farmlands -2 km in length	-5 villages of Sai Na Wang Sub-District of Na Khu District, Kalasin Province -1552 Male -1601 Female -22 % piped water coverage -72% finished primary school -100% no irrigation farmland -73% poverty family (income lower than 2667 Baht per person per month)	2,500,000
2	Water canal (PVC diameter 12 inch) connecting Sai Na Wang reservoir to Nong Koog reservoir of Na Kra Dao village Moo 5 Aim: Allocate water to households and farmlands - 800 meter	-Na Kra Dao village Moo 5 of Sai Na Wang Sub-District, Kalasin Province (one village) -468 Male -472 Female -49% piped water coverage -61% finished primary school -10% irrigation farmland -64% poverty	700,000
3	Renovation of water diversion canal of Huay Ma No reservoir (Left bank) Aim: Allocate water to households and farmlands -4 km in length	-6 villages of Sai Na Wang Sub-District of Na Khu District, Kalasin Province -1667 Male -1703 Female -31 piped water -68% finished primary school -13% irrigation farmland -76% poverty	6,500,000
4	Restoration of Kood Mek water way Aim: Restoration of riparian zone and planting local vegetation. -520 meter	-2 villages; Kood Ta Klai Moo 4 and Moo 7, Sai Na Wang Sub-district, Na Khu District, Kalasin Province	2,000,000
5	Living check dams Aim: Retain water and prevent flash flood	-5 villages; Kood Hae village, Kood Ta Klai Moo 4-7 of Sai Na Wang Sub-district, Na Khu District, Kalasin Province -1204 Male -1232 Female -28% piped water -71% finished high school -59% poverty	400,000

6	Restoration of community forest at Na Kra Dao village, Sai Na Wang Sub-district, Na Khu District, Kalasin Province Aim: Reforestation of community forest -14 rai	-188 Male -188 Female -32 piped water -62 finished primary school -66% poverty	1,000,000
7	Establishment of community seed variety bank at Sai Na Wang Community Center Aim: -Local seed variety -Build the seed collection house to promote and supply across the Young river basin		3,000,000
8	Youth for Water and Soil Conservation Project (upper-middle-lower Young river basin) Aim: -Establish seeding stock -Promote replanting local vegetation across the entire river basin		2,000,000
9	Renovation of water weir of Wang Vieng Moo 6, Na Khu Sub-district, Na Khu District, Kalasin Province Aim: Water retention		300,000
10	Renovation of water weir of Wang Vieng Moo 9, Na Khu Sub-district, Na Khu District, Kalasin Province Aim: Water retention		300,000
11	Capacity building activities of Young River Basin Committee Aim: -Organize a series of meetings and training on integrated water resource management		2,000,000
12	Renovation of Huay Ma No canal (right bank) Aim: Increase flow		5,000,000
Grand total			**25,700,000**

Table 3. Proposed EbA interventions by middle Young river basin community.

Topic	Intervention	Beneficiaries	Estimated costs (Baht)
1	Restoration of riparian ecosystems of the Young River, Kuchinarai District, Kalasin Province -Lao Yai Sub-district -Som Saad Sub-district	Lao Yai -3,596 Males -3,627 Females Som Saad -2,166 Males -2,155 Females	2,000,000
2	Restoration of headwater forest -Sa Nok Kao Sub-district, Ponthong District, Roi-Et Province; -Som Saad Sub-district and Lao Yai Sub-district, Kalasin Province	Sa Nok Kao -2,409 Males -2,346 Females Som Saad -2,166 Males -2,155 Females	2,000,000
3	Development of eco-tourism/local culture/organic farming products -Sa Na Kao Sub-district, Nakam Dee Sub-district, of Ponthong, Roi-Et Province -Lao Yai Sub-district, Som Saad Sub-district, of Kuchinarai District, Kalasin Province	Sa Nok Kao -2,409 Males -2,346 Females Lao Yai -3,596 Males -3,627 Females	3,000,000
4	Living check dams -14 dams/sites -Ponthong District of Roi-ET Province -Kuchinarai District of Kalasin Province	Ponthong -53,871 Males -54,041 Females Kuchinarai - 50,540 Males - 50,725 Females	5,000,000
4	Water distribution system for community conservation using sola panel -Kok Kam Plakung Village, Photong Sub-district, Ponthong District, Roi-Et Province	Photong -4,899 Males -5.124 Females	3,000,000
Grand total			15,000,000

Table 4. Proposed EbA interventions by lower Young river basin community.

Topic	Intervention	Beneficiaries	Estimated costs (Baht)
1	Development of life cycle agriculture production (local variety development/training/demonstration farming system/food processing) -rice/sugarcane/cassava/corn -Six Sub-districts of Selaphum District of Roi-Et Province; Wang Luang, Na Muang, Laonoi, Sriwilai, Na Gnam, and Na Sang	-19853 Males -19828 Females	1,000,000
2	Renovation of water canals for farming -Six Sub-districts of Selaphum District of Roi-Et Province; Wang Luang, Na Muang, Laonoi, Sriwilai, Na Gnam, and Na Sang	-19,853 Males -19,828 Females	10,000,000
3	Production and promotion of local products (weaving; mat, cloth, local nature-based plant product) -Six Sub-districts of Selaphum District of Roi-Et Province; Wang Luang, Na Muang, Laonoi, Sriwilai, Na Gnam, and Na Sang	-19,853 Males -19,828 Females	5,000,000
4	Promotion of eco-tourism in middle Young river basin -Historical site development -Conserve local folkways -Development local curriculum on conservation of ecosystem and culture -Six Sub-districts of Selaphum District of Roi-Et Province; Wang Luang, Na Muang, Laonoi, Sriwilai, Na Gnam, and Na Sang	-19,853 Males -19,828 Females	10,000,000
5	Development of sustainable agriculture for food security within local ecological landscape -Integrated farming practice -Agroforestry practice -Four Districts of Roi-ET Province; Phon Thong, Selaphum, Nong Phok, and Moei Wadi	-135570 Males -135986 Females	5,000,000
6	Building capacity of community leaders for sustainable development concept and practices -Two Provinces; Kalasin and Roi-Et	Kalasin -490,584 Males -494,323 Females Roi-Et -653,903 Males -655,805 Females	3,000,000
Grand total			34,000,000

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3. Validation workshop

Validation Workshop - Thailand

The Validation Workshop is complete. In order to assist you to finalize the proposal document as soon as possible, I capture key outcomes which will change some texts in current version. It comes out of discussion and agreement at the Workshop on 2 July 2018.

The following points and texts are commented and agreed by Validation Workshop's participants and led by Deputy Director General of Department of Water Resources.

1) Referring to Part II: Project/Programme Justification

On a description of demostration site of Thailand; Young River Basin (page 24-25), it is requested to describe Young River basin coverage including Upper, Mid and Lower Young River basin. Now, it misses **Middle Young river basin**.

"Young River basin demonstration site will extend the whole river reach from uppermost to middle and lowermost reaches. The whole river basin is selected to synergize and integrate water resources management. Flood and drought is encountered for the whole basin. Adaptation interventions at demonstration site will be complemented to consider the whole river basin; not at a particular location or hotspot."

You should **delete a reference to merely specific sub-districts** (eg Sai Na Wang subdistrict or Sriwilai sub-district).

Instead,

"The demonstration of adaptation interventions will spread over a whole geographical area of the whole Young River Basin. District and community level will be identified based on vulnerability assessment"

2) Referring to section 1.1.2 Train communities.....(page 30)

Rephase bullet no2 as "Create at least 2 community training centres in selected districts where are in Young River basin"

3) Referring to Table 3 section E Consistency with regional/national strategies

For Thailand (page 56-58), it is suggested **to update National Adaptation Plan (final draft 2018)** to complement with Climate Change Master Plan (2015-2050).

Kindly append the following;

"National Adaptation Plan (final draft 2018) is underway for public consultation in 2018.It is expected to finalize and published by 2018. The NAP of Thailand is consistent with the proposed project with respect to a promotion of ecosystem-based adaptation intervention.

So far, there is a few adaptation interventions in Thailand for key development sectors/areas. Both key sector-based and area-based adaptation are partly demonstrated and implemented by government line agencies at central and local level. The proposed project is fully in line with an implementation of NAP of Thailand for next years ahead."

4) Referring Part III Implementation Arrangements

For Thailand (page 77-78), please rephase as following;

Tentatively, Thailand plans to implementation arrangements in such a structure and hierachy which facilitates on-the-ground interventions. However, actual implementation arrangements will be finalized prior to a kickoff of the project by 2019.

1.Climate Change Adaptation Committee (Department of Water Resources) (recently established in 2018)

- Oversight and advise on climate change adapation intervention, policy and strategy with respect to water resources. Committee members consist of directors of relevant departments both in central and regional offices. Key members are from national focal points of Climate Change related convention of Thailand. Specialists and experts are invited.

2.Working Group on Climate Change Adaptation for Young River Basin (planned to be established in 2018)

- Support to implement Mekong EbA South project for adaptation interventions in Young River basin. Members of Working group consist of representations of government line agencies which are responsible for Young river basin, acadamic and researcher, community leaders and stakeholders, district and sub-districts representatives from Upper, Middle and Lower Young river basin.

3. Designated execution entity (planned to be established if the proposed project starts by 2019)

- Department of Water Resources will consider to designate external entity to be responsible for an execution of the Project. Designated execution entity will be responsible for daily operation and management with an oversight and monitoring of Department of Water Resources. Designated execution entity will be located nearly demonstration site or be easily coordinated with local partners/comminities. Designated execution entity must comply with AF rule and procedures on behalf of Department of Water Resources.

4. National Project Director : (not changed)

5. National Project Management Unit :

Based within office of designated execution entity close to demonstration site (Young river basin).

Staff;

- Project coordinator (selected government officer of Department of Water Resources)

- Thailand project manager (recruited and contracted under designated execution entity)@$1,800 per month)

- Thailand adminstrative and procurement assistant (recruited and contracted under designated execution agency)@$900 per month)

- Local Community coordinators (3 nominated representatives from upper, middle and lower Young river basin) @$500 per month per person)

Please add cost for Local community coordinators for a total of 500x3x48 = 72,000 $.

Kindly adjust an allocation of costs in the Table accordingly, But you may remain a total of 210,000 $.

6. Referring to section G Budget

For Thailand, we request to reallocate budget among Act 1.1.4 and 1.1.6 as follows;

	Y2	Y3	Y4	
Act 1.1.4	150000	125000	125000	; a total of 300,000 (a decrease of 100,000)
Act 1.1.6	150000	75000	75000	; a total of 350,000 (an increase of 100,000)

This change has no change for a total budget of Act 1.1 (of Thailand). it simply cut one to add another.

Supplement Document 2:

1. Inception report of Vietnam
2. Climate change Vulnerability Assessment report of Vietnam
3. Validation workshop report of Vietnam

1. Inception report of Vietnam

INCEPTION WORKSHOP REPORT

Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation

(Tram Chim National Park, Vietnam, March 14th 2018)

I. Project Background

The natural ecosystems of the Greater Mekong Sub-region (GMS) are of critical importance to the 75 million people living within the region who rely upon natural resource-based livelihoods. As the Mekong flows from its origin at the Lasagongma Spring in China through the Greater Mekong Sub-region (GMS) countries and into the South China Sea, it delivers numerous ecosystem goods and services to millions of South-East Asia's poorest people. Despite their regional importance, the ecosystems of the GMS face a multitude of anthropogenic pressures that threaten their capacity to provide goods and services for local communities, for example, extensive deforestation. The problems in the GMS are exacerbated by a climate that has undergone considerable change in recent decades and is expected to continue changing throughout the 21st century. Without appropriate adaptation interventions, it is likely that a large proportion of the GMS's population will remain extremely vulnerable to the effects of climate change and ecosystem degradation.

The overall objective of the proposed project is to reduce vulnerability to climate change in the Greater Mekong Sub-region (GMS).

This objective will be achieved through three complementary outcomes:

i) Climate change adaptation interventions, particularly EbA, implemented by vulnerable communities in the GMS to manage climate change impacts, particularly droughts and floods;
ii) Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS;
iii) Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

The proposed project will increase the resilience of beneficiary communities to the effects of droughts and floods by implementing a suite of adaptation interventions – with a focus on EbA – including inter alia: i) living check-dams; ii) integrated home gardening; iii) agroforestry; iv) forest regeneration; v) water distribution canals; vi) Non Timber Forest Products (NTFP)-based and additional livelihood options; vii) climate-resilient crop varieties; and viii) natural resource-based community cooperatives.

Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand) and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts. The project will share implementation experiences across the GMS.

The project is funded by Adaptation Fund Board and UNEP is the Implementing Entity for the project while Department of Water Resource is the executing agency for Thailand and Ministry of Natural Resources and Environment in Vietnam. The project aims to recruit a researcher in each country for undertaking climate vulnerability assessment to understand the current as well as future impacts of climate change in the proposed project sites.

II. Workshop Objectives:

One of the project demonstration sites is Tram Chim National Park in Vietnam. The inception workshop held at Tram Chim National Park aimed to collect information at demonstration site in order to develop the full size project proposal to be submitted to Adaptation Fund Board.

Specific objectives of the Workshop are:

- To introduce the projects to stakeholders at the project site in Vietnam (Tram Chim, Dong Thap, Vietnam)
- To identify main climate threats in the area and interventions to address to these climate threats (must help people to adapt)
- To identify important stakeholders and criteria to determine project beneficiaries

III. Summary of the Workshop

The inception Workshop was taken place at Tram Chim National Park on March 14th 2018. The participants included representatives from Ministry of Natural Resources and Environment, Tram Chim National Park Management Board, Tram Chim National Park staffs, Environment Projection Division under Department of Natural Resources and Environment in Dong Thap province, Staffs from women association, farmer's union, and environment protection units from the communes surrounding Tram Chim National Park, international and national consultants (see Annex 2 for the list of participants).

The workshop was organized in two sessions. The first session was to introduce the projects, the vulnerability assessment methodology supposed to be applied in the project to the stakeholder. This session included 3 presentations from the international consultants Mr. Nicholas Tye, national consultant, Dr. Linh Nguyen and Climate Change in Tram Chim National Park from Mr. Hai Nguyen, Tram Chim National Park Management Board. The second session was to consult with stakeholders on main climate threats at the area, intervention to address those threat, key stakeholder and project beneficiaries. This session was facilitated by a national consultant, Dr. Anh Do.

III.1. Session 1: Introduction presentations

III.1.1. Project Introduction

The international consultant, Mr. Nicholas Tye, introduced the principles of an Adaptation Fund project, the project development process, logical framework of the project.

- Adaptation Fund:

Mr. Tye gave out some key points on principles of Adaptation fund project:

- The Adaptation Fund shall finance **concrete adaptation** projects and programmes.
- The project should be defined as a set of activities aimed at addressing the adverse impacts of and risks posed by climate change. The activities shall aim at producing **visible and tangible results on the ground by reducing vulnerability and increasing the adaptive capacity of human and natural systems** to respond to the impacts of climate change, including climate variability.
- Projects/programmes concern activities with a specific objective(s) and concrete outcome(s) and output(s) that are **measurable, monitorable, and verifiable**.
- An AF project should be a participatory process and have a multi-disciplinary approach; a complementary approach; sustainable development; gender equality; a country-driven approach; sound environmental management; cost-effectiveness; be simplicity and flexibility of procedures based on individual country circumstances.

- The project development process:

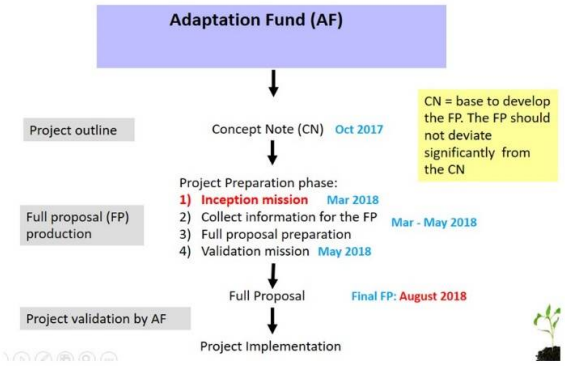

Figure 1: Project process development (Adopted from Mr. Tye's presentation)

The project concept note was accepted by Adaptation Fund in October 2017. The upcoming step is project preparation. This inception workshop is a part of project preparation phase. The main purpose of this workshop is to gather information to develop a full proposal of the project and get stakeholder involved in the project development process. The schedule of this phase should be inception mission would be held in March 2018. All information needed to develop full proposal should be collected before May 2018. Then it will come to full proposal preparation. The full proposal of

the project will be validated internally by UNEP and experts around middle of June. Then it will be revised and submitted to Adaptation Fund in August 2018.

- Logical framework of the project:

The project should have 3 components:

Component 1: Demonstration of climate change adaptation interventions, with a focus on drought and flood management, in vulnerable communities and different ecosystems

Outcome 1: Climate change adaptation interventions implemented by vulnerable communities in the GMS to manage climate change impacts, particularly droughts and floods

Output 1.1: A suite of climate change adaptation interventions, including EbA, implemented at Young River Basin in Thailand.

Output 1.2: A suite of climate change adaptation interventions, including EbA, implemented in communities living around Tram Chim National Park in Vietnam.

Output 1.3: Monitoring programme established.

Output 1.4: EbA monitoring guidelines developed

Component 2: Regional knowledge base on climate change adaptation expanded in the GMS

Outcome 2: Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems.

Output 2.1: GMS-specific cost-effectiveness analysis of climate change adaptation interventions.

Output 2.2: Policy briefs developed.

Output 2.3: Knowledge on EbA shared on the main regional knowledge platforms and presented at regional adaptation forums.

Output 2.4: National level knowledge-sharing strategy implemented in Thailand and Vietnam.

Component 3: Political cooperation on climate change adaptation

Outcome 3: Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

Output 3.1: Recommendations for regional cooperation on the scaling up of climate change adaptation interventions developed and presented at regional forums.

Output 3.2: Exchange visits for practitioners, policy-makers and planners to project intervention sites.

The total budget of the project was estimated around $7000,000.

Implementing agency: UNEP

Executing entities: UN Environment-International Ecosystem Management Partnership (UNEP-IEMP). Ministry of Natural Resources and Environment of Thailand. Ministry of Natural Resources and Environment of Vietnam.

Demonstration sites: Young river basin, Thailand and Tram Chim, Vietnam

III.1.2. Climate Change Vulnerability Assessment Methodology and Resilience Enhancing Approach

Dr. Linh introduced about the concept of climate change vulnerability and process for climate change vulnerability assessment. Dr. Linh suggested 7 steps for the process which are:

Step 1: Identify natural disasters/hazards in the area (under climate change scenarios)

The climate threats could be drought, flood, tropical storm, sea level rise, etc.

Step 2: Identify prioritized objectives/areas

The area could be livelihood, agriculture, tourism, infrastructure, services, national park, ect.

Step 3: Identify Vulnerability (V) index

V is a function of exposure, sensitivity and adaptive capacity. V = f (E, S, AC).

Step 4: Determine indicators of Vulnerability (V) and risk (R) index

Step 5: Calculate V index for each objective/area

Step 6: Mapping CC Vulnerability or risks.

Step 7: Propose adaptation/vulnerability reduction/resilience enhancing interventions

After the 2 presentations, there a short Q&A. The participants had some questions on the projects such as the project budget, project duration, role of Tram Chim National Park in the project. Representatives from MONRE, Mr. Nguyen Thi and the consultants explain and clarify all the points that the participants raised.

III.1.3. Climate Change Impacts on Tram Chim National Park

Tram Chim National Park was located at downstream of Mekong river and the center of Dong Thap Muoi region. The area of Tram Chim is 7,313 hectares. Population living in Tram Chim's neighborhood is estimated around 50,000 people. Tram Chim is one of the last remnants of the Plain of Reeds wetland ecosystem. There are 130 plant species, 6 main plant communities, 232 bird species including 32 species of rare birds, 130 species of fish in Tram Chim Park.

Climate change has emerged as threat to the biodiversity of Tram Chim. Recently, the dry season occurred in longer period which caused serious droughts in the Park. Droughts has threatened the food supply, reproduction and migration time of bird species. It's observed that the number of water birds and the red crowded cranes in the Park decreased.

Offseason rain events happened more frequent and unpredictable. This caused the inundation of the eleocharis field surface and make the eloecharis not be able to procuce tuber. Hence, the red crowned cranes don't have sufficient food supply.

The increase of temperature has also been recorded in the area. Higher temperature could affect the environment for all species in the Park. For example: higher temperature could cause spreading of diseases, evaporation of water, reduction of the oxygen in water which could affect fish health

Hydrological regime is an important factor to the existing of the wetland. The change of the regime due to climate change is affecting much to the wetland ecosystem.

Few adaptation activities were implemented in Tram Chim National Park in the past decades. Those activities focused on:

- Strengthening education and training on the importance of the park conservation
- Regulating hydrological regime in the Park
- Forest fire prevention
- Restoration of deteriorated habitats
- Fire prevention lane construction
- Alien species control
- Ecosystem observation
- Enhancing forest protection
- Water pumps installation
- Encouraging community participating in sustainable use of natural resources activities.
- Collaborating with WWF for improving livelihood and living condition of the residents surrounding the Park such as training courses on mushroom, Sesbania sesban, squash planting; installation of water supply system.
- Collaborating with Can Tho University for various activities on enhancing the livelihood of residents.
- A project with HSBC for installation of 5 water stations in Tam Nong Disctrict and providing 5 water filters
- A project with APFNET includes following activities: lilies and lotus planting; bee keeping; handicraft production development; capacity building for residents on sustainable use of natural resources.

III.2 Session 2: Consultation with stakeholders

This session aimed to identify the climate threats in Tram Chim National Park and surrounding communes; consult with local stakeholders on interventions that they want to apply to enhancing the resilience to climate change; identify important stakeholders and criteria to determine project beneficiaries.

Mr. Nicholas Tye suggested 4 topics that the discussion session should focus on which are: Main climate threats in the area; Interventions to address to these climate threats (must help people to adapt); Important stakeholders; Criteria to determine project beneficiaries.

Representatives from 5 communes surrounding Tram Chim shared information on the topics:

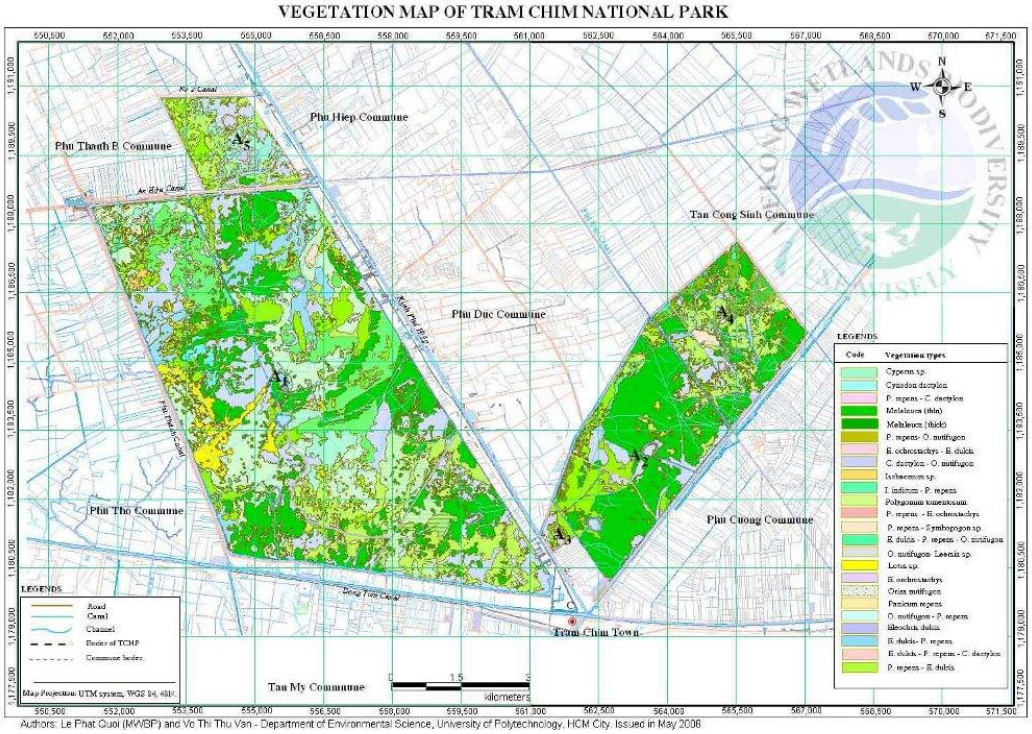

Figure 2: Tram Chim National Park's Neighborhood (Source: Tram Chim National Park website: http://vqgtc.dongthap.gov.vn/wps/portal/vqgtc)

1. Phu Duc Commune:
    a. Climate Change impacts or climate threats: changes in precipitation, drought and unseasonal rain, floods, diseases; Those threats caused losses in agricultural productions, especially rice production, in Phu Duc Commune. Also high temperature and drought caused forest fires; erratic flood causes river or cannal erosion.
    b. Livelihood: rice cultivation, aquaculture and vegetable planting. Currently, there are 230 poor households in Phu Duc, contributing to 11% of Phu Duc commune's household. A decade ago, poor local residents often exploit illegally the resources in the Park. Recently, there have been several programmes impelented in Tram Chim providing training courses to guide local residents on when they could come to havest resources in the forests,

which kind of fishes, plants they could havest, which are not allowed, ect. These courses could help to protect and conserve the biodiversity in the Park.

c. Recommendations: there are several models initiated to promote livelihood of the residents in Phu Duc which are algae (water hyacinth) planting, Sesbania sesban planting. Algae could be harvested and used for making knitted baskets. Phu Duc commune would love to see these models to be upscaled in the commune and also need to find markets for these products. Training courses and awareness raising activities on climate change, adaptation measures including livelihood models, techniques for cultivation, aquaculture to respond to climate changes, should be taken place more in future.

2. Phu Hiep Commune:
   a. Climate change impacts: similar to Phu Duc; heat waves with longer period affected a lot on livelihood of people in Phu Hiep. Climate change affected a lot on vulnerable objects such elders, childrens, women and poor people.
   b. Livelihood: mushroom farming, potato and **Allium** chinense planting, basket knitting (using water hyacinth as material). The poverty rate of household in Phu Hiep is 13.4 %. The resident was used to exploit illegally the Park. However, there have been several training and awareness raising courses on how to havest rightfully the Park taken place in the commune.
   c. Recommendations: More training courses and awareness raising held; more livelihood introduced for residents in Phu Hiep. Eco tourism could be good measures in the futures which could help both livelihood promoting and Park conservation.
3. Tan Cong Sinh:
   a. Climate change impacts or climate threats: similar to the other commune
   b. Livelihood: similar
   c. Recommendations: raising awareness on environment protection (people having habits of dumping empty pesticide bottles or bag after used all over the places which contaminated environment), well planning for water hyacinth growth to avoid the impacts of water hyacinth growth for aquaculture and hydrological flow scheme in water reservoirs; need to keep promoting other livelihood models such as mushroom farming, basket knitting, sesban planting; introduce more livelihood models.
4. Phu Thanh B:
   a. Climate threats: similar; dike elevation in Phu Thanh B is normally lower than flood level, need to be improved in future
   b. Livelihood: similar plus duck farming

c. Recommendations: awareness raising on environment protection (for example: change behavior of farmer in using fertilizer, using lesser amount); reinforcing irrigation systems; elevating dikes; introducing more best practices in livelihood for Phu Thanh B's residents

5. Tram Chim Town:
   a. Climate Change impacts: Similar
   b. Livelihood: small business and services; rice growth; Promote safe agriculture; recently, establish a tourist club chaired by Tram Chim Town people committee. The club members include individuals, organizations working or interested in working in tourism
   c. Recommendation: considering tourism as a key economic sector in Tram Chim; elevating dikes in Tram Chim Town.

ii. Comments from Mr. Le Thanh Cu: very similar to what Mr. Hai Nguyen presented in his presentation

iii. Comments from Mr. Nguyen Viet Thang:

Dong Thap province had develop Provincial action plan to respond to climate change in 2012. However, the plan didn't have much solutions or specific activities for Tram Chim National Parks. Therefore, it's needed to develop adaptation plan for Tram Chim aligned with Resolution No.120/2017/NQ-CP on sustainable Mekong delta development in adapting to climate change.

IV. Conclusion

The inception workshop was held at Tram Chim National Park to introduce about the AF project to local stakeholders and gather the information in order to develop the 1st draft of full proposal. The stakeholders were very excited and agreed on the content of the project. They also shared their knowledge, experiences on climate threats and their needs to enhancing the resilience in Tram Chim. The impacts of climate change on livelihood of the residents in the area and the ecosystem has been getting more severe. It's necessary to have interventions that could help Tram Chim National Park adapt well to climate change and also support enhance livelihoods of the residents living in Tram Chim National Park's neighborhood.

Annex 1:

INCEPTION WORKSHOP AGENDA

Project

Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation in the Context of South-South Cooperation

Venue: Tram Chim National Park, Tam Nong, Dong Thap, Vietnam
Date: March 14th 2018

Time	Activities	Presenters/Facilitator
8.00:8.10	Opening Remark	Representatives from MONRE and Tram Chim National Park
8.10: 9.30	**Session 1: Introductory Presentations**	**Nicholas Tye, International Consultant**
8.10:8.30	Presentation of the Project	Nicholas Tye, International Consultant
8.30:8.50	Climate Change Vulnerability Assessment Methodology and Resilience Enhancing Approach	Linh Nguyen, Ph..D., ISPONRE
8.50:9.10	Climate Change Impacts on Tram Chim National Park	Hai Nguyen, Tram Chim National Park
9.10:9.30	Q&A	
9.30:9.50	**Tea Break**	
9.50:11.20	**Session 2: Consultation with stakeholders**	**Anh Do, Ph.D., IMHEN**
11.20:11.30	Wrap up and Conclusion	Representatives from MONRE and Tram Chim National Park

Annex 2:

LIST OF PARTICIPANTS

No.	Full name	Organization/Agency
1	Le Ba Linh	Phu Thanh B commune
2	Nguyen Van Linh	Tan Cong Sinh commune
3	Do Thi Chinh	Phu Hiep commune
4	Nguyen Thi Bang	Tan Cong Sinh commune
5	Dinh Thi Thu Hien	Tan Cong Sinh commune
6	To Thi Bao Anh	People's Committee of Tram Chim Town
7	Pham Tran Linh Chi Thao	Tan Cong Sinh commune
8	Tran Van Ut Nưa	Tan Cong Sinh commune
9	Tran Thi Anh Thu	Tram Chim National Park
10	Le Nhat Ban	Tram Chim National Park
11	Nguyen Thi Huong	Tram Chim Town
12	Nguyen Do Lac	Farmer's union of Phu Hiep commune
13	Nguyen Van Khich	Tram Chim National Park
14	Dao Phuoc Loi	People's Committee of Phu Thanh B commune
15	Nguyen Van Than	Tram Chim National Park
16	Doan Van Nhinh	Tram Chim National Park
17	Pham Viet Thang	Department of Natural Resources and Environment
18	Nguyen Hoang Dan	Department of Natural Resources and Environment
19	Le Thanh Cu	Tram Chim National Park
20	Nguyen Van Nhon	Phu Hiep commune
21	Tran Thi Bich Tien	Phu Thanh B commune
22	Duong Thi Thanh Tu	Phu Duc commune
23	Nguyen Thi My Tuyen	Phu Duc commune
24	Pham Thanh Tung	Tram Chim Town
25	Nguyen Hoang Minh Hai	Tram Chim National Park
26	Cao Thai Phong	Tram Chim National Park
27	Tran Van Qui	Tram Chim National Park

28	Vo Chi Nguyen	Forest rangers agency
29	Nicholas Tye	C4ES/UNEP
30	Nguyen Thi	DLA – MONRE
31	Do Tien Anh	IMHEN – MONRE
32	Nguyen Sy Linh	ISPONRE – MONRE

2. Climate change Vulnerability Assessment report of Vietnam

1. Introduction

The natural ecosystems of the Greater Mekong Sub-region (GMS) are of critical importance to the ~75 million people living within the region who rely upon natural resource-based livelihoods. Of the region's natural systems, the Mekong River is arguably the most essential in supporting rural livelihoods and maintaining the functionality of associated ecosystems. Despite their regional importance, the ecosystems of the GMS face a multitude of anthropogenic pressures that threaten their capacity to provide goods and services for local communities. Additionally, the GMS has undergone extensive deforestation in past decades, which has reduced the supply of important ecosystem goods and services to poor communities. The problems in the GMS are exacerbated by a climate that has undergone considerable change in recent decades and is expected to continue changing throughout the 21st century. Without appropriate adaptation interventions, it is likely that a large proportion of the GMS's population will remain extremely vulnerable to the effects of climate change and ecosystem degradation.

The project will implement innovative, on-the-ground adaptation technologies and share implementation lessons across the GMS. Adaptation technologies will be demonstrated in the middle (in the Young Basin in Thailand) and lower (surrounding Tram Chim National Park in Vietnam) reaches of the Mekong River basin to build climate resilience and generate adaptation knowledge from diverse environmental and socio-economic contexts.

The proposed project will increase the resilience of beneficiary communities to the effects of droughts and floods by implementing a suite of adaptation interventions– with a focus on EbA – including inter alia: i) living check-dams; ii) integrated home gardening; iii) agroforestry; iv) forest regeneration; v) water distribution canals; vi) NTFP-based and additional livelihood options; vii) climate-resilient crop varieties; and viii) natural resource-based community cooperatives. Additionally, knowledge-sharing and awareness-raising in local communities surrounding project beneficiaries will be accomplished through inter alia: i) knowledge-sharing days; ii) local field visits; iii) the dissemination of awareness-raising and training materials; iv) climate change centres at local schools ; v) grassroots adaptation sharing events; and vi) regional exchange visits. Comprehensive monitoring and evaluation, as well as small-scale research projects, will be conducted with local institutions to generate knowledge products on context-specific lessons learned. The knowledge generated at the country level will be shared regionally on ways to combat drought and flood risk– specifically EbA – across the GMS in the different ecosystems of the GMS.

The overall objective of the proposed project is to reduce vulnerability to climate change in the Greater Mekong Sub-region (GMS). In order to increase resilience of the region, it is essential to identify the climate vulnerability. This objective will be achieved through three complementary outcomes:

iv) Climate change adaptation interventions, particularly EbA, implemented by vulnerable communities in the GMS to manage climate change impacts, particularly droughts and floods.

v) Enhanced knowledge and awareness of adaptation measures, including EbA, to shared climate change impacts in different ecosystems to promote regional cooperation, planning and implementation of adaptation in the GMS.

vi) Strengthened regional cooperation on climate change adaptation, particularly in response to floods and droughts, in the GMS.

In Vietnam, areas around Tram Chim National Park (TCNP) have been selected as the site to implement adaptation interventions, particularly EbA measures to increase climate resilience of the area. In order to support the development of a full project document, the research team will undertake a study of climate vulnerability and adapting for the proposed site. The research will focus on (1) identify appropriate methodology for undertaking climate vulnerability assessment; (2) Undertake vulnerability assessment of the proposed site and (3) Recommend appropriate EbA options for the proposed site.

2. Approach and methodology

2.1 Approach

In order to understand the climate vulnerability of the site and appropriate adapting options which include Ecosystem-based Adaptation (EbA) and non-EbA measures, this study applies the approach of qualitative research in which climate threats of the Mekong Delta Region are listed through a comprehensive literature reviews. Climate threats of the proposed site were then identified and confirmed in a consultation meeting with staff of Tram Chim National Park (TCNP) and leaders of community groups and unions around TCNP. Climate threats which indicate in form of temperature, rainfall, sea level rise and extreme weather events. These climate behaviors, if accelerated will cause consequences or impacts on nature (biodiversity losses including ecosystem services) and Socio-Economics (socio-economic losses including welfare of people). The approach applied in this study is schematically presented in Figure 1.

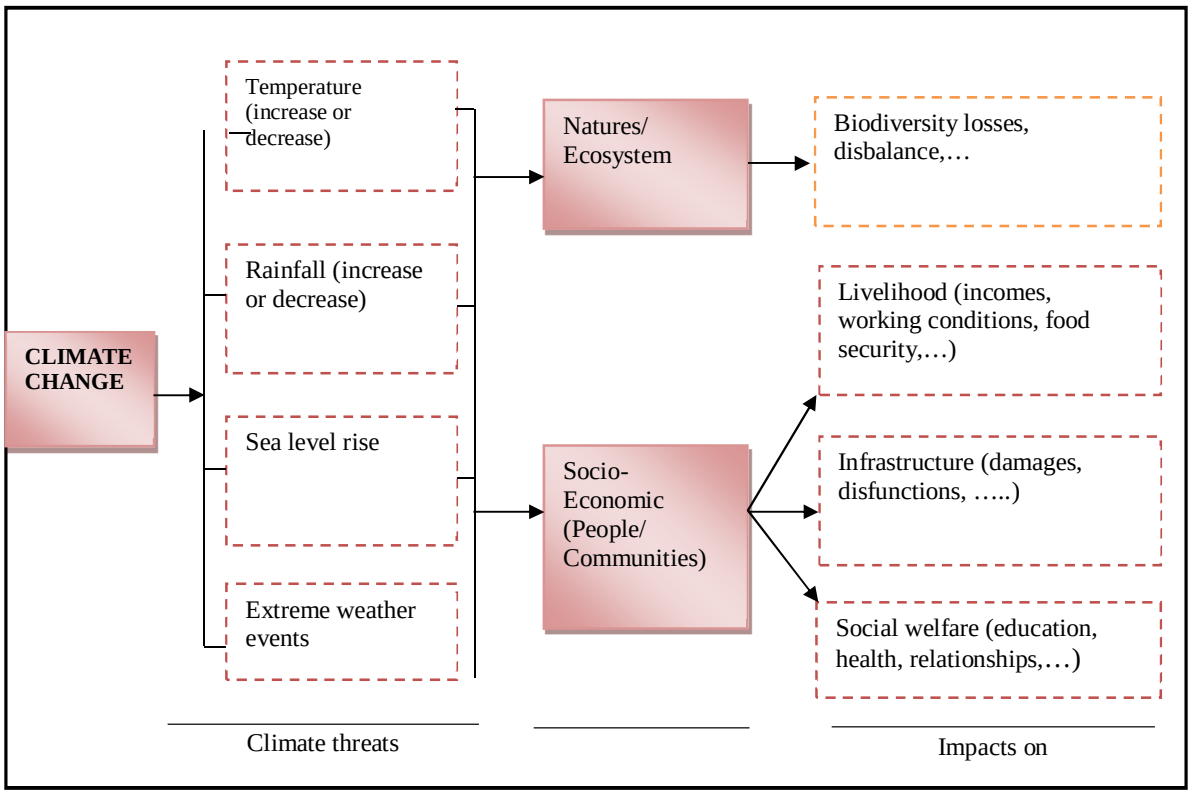

Figure 1. The approach in linking climate threats and its impacts to nature socio-economic system

2.1.1 Planning and inception

In order to gain a thorough and harmonized understanding and agree on the scope of tasks including key climate threats and their impact on ecosystems (particularly the national park) and communities, planning meetings were held with the technical team of the national park, representatives of communes/counties, community groups and the International Consultant. In such meetings, the teams and the consultants agreed on the approach and methodology and timelines for engaging the stakeholders and collecting the information required for developing a full size project document for submission by the international consultant to the Adaptation Fund (AF) in August 2018. The key stakeholders for the proposed project were also generally agreed upon for instance sub county and district local governments, with emphasis to conduct more consultations at community level.

2.1.2 Field visit

As part of the preparations for information/data collection, a reconnaissance field visit was carried out to the proposed and project sites agreed upon for purposes of getting exposed to the their location, problems, stakeholders, natural resources and socio-economic issues, problems and challenges and opportunities and overall baseline information. Generally, information about various issues regarding climate change vulnerability in the proposed and agreed areas, community livelihoods and natural resource conservation issues were collected.

2.1.3 Stakeholder consultations and community engagements

In line with the UN Environment policy1, various stakeholders at national, district and local levels were consulted. Efforts were made to capture issues unique and specific to men and women and indigenous peoples as required by the UN gender policy2. Indeed, 60% of the community consulted were women. Stakeholder consultations were conducted at two levels; i.e. national park and communes/communities. Key stakeholders including the national park management board and commune (or sub-county) authorities i.e. both technical and political leadership, local institutions, field staff responsible for forests protection and wetlands conservation (inside the park) and related resources, planning, monitoring, and other activities for management of natural resources in the proposed project site were consulted. Stakeholder engagement mainly involved local government leaders and local communities at commune and village levels. During consultations the techniques such as focus group discussion, participatory rapid appraisal and in-depth interviews were used to collect qualitative data and information.

2.2 Research methods

In order to be able to generate and implement appropriate climate change adaptation measures, it needs to know which risks (or threats) climate change poses to a system (ecosystem and population). Identifying these adaptation measures can be done with the help of a vulnerability assessment. Such assessments allow practitioners and decision-makers alike to determine where, in which sector and by whom their support is most urgently needed, and in which form. The vulnerability assessment thus allows that targeted, more effective and sustainable adaptation activities can be conducted (GiZ and ISPONRE, 2017). Additionally, climate vulnerability assessment helps to:

1. **Identifying current and potential hotspots** → Vulnerability assessments can compare susceptibility to climate change in multiple systems. They also allow better understanding of the factors driving the vulnerability of particular climate change hotspot (e.g. a specific geographical area or industry, which is more severely affected by climate change than others).
2. **Identifying entry points for intervention** → information on the factors underlying a system's vulnerability can serve as a starting point for identifying suitable adaptation interventions. Adaptation can reduce vulnerability by increasing a system's adaptive capacities and by decreasing its sensitivity to climate change

Based on available resources and times as well as ultimate objective, one can conduct climate vulnerability assessment in different approaches. There is no one-size-fits-all approach to vulnerability assessments. They can differ significantly in their set-up depending on scope and available resources. There are two types of vulnerability assessment, focused vs. explorative.

Explorative vulnerability assessments focus on several topics, covering a large area with a low spatial resolution for data collection and including only rough climatic trends for the

[1]UNEP, 2015. Handbook for stakeholder engagement at UNEP, http://wedocs.unep.org/handle/20.500.11822/7449.
[2]UNEP, 2015. Gender Equality and the Environment: Policy and Strategy http://hdl.handle.net/20.500.11822/7655

future. They are usually less resource and time-intensive and primarily based on expert opinion, existing literature and data.

Focused vulnerability assessments involve extensive stakeholder involvement, concentrating on a smaller spatial unit, a specific topic or system and/or defined period of time. While this requires more time and resources, the methods used produce the kind of focussed analysis which may well be required for concrete adaptation planning. However there is no defined cut-off point between the two types of assessment.

In this study, it uses the combination between two types of vulnerability assessments. At first explorative vulnerability assessments was used to identify key vulnerable groups and locations/areas (climate threats). The focused vulnerability assessment then were applied to further identify most vulnerable groups and to propose appropriate adapting options, particularly EbA interventions.

In this study due to time constraints, most of assessments are relied on literature review combined with community meetings and expert consultation. Table 1 summaries key steps in studying the climate vulnerability and adapting options for Tram Chim site.

Table 1.Key steps in in studying the climate vulnerability and adapting options Tram Chim site

STEP	HOW TO PROCESS	EXPECTED OUTPUTS
Step 1: Identify climate threats in the areas (past, present and future scenario)	- Review related climate change documents and reports of the region - List of potential climate threats - Group discussion to rank the most climate threats by scoring	- A comprehensive list of climate threats of the region - A list of 5 most climate threats of the region/area
Step 2: Identify vulnerable groups/sectors that needs detail assessment.	- Review the socio-economic development of the regions - List all the key livelihood activities that may mostly effected by climate threats - List of key infrastructure that most vulnerable to climate threats	- List of the most vulnerable groups/sector in the regions - List of the most vulnerable infrastructure in the regions
Step 3: Identify impact chains	- After key climate threats identify, the impact of these threats are identified and assessed through literature reviews - Impacts on the ecosystem identified and assessed by literature review and expert consultation	- Maps of impact chains - Key impacts on ecosystem (national park) are recognised and documented - Key impacts on communities (people living around the park) are recognised and documented

	- Impacts on local communities identified through literature review and community meetings	
Step 4: Identify adapting options	- After the most vulnerable group identified and confirmed, assessment on adaptive capacity conducted qualitatively. - Identify the existing adapting options for each climate threat - Review the future threats/challenges - Propose the most promising adaptive measures	- Ecosystem and communities most vulnerable confirmed - Adaptive capacity of ecosystem and communities assessed - List of existing adaptation measures finalised and reconfirmed by local communities - Future threats (climate change scenarios/risks) reviewed - List of the most promising adaptation measures proposed (both EbA and non-EbA options)

2.3 Data collection tools and data collected

A check list with pre-determined questions was used to guide the discussions during consultations with key informants, focus group discussions and the community meetings. The check list sought to first of all confirm the importance or the values of the wetland (national park) and Mekong river; the climate variability and changes that they were exposed to; who was vulnerable to the climate variability and change threats; causes of their vulnerability; barriers to adaptation; coping strategies they use at local level and interventions that could enable them to better cope with the climate change variability in their areas. Data on socio-economic development of the district and communes around Tram Chim National Park (TCNP) was also collected through statistical year book and reports provided by local government.

3. Background of the site

3.1 Location and size

Tam Nong is a remote district of Dong Thap province, in Mekong delta river of Vietnam, with a total area of 46,081.86 hectares. The north adjoins to Tan Hong and Hong Ngu districts, Thanh Binh district to the south, and Thap Muoi district to the east. The district is located in the center of the northern part of the province, with Tien River and National Road 30 stretching through it, and the waterway network is distributed evenly, creating favourable conditions for goods exchange and economy development (Figure 2).

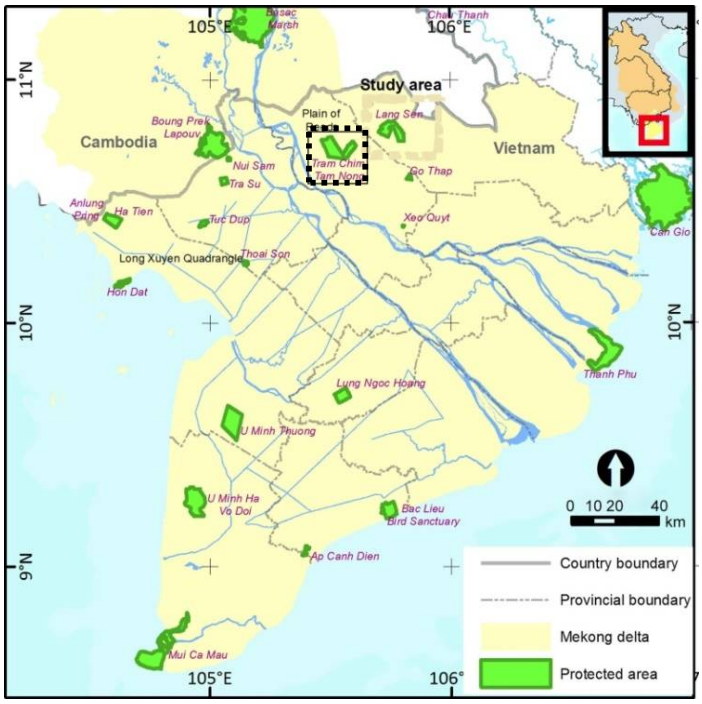

Figure 2. Location of the project in Vietnam's Mekong Delta

The district has 12 administrative units, including 12 communes: Tan Cong Sinh, Phu Tho, Phu Thanh A, Phu Thanh B, Phu Ninh, Phu Hiep, Phu Duc, Phu Cuong, Hoa Binh, An Long, An Hoa communes (or counties) and Tram Chim town with a total of 53 hamlets/villages. In which, 25 villages under 6 administrative units (communes and town) located around the national park. While the Project covers Tram Chim National Park (TCNP) and its buffer zones (include 5 communes and one town) in Tam Nong district, Dong Thap province with a total area of 37,613 hectares (Figure 3). In which, TCNP occupies an area of 7,313 ha and 30,730 hectares under the management of local communities.

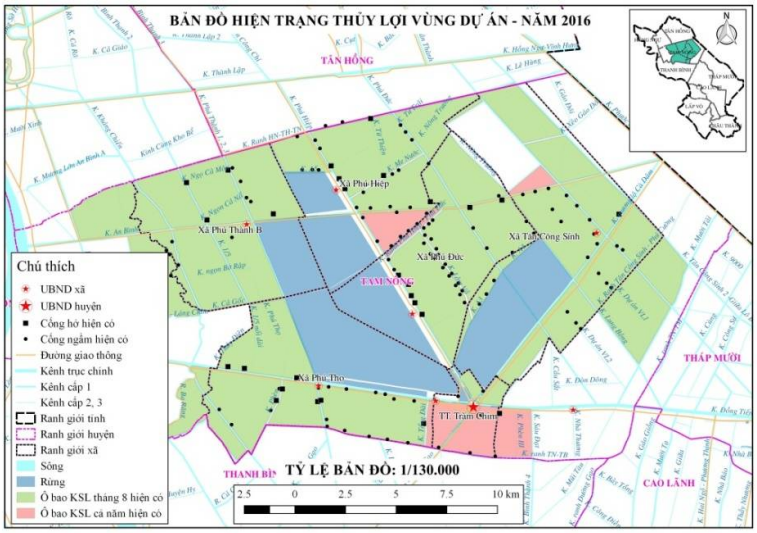

Figure 3. Project area includes Tram Chim National Park

3.1.1 Introduction of Tram Chim National Park

Tram Chim National Park was first established as a Nature Reserve (Decision No. 47/TTg dated 2nd February 1994 by the Prime Minister of Vietnam). In 1998, it has oficial recognised as a wetland National Park which covers an area of 7,588 ha in Tam Nong district, Dong Thap province in Mekong Delta region of Vietnam, with coordinates: from 10º37' to 10º46' North and from 105º28' to 1005º36' East. The park located in 5 communes (including Phu Duc, Phu Hiep, Phu Thanh B, Phu Tho and Tan Cong Sinh) and Tram Chim town. Tram Chim National Park (TCNP) supports one of the last remnants of the Plain of Reeds wetland ecosystem. In 2012, Tram Chim National Park was recognized as the World's 2000th Ramsar site and the 4th Ramsar site in Vietnam. The Park is divided into five separate management zones, A1, A2, A3, A4, A5 (Figure 1), and Zone C as Administrative area, each surrounded by canals with a total of 60 km in length. A network of canals with various depth and width runing through the management zones, for example A1 has been divided into three units by additional major canals. The Park consists of 2,808.05 ha of forested land (Melaleuca cajiputi stands mainly aging from 10 to 18 years, grown on sand and clay soils), 4,307.02 ha of grassland and 472.93 ha of other land uses. The dominant flora species include Eleocharis spp. grass, Panicum spp., Ischaemum spp, grass, wild rice, and lotus. The site is inundated annually to a depth of 1-3 m during the wet season (peak level occurring sometime between September and November).

3.2 Biophysical characteristics

The project site is a wetland and lowland where local communities living outside of the national park. Located in the Plain of Reeds which is inland wetland in Vietnam's Mekong Delta and is a "back swamp" forming a large inundated depression of highly acidic soil. Until the 1970s, only primitive floating rice could be grown in the area. It is similar to a very large swampy floodplain stretching along the Tien River from Chau Doc to the Takeo Plateau. It was around 1,000,000 hectares in the 18th Century, and is now half that size due to drainage and irrigation systems. Within Plain of Reeds, Tram Chim National Park has been protected for the conservation of wetland ecosystems. The zonings of Tram Chim National Park is schematically presented in Figure 4 which consist of 5 zones (A1-A5).

Zone A1: Compared to the suggested water levels of MWBP, the actual water levels were different from 10-16cm higher. If we considered the variation was ±5cm then the differences varied from 5-11cm. In general it is acceptable, except the year 2012 it was extremely high from April to June. This could be the reason that *Eleocharis* tubers could not be formed thus resulting in a low number of Sarus Crane (13 individual) in the following year of 2013.

Zone A2: The actual water level was higher than the suggested water levels by about 18-58cm. This is a special case of TCNP as water levels in this zone were kept very high after a seriously fire in 1996. After almost 20 years keeping high water levels to prevent fires, organic matters accumulation was very high due dead *Melaleuca* trees and grass materials cannot decomposed, some part of this zone this organic layer reached about one meter.

Zone A3: This is a disturbing ecosystem as it is in restoration trial stage. Then the suggested water levels should be based on the vegetation restoration, especially the restoration of *Eleocharis* community. The data of vegetation monitoring in 2011 and 2012 indicated that *Eleocharis* is recovering and tubers were formed. Therefore, it is suggested to manage water as the present. However, it needs more time to monitoring the Eleocharis community and their tubers as well as the number of Sarus Crane come back for feeding.

Zone A4: This zone is an important feeding place for Sarus Crane when they came to TCNP. Usually they use this zone during the period of December to January. Therefore, the project suggests keeping water low at this time to support feeding place for them. Several dikes and sluices were built to manage water at low levels in the dry season and maintain water levels in the end of the dry season to allow *Eleocharis* to form their tubers. However, based on the actual data we can see that the water levels in the beginning of the dry season is still high (>20cm) and there is a lack of water at the end of the dry season (-2cm). It is important to keep water levels at this zone at the suggested water levels.

Zone A5: This zone is too dry (-24 to -48cm) and although several dikes and sluices were built to maintain and keep water longer than that normal, the data shows the water regime for this zone has not improved. More surveys to dike systems and soil infiltrations are needed to re-calculate water budget management. This new water levels should be applied for water level control inside the zone and dikes and sluices improvement to maintain water regime for this zone are required.

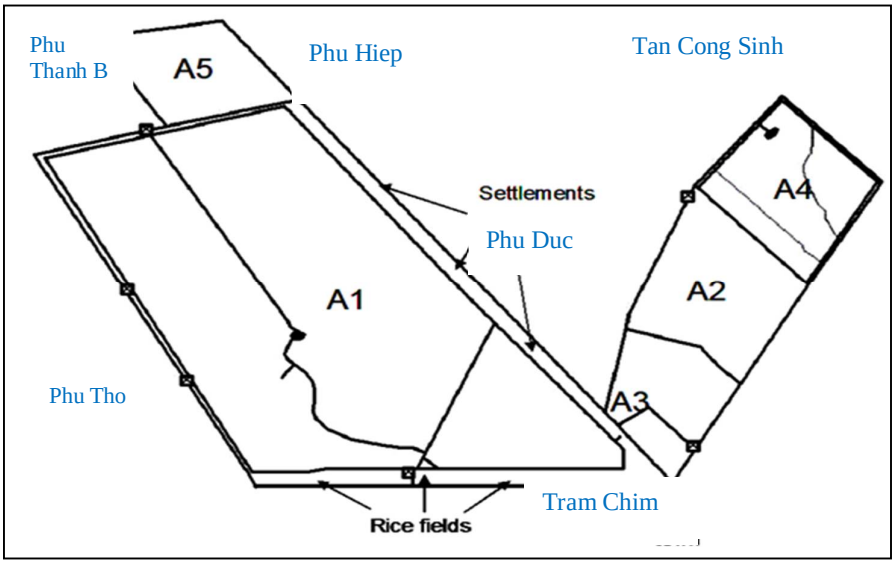

Figure 4. Schematic presentation of Tram Chim national park and surrounding communes

3.3 Ecosystems profile

The ecosystem in Tram Chim can provide different important goods and services to local communities and to the Delta (Table 2). It is hence very essential to protect and maintain the national park in the context of climate change.

Table 2. Goods and services provided by Tram Chim ecosystem

Goods and service to local communities	Goods and service to the Delta
+ Fish + Fuel wood + Grass + Lotus and water lily for foods + Provision of fish to the surrounding	+ Tourism + History and culture + Ground water recharge; + Regulate saline intrusion + Carbon sequestration

+ Micro-climate regulation	+ Scientific (site study) + Biodiversity conservation

3.3.1 Wetlands (national park)

According to Tran (2005)[3], wetland ecosystems at Tram Chim are grouped into three broad types: Melaleuca woodlands, seasonally inundated marshes, and permanently inundated swamps. Melaleuca cajuputi (Myrtaceae) forest is the only type of forest known to exist in the region since reliable scientific records were established. There is, however, evidence of more ancient forests dominated by other species of trees in the Plain of Reeds. Large tree stumps (1.8–2 m in diameter) with shallow spreading root systems were discovered in the buffer zone of Tram Chim National Park and were subsequently identified as a species of the genus Syzygium. At present, all forest stands at Tram Chim are replanted with the native Melaleuca cajuputi.

The seasonally inundated marshes at Tram Chim are the last extensive remnant of once immense freshwater marshes of the Plain of Reeds. The marsh plant communities form a continuum, closely following the gradient of soil surface elevation and water permanence. The Panicum repens (Poaceae) community is located on sand ridges and old-alluvium formations, with inundation time of 1–3 months a year. Oryza rufipogon (Poaceae) and Eleocharis dulcis (Cyperaceae) communities are located on the most depressed areas that may be flooded up to 9–10 months a year. The Ischaemum rugosum (Poaceae) community is located in areas of medium elevation, with average flooding time of 4–5 months a year.

Lotus Nelumbo nucifera (Nelumbonaceae) is abundant in permanently inundated swamps which are located on old riverbeds and shallow streams. Besides Nelumbo nucifera, many other aquatic plants are also found in lotus swamps such as Nymphaea nouchali, Nymphaea tetragona (Nymphaeaceae), Polygonum tomentosum (Polygonaceae), Ludwigia adscendens (Onagraceae), Nymphoides indica (Menyanthaceae), and Hymenachne acutigluma (Poaceae).

[3] Tran T, 2005. An introduction to the biophysical environment and management of wetlands in Tram Chim National Park, Dong Thap Province, Vietnam. J Sci Technol Develop. 2005;8(6):31–9

Figure 5. Key wetland flora communities in Tram Chim National Park[4]

3.3.2 Biodiversity

The avifauna of Tram Chim National Park is both diverse and abundant. To date, 231 bird species have been identified at Tram Chim, of which 15 species are either endangered, threatened, or of special concern: Comb Duck (Sarkidiornis melanotos), Grass Owl (Tyto capensis), Bengal Florican (Houbaropsis bengalensis), Eastern Sarus Crane (Grus antigone sharpii), Greater Spotted Eagle (Aquila clanga), Oriental Darter (Anhinga melanogaster), Black-headed Ibis (Threskiornis melanocephalus), Black-faced Spoonbill (Platalea minor), Painted Stork (Mycteria leucocephala), Asian Openbill Stork (Anastomus oscitans), Lesser Adjutant (Leptoptilos javanicus), Greater Adjutant (Leptoptilos dubius), Black-necked Stork (Ephippiorhynchus asiaticus), Malaysian Plover (Charadrius peronii), and Asian GoldenWeaver (Ploceus hypoxanthus). Some of these birds, however, are infrequent visitors to Tram Chim wetlands or are represented by very few records. Tram Chim frequently hosts large flocks of water birds such as Garganey (Anas querquedula), Common Teal (Anas crecca), and Little Cormorants (Phalacrocorax niger) and a variety of wading birds (e.g., Ardea spp., Egretta spp., Ixobrychus spp.).

Tram Chim National Park is well known in Vietnam for the presence of the Eastern Sarus Crane. The discovery of large flocks of Sarus Cranes in Tram Chim in the mid-1980s generated much excitement in the country and was the main reason for Tram Chim to be gazetted for conservation as a provincial nature reserve and then as a national park. Even though the number of cranes has declined at Tram Chim from the highest two decades ago, Tram Chim National Park is still one of the most important sites for Sarus cranes in the Mekong Delta.

The wetlands of Tram Chim National Park provide important sources of food, spawning grounds, and migration paths for dependent fish stocks, both within and outside the wetlands. Of the 130 fish species identified in Tram Chim, 5 species are globally threatened and 20 species are ranked as high or very high vulnerability according to the FishBase 2004 (an online-data base of fish species worldwide).

3.3.3 Ecosystem services

For people living in the buffer zone, fish from Tram Chim are probably the most desirable resource. Local people also harvest turtles, snakes, birds, Melaleuca for fuel wood, and some aquatic plants such as lotus and water lilies for food. Wetland plants, such as Panicum repens and Eleocharis dulcis, are an important source of mulching material for local vegetable gardeners. Tram Chim recently has become a popular ecotourism destination in Vietnam, serving over 20,000 visitors a year, many of whom are students. The handicraft made from wetland plant materials become important product to diversify livelihood of the local communities.

3.4 Community Profile

The natural area of 5 communes and 1 town adjacent to Tram Chim National Park is 30,730 ha, accounting for 64.8% of the total area of the district. The number of households in these

[4] Nguyen Huu Thien, Hoang Van Thang and Ho Cong Hoa, 2010: Tram Chim Wetland Vulnerability and Climate Change-Initial findings

6 administrative units is 45.9% and the number of people accounts for 45.4% of the total population and the number of people in the district.

In only 10 years from 2005 to 2015, the number of households around the park has added more 2,300 households, corresponding to the population increased 5,273 people (up 12.4%), and increase 878 people per year in average. Population density increased by 17 persons per km^2 in the last 12 years. The fastest growth is Tram Chim town and Phu Duc commune with an increase of 34 people per km^2.

This shows that the pressure is always on the protection and conservation of Melaleuca forests, wetland ecosystems and biodiversity of Tram Chim National Park. The statistics below show an increase in the number of households, population and population density between 2005 and 2015.

3.4.1 Population

Tam Nong district, Dong Thap province has a total population of 175, 926 people (2016), in which more than 115,000 people living around Tram Chim National Park (TCNP). Table 3 shows the population growth for the period 2005-2015 of communes around the park, in which Tram Chim town has a largest number of household as well as population in 2005.

Table 3. Population and population density 2005-2015

No.	Commune/Town	Number of household		Population (Person)		Population density (Person per sq. km)	
		2005	2015	2005	2015	2005	2015
1	Tram Chim town	2.330	2.899	9.865	11.061	801	835
2	Phu Duc	1.403	2.230	6.198	8.409	120	154
3	Tan Cong Sinh	1.109	1.636	4.506	6.330	58	76
4	Phu Thanh B	1.032	1.168	3.901	4.627	76	89
5	Phu Hiep	1.736	2766	7.478	10.212	148	160
6	Phu Tho	2.290	2.738	10.551	10.946	166	172
	Total	**9.900**	**12.271**	**42.499**	**47.772**	**138**	**155**

3.4.2 Livelihoods

Livelihood of local communities around the national park is agriculture-based. Number of households under the poverty line is quite high with more than 20% in average, Tan Cong Sinh in particularly has more than 25% of families living under 44$ per person monthly (Table 4). In the buffer zones, farmlands or agriculture land occupies around 89% of 23,000 hectares, in which most of the area are for rice production. Aquaculture and orchard consist of small portion (less than 2% of total agriculture land). More than 80% families are relied on income from farming activities.

Cultivation on farmland around the national park recently influences by drought and off-season rains which reduce the income of farmers. For example, most of paddy rice field in

Phu Duc commune/village are three –crop annually (3585.3 ha in total area of agriculture land 5207.52ha), which requires precise crop calendar and water irrigation control. However, drought and off-season rains have caused yield reduction of paddy rice and eventually lead to lower income of more than 70,000 persons living in the area.

Table 4. Total population, number of households and poverty rate[5] in 2017

Villages/commune	Population	Household	Poverty (%)	Gender	
				Female	Male
Phu Hiep	10212	2766	23.15	50.1	49.9
Phu Duc	8409	2230	20.68	49.6	50.4
Phu Thanh B	4627	1168	22.72	50.2	49.8
Tan Cong Sinh	6330	1636	26.96	50.3	49.7
Tram Chim	11061	2899	17.55	49.8	50.2
Phu Tho	10946	2738	16.74	50.4	49.6
Total	**51585**	**13437**			

Source: Statistical data from Tam Nong District

3. Climate change threats/risks to the site

Interviewing with local communities and staff of TCNP as well as the recent studied report, it highlights that there are a number of climate related threats in Tram Chim. The finding includes:

1. Temperature increased will lead to increase evaporation and lower water availability in the areas.
2. Flood peaks decreased that ended up in fish reduced and sediment also is reduced significantly in the delta.
3. Longer dry season that leads to prolong drought and end up in a number of consequences including lower crop yield, lack of fresh water, …
4. Unpredictable offseason rain events, normally with high intensities and short events caused localized inundation on field surface that is difficult to drain leading to Eleocharis fails to produce tubers and as a result Sarus cranes do not have enough food supply.
5. Dry season inundation caused by offseason rains. In this case, Eleocharis cannot produce tubers that lead to less Sarus cranes arrived due to lack of food chain.

The climate change problem in Tram Chim can be schematically presented in Figure 6 that also highlights key adaptation strategies.

[5] According to standard of Decision 59/QD-TTg date 19th November 2015 on multi-dimension poverty for 2016-2020. Poor household = monthly income of 1,000,000 VND per capital (around 44$/month/person).

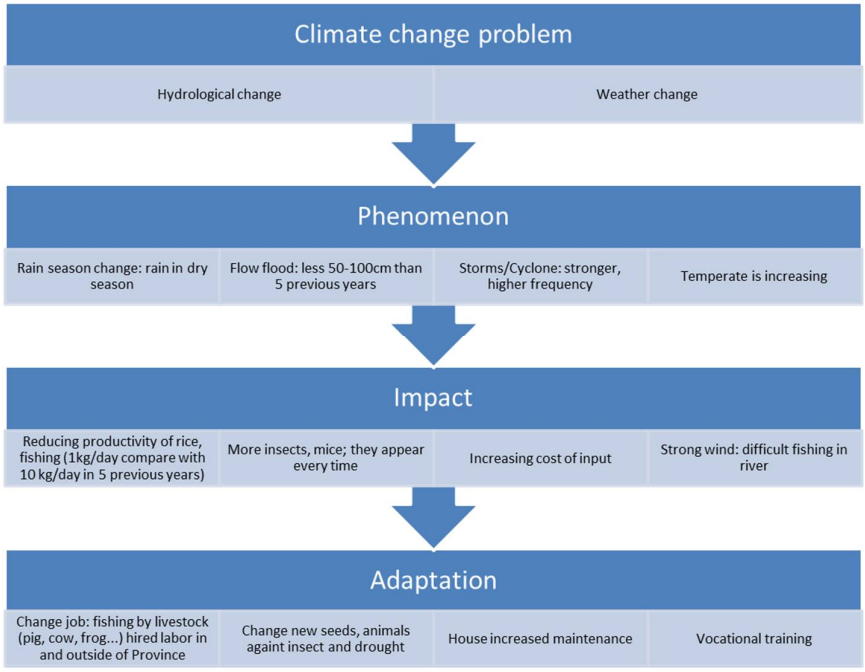

Figure 6. Climate change pathway and adaptation in Tram Chim

Causes and effects of climate change in Mekong Delta include Tram Chim site is presented in Table 5, where only high floods show the positive effects/impact all other threats lead to negative impact. However, increase temperature lead to hotter water surface and stratified water column have impacts on primary production of ecosystem and fish is not clear and need further studies.

Table 5. Causes and effects of climate change in Mekong Delta, Vietnam

IF	**THEN →**	**(+) or (-)**
High floods	More fish eggs and fries enter the system	(+)
	Wash away accumulated organic matters	(+)
Low and late start of floods	Less fish eggs and fries	(-)
	Organic matters accumulated→ depleting D.O	(-)
Longer dry season	Increase evaporation→ risk of fires→ Increase water stocking at end of flood season	(-)
Longer flood season	Advantage for deep-water bird species	(-)
Increase temperature	Increase evaporation → increased risk of fires→ higher stocking at end of food season → not good for Eleocharis	(-)
	Hotter water surface + Stratified water column lead to: - Impact on primary production - Impact on fish	(?)

Increased off-season rains	Localised flooding → no food for Eleocharis	(-)
	Complicated water management scheme	(-)
	Washing acidity down to low areas and canals → fish die-off	(-)

Source: Nguyen Huu Thien, Hoang Van Thang and Ho Cong Hoa, 2010: Tram Chim Wetland Vulnerability and Climate Change-Initial findings

4.1 Existing threats

Recently, Tram Chim National Park (TCNP) and its surrounding areas face threats from a number of climate hazards such as higher temperatures, irregular rainfall patterns, and storms. These hazards lead to drought and flooding that cause loses in biodiversity of the national park and livelihood of nearby communities. Additionally, illegal fishing practices that use dangerous methods like electricity and explosives which can cause forest fires, and human encroachment due to high rate of poverty in the surrounding communes. Beside the pressure from livelihood activities, the part also faces the threats from climate change or the combination of climate change and human induced causes.

4.1.1 Threats by higher temperature and drought

According to Duong Van Ni and Le Anh Tuan (2015)[6], one of the consequences of drought is the forest fire. In only 5 years (2009-2013) there were 24 fires that destroyed a total of 294.13 ha grassland and 133.19 ha Melaleuca forest (Table 6). Of that, A1 and A5 has 9 fires, one of the most severe fires was happen in 2010 in zone A1 and zone A5 in 2009, others has from 1-3 fires. It is notable here that in 2012-2013 there no fires were reported.

Table 6: The frequency of fires and total area destroyed by fired (ha)

Zone	Frequencies	Praries	Melaleuca	Total (ha)
A1	***9***	***270.14***	***130.92***	***401.06***
A2	2	0.00	2.16	2.16
A3	1	1.81	0.00	1.81
A4	3	3.30	0.10	3.40
A5	***9***	***18.88***	***0.00***	***18.89***
Sum	**24**	**294.13**	**133.19**	**427.32**

The water levels of zone A1 and A5, where water levels at A1 were closed to the suggested levels by project and A5 were much lower than the water levels suggested, it is concluded that fire of zone A1 in 2010 was not caused by low water levels, but it is considered as a

[6] Duong Van Ni and Le Anh Tuan, 2015. Review existing water management strategy in Tram Chim National park and develop the new strategy that climate change issues are incorporate

cause of the dead organic matters, which have accumulated due to keeping high water levels during the previous years. Figure 7 highlights the fires in grassland of TCNP.

Figure 7. Fires in the national park (grass field) in 2010

Due to the characteristics of terrain, canals and canals divided into 6 subdivisions (A 1, A 2, A 3, A 4, A 5 and C), making the management, patrol and control meet encounter difficulties, security forces have no means of motorcycle to go patrol. In the dry season, villagers violate the park regularly, most of which use fire so easily burns at any time. Local people have no place to grazing livestock, so the households have taken advantage of the natural grass of the park to release cattle into the park.

4.1.2 Threats by offseason rain

The symbol of biodiversity in Tram Chim national park is Sarus Crane (red-headed Sarus Crane). However, in recent year number of Sarus Crane arrived in TCNP reduced significantly. The set of data was distinguished in two gaps: from 1990 to 2000 it was always more than 200 individuals came back every year, and from 2000 to date that number was always lower than 200! It is remarkable that during a 12 year period (2000 to 2012) there were several alternatives of water management had been implemented, e.g. from 2000 to 2008 water levels were kept high and from 2009 to 2013 it was managed as target water levels developed by MWBP (Table 2), although in 2012 the water levels were kept higher than the suggested water levels. However, it is reported that crane numbers in lower Mekong basin (Cambodia, Lao PDR and Vietnam) was also decreased. Then, to adjust the water levels for different zone of TCNP and characteristics of plant communities are more reasonable to concern than just only crane numbers.

In general, the number of cranes varied from 1990 to date is related to fires. In the years with grassland fires then the number of Sarus crane in the following years was increased. However, the number of cranes to the Mekong delta was always smaller than 200 individuals from 2000 to date was not much related to the water or fires at Tram Chim.

At the beginning of dry season, cranes migrated from Northern part of Cambodia to Takeo province at the border of Cambodia-Vietnam; later on they moved to Kien Luong - Ha Tien and then Tram Chim national park before came back to Cambodia at the end of the dry season. In recent years, it was reported that the number of Crane came to Takeo province

varied between 300-500 individuals. Thus, the number of crane was smaller than 200 from the year 2000 may relate to the land uses changes, mainly from grass lands to the shrimp farming at Kien Luong - Ha Tien areas and off-season rains in feeding areas.

4.1.3 Other threats and challengs

Besides the fire and water issues, invasive alien species is another important threat to Tram Chim. The giant sensitive plant Mimosa pigra (Fabaceae) and the Golden Apple Snail (Pomacea canaliculata) are the two most serious invasive species at Tram Chim. Mimosa pigra once covered more than 3,000 ha of wetlands in Tram Chim. Recent eradication activities have reduced the area of Mimosa pigra infestation. Golden Apple Snails were first detected at Tram Chim during 2000–2002 and quickly became abundant by 2004. An effective invasive species management program needs to be implemented on a permanent basis at Tram Chim in order to keep harmful invasive species under control. Even though there has been good progress in managing resource sharing with local communities, illegal exploitation of wetland resources can still be a major threat to the Tram Chim wetlands.

Located downstream of the Mekong river, Tram Chim National Park is susceptible to changes in the river hydrology and sedimentation caused by upstream development, especially hydropower development. Twelve hydropower dams, proposed to be constructed along the Mekong main channel in Laos and Cambodia, together with the existing and planned dams, in the upper Mekong basin in China, would cause tremendous changes in river hydrology and sedimentation in the delta area (ICEM 2010) and as a result would profoundly affect Tram Chim.

4.2 Predicted future threats

4.2.1. Temperature change projection

SIMCLIM model was used to project temperature change for Dong Thap province up to year 2100 corresponding to the B1, B2 and A1FI scenarios (Table 7). The medium temperature in Dong Thap area tends to increase through the years according to different considered scenarios (Figure 8). In March – May period of the year 2100, the highest temperature on B1, B2 and A1FI scenarios will increase about 1°C, 1.44°C and 2.549°C, respectively. Higher temperature distribution will be in the northwest and descending to the southeast of Dong Thap province. All scenarios results showed the highest temperature will increase in the dry months of province, leading the water shortage and drought situations will be more serious in the future.

Minimum temperature of Dong Thap sub-areas have tended to increase over the periods of years and will increasing following the low, medium and high emission scenarios.The highest minimum temperature have found to increase in 2100 according to the B1, B2, A1FI scenarios as 1.0℃, 1.55°C, 2.63°C, respectively, these projected data will appear primarily in the period of March to May of the yearly dry season. Maximum temperatures are found also as upward trending over the years likely medium and minimum temperatures. The highest maximum temperature will increase in 2100 according to the B1, B2, A1FI scenarios as 0.99°C, 1.3°C, and 2.56°C, respectively.

Table 7: Projecting the medium temperature in Dong Thap through different scenarios (B1, B2, A1FI)

Scenarios	Temperature	2020	2030	2050	2070
B1	Medium	28,025	28,097	28,405	28,499
	Max.	31,74	31,92	32,3	32,68
	Min.	24,30	24,48	24,86	25,52
B2	Medium	28,046	28,117	28,466	29,351
	Max.	31,79	32,01	32,47	32,95
	Min.	24,35	24,57	25,04	25,51
A1FI	Medium	28,033	28,126	29,4	30,313
	Max.	31,77	32,06	32,96	34,06
	Min.	24,33	24,62	25,52	26,62

Source: Dong Thap DONRE, 2011. The action plan to respond to climate change from 20112-2020 of Dong Thap province

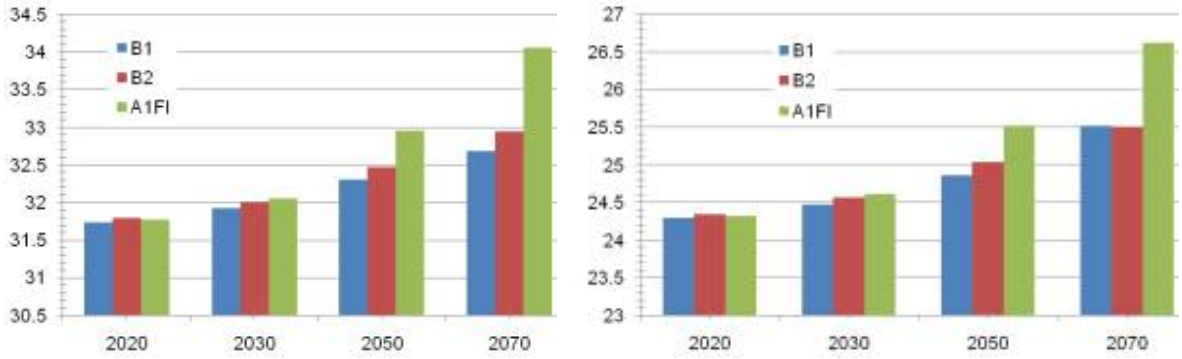

Figure 8. Projecting the maximum temperature (left) and minium temperature (right) in Dong Thap through scenarios

4.2.2 Rainfall change projection

SIMCLIM model was also applied to project rainfall in Dong Thap province up to tear 2100 under B1, B2 and A1FI scenarios, resulting that Dong Thap rainfall distribution will descend towards the northwest of and ascend to the southeast of the Dong Thap province. Under the B1, B2, A1FI scenarios, over the period the average rainfalls of Dong Thap area are tending to increase (Table 8). Average annual rainfall scenarios over the period will be increased, but by each stage of the months of the year, there is an abnormal vary from monthsto months. The seasonal average rainfall in the wet period of July – August and September – November have tended to increase compared to the base data, the highest rainfall percentage will increase 20.2% under A1FI scenario (2100). In contrast, Seasonal average rainfall in the dry period of December – February and March – May will tend to decrease compared to the base periods (1990), rainfall amounts will mostly reduce 17.5% compared with baseline data under A1FI scenario (2100) (Table 8).

Table 8: Average rainfall through different scenarios in Dong Thap province

Scenarios	2020	2030	2050	2070
B1	1483.4	1489.7	1503.3	1516.2
B2	1485.3	1492.8	1509.1	1527.0
A1FI	1484.6	1494.7	1527.6	1561.5

(Source: Dong Thap DONRE, 2011)

Table 9: Change (in %) of seasonal rainfall in Dong Thap through B1 senarios

Month	2020	2030	2040	2050	2060	2070	2080	2090	2100
Dec-Feb	-2.2	-3	-3.8	-4.6	-5.5	-6.2	-6.8	-7.2	-7.5
Mar-May	-1	-1.3	-1.7	-2	-2.4	-2.7	-3	-3.2	-3.3
Jun-Aug	2.6	3.5	4.4	5.4	6.4	7.2	7.9	8.3	8.7
Sep-Nov	1.4	1.8	2.3	2.8	3.3	3.8	4.1	4.4	4.5

(Source: Dong Thap DONRE, 2011)

Table 10: Change (in %) of seasonal rainfall in Dong Thap through B2 senarios

Month	2020	2030	2040	2050	2060	2070	2080	2090	2100
Dec-Feb	-2.5	-3.4	-4.3	-5.4	-6.3	-7.3	-8.3	-9.3	-10.3
Mar-May	-1.1	-1.5	-1.9	-2.4	-2.8	-3.2	-3.7	-4.1	-4.6
Jun-Aug	2.9	4	5	6.2	7.4	8.5	9.7	10.9	12
Sep-Nov	1.5	2.1	2.6	3.2	3.8	4.4	5	5.6	6.2

(Source: Dong Thap DONRE, 2011)

Table 11: Change (in %) of seasonal rainfall in Dong Thap through A1FI senarios

Month	2020	2030	2040	2050	2060	2070	2080	2090	2100
Dec-Feb	-2.4	-3.6	-5.3	-7.4	-9.8	-12.1	-14.2	-16	-17.5
Mar-May	-1.1	-1.6	-2.3	-3.3	-4.3	-5.3	-6.2	-7	-7.7
Jun-Aug	2.8	4.2	6.1	8.6	11.3	14	16.3	18.3	20.2
Sep-Nov	1.4	2.2	3.2	4.5	5.9	7.3	8.6	9.6	10.6

(Source: Dong Thap DONRE, 2011)

Table 12: Change of rainfall in the dry season (November – April) through senarios

Scenario	2020	2030	2040	2050	2060	2070	2080	2090	2100
B1	174,3	198,8	223,2	247,6	272,1	296,5	320,9	345,4	369,8
B2	174,45	198,95	223,35	247,75	272,25	296,65	321,05	345,55	369,95
A1F1	174,56	199,06	223,46	247,86	272,36	296,76	321,16	345,66	370,06

4.2.3 Upstream flood change projection

Flood regime in the Mekong River delta is determined by the regional flow changes that result from climate change's influence in upper parts of the basin, especially the change in annual precipitation. Moreover, sea level rise induced by global warming would also affect the change in flood regime in the delta; in addition to its impacts on salinity intrusion and coastal erosion that has also become major concerns in the delta[7].

Yearly flood flows from the upstream of the Mekong River enter the Tram Chim National Park due to both pathways: the run-off flow and overbank flooding from the Tien River to the eastward of the site and the directly overland flood flowing from Cambodia fields to the southern of the Plain of Reeds and Tram Chim site. Effects of tidal and saline intrusion in the wet seasons to TCNP are not significant. In the dry seasons, sometimes the fluctuations of water levels are clearly recorded in the Mekong Rivers through Dong Thap. The potential water heads in the dry months from the canals of Tan Thanh, Hong Ngu, Dong Tien – Duong Van Duong, Can Lo are always higher than the water levels of fields the Plain of Reeds and Vam Co Tay River. During the past of more 10 years flood peaks measured at Tan Chau and Chau Doc shows the decline trend of flood peaks, except flood peak in 2011 was higher than the normal flood recorded (Figure 9).

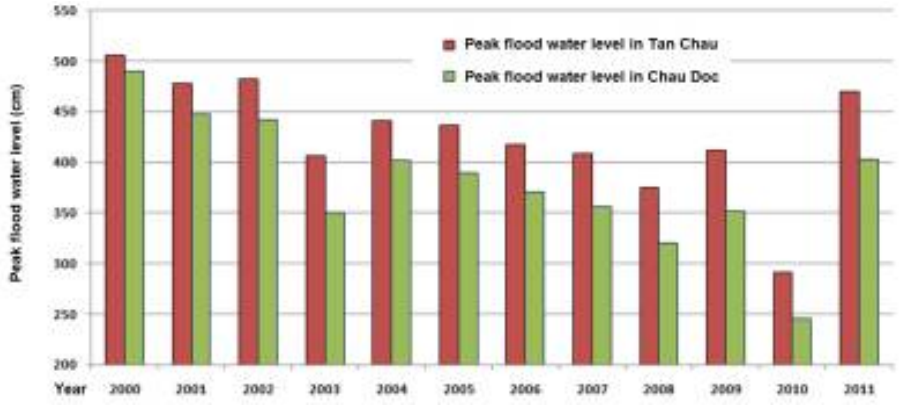

Figure 9: Flooding peaks recorded in Tan Chau and Chau Doc in 2000 - 2011[8]

According the result from 3-D hydrodynamic model provides guideline data to determine future change in flood regime in the Mekong River delta, where boundary of flood tends to expand further. The model simulations show an increasing trend in the annual maximum water depth and flooded area during the average and driest water years. Similarly clear trend is not visible in the wettest water years. This change may have significant impact on both the agriculture and aquaculture[9]. Flood boundary is projected to expand to the southern part of the Mekong River Delta, toward areas in Bac Lieu and Ca Mau peninsula) will cause threat to aquaculture. The inundation periods of flood in the upstream provinces will be

[7] Tuan and Suppakorn, 2011. Climate Change in the Mekong River Delta and Key Concerns on Future Climate Threats

[8] Duong Van Ni and Le Anh Tuan, 2015. *Review existing water management strategy in Tram Chim National park and develop the new strategy that climate change issues are incorporate*

[9] Tuan and Suppakorn, 2011. Climate Change in the Mekong River Delta and Key Concerns on Future Climate Threats

lessen; this flood regime changed will cut short the fish catching periods of the poor people in the An Giang and Dong Thap flooding areas (Figure 10).

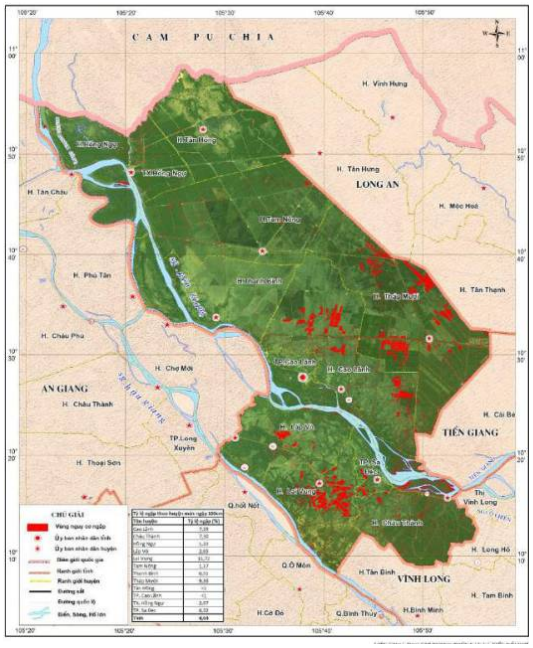

Figure 10. Flooding risk of Dong Thap province if the sea level rise by 100 cm[10]

Coming closely to fields inside the Tram Chim National Parks, it is hardly to project the change of water levels in the future because there are many uncertainty of future change – scenario based study and hydrological factors. The hydropower development projects in the upstream of the Mekong River will also bring more unexpected hydrological changes. However, it is predicted quantitatively that in the future, there will be an annual alternate flood and dry cycle to the site area. The flood intensive and duration will be change dramatically due to the early snow melts in the Tibet mountainous area and more tropical storms from East Sea to the Central and Southern areas of the Mekong Basin. The flood peaks will be reached around Early-to-Mid of October but the inundation duration may be shorted a little bit. Flood water from Tram Chim will release gradually earlier than the normal years, around in the Mid-to-End of November. In the dry season, water level is predicted less. Ground water table in the park may drop more rapidly due the higher evapotranspiration processes and more human aquifer water extraction as a response measure on higher air temperature and drought.

4.2.4 Sea level rise impact projection

Sea level rise from the East Sea may affect to the water levels in Dong Thap province's rivers and canals, especially in the flooding seasons. Applying the 1-dimension hydrodynamic model with the case of flood level in year 2000 and the downtream water level in the East Sea with the assumption of sea raising of 12 cm in 2020, 17 cm in 2030 and 30 cm in 2050, the water levels in Hong Ngu, Cao Lanh and the Plain of Reeds are projected as Figure 16, Figure 17 and Figure 18, repestively (data source: Dong Thap DONRE, 2011).

[10] According to Vietnam's Climate Change and Sea Level Rise Scenarios released in 2016

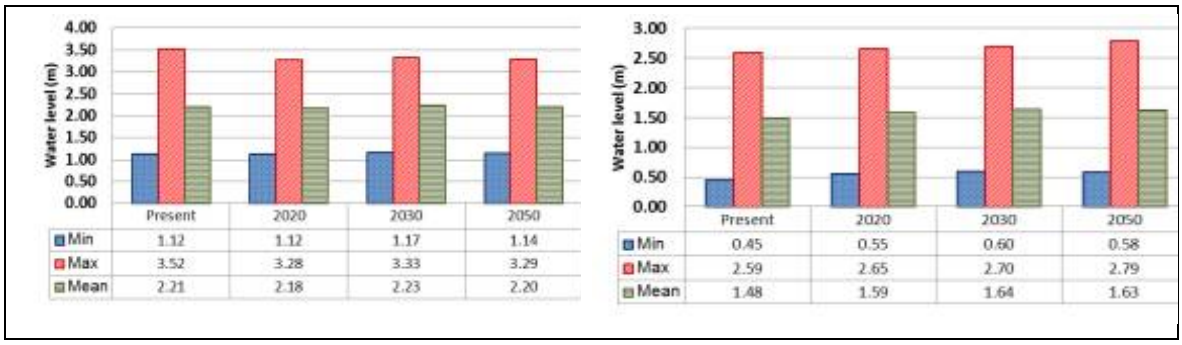

Figure 11. Projected change of water level in Hong Ngu (left) and in Cao Lanh (right)

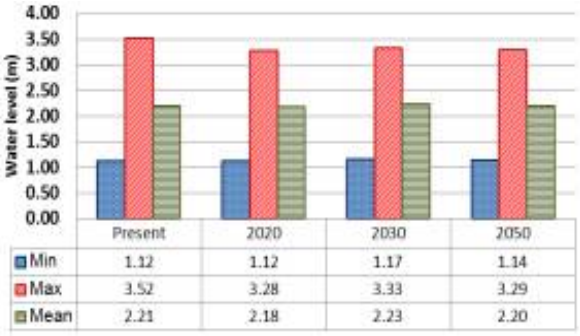

Figure 12: Projected change of water level in the Plain of Reeds[11]

It is found that the maximun water levels in the Planin of Reeds have trended to decrease by 2020, however they will increase a litle bit in year 2030 and 2050 but the peak levels will be still lower than the present record. The mínimum water levels will be change irrigiularly; if compared with the present level, they drop in year 2020, but raising in year 2030 and then, dropping again in year 2050. It may be due to the complexity of the hydrological regime in the area combined with the abnormal flow patterns both up-and-down flows. It also may be a limitation of the model input conditions. Anyway, generally, the change of water levels are hardly to predict in small scales, especially the unpredictable of posible upstream hydropower dams operations.

5. Coping strategies

5.1. Coping strategies for ecosystem

There are a number of adapting options have been recommended. Enhancing resilience to changes, the key is to maintain integrity of the ecosystems through restoring (i) Components (ii) Structure (iii) Processes of the ecosystem. It is very essential to continue implementing current ecosystem management measures promoted by WWF project in 2011 such as (1) Hydrology restoration; (2) Habitat restoration; (3) Alien species control; (4) formulation of Resource Users Groups. Additional measures should also be implemented such as (1) to lower ring dykes to facilitate more intakes of fish eggs and fingerlings from Mekong flood

[11] Refer to an inland wetland in Vietnam' Mekong Delta. Most of the wetlands are within Long An Province and Dong Thap Province

waters; (2) more flexibility in hydrology management→ released excessive water in the dry season caused by off-season rains.

In order to cope with drought and hydrological changes in the park, a number of measures have been induced including increase the connectivity of the canals; improve water drainage system and replanting forest trees. In recent years due to the dry conditions (drought and lower water level in Mekong River) aquatic habitat has degraded and therefore the numbers of fish have declined. The loss of income sources from traditional fishing as such using net and fishing practices, local people used more destructive methods as such electronic devices or explosive compound in order to exploit fish in the park. To protect the park from degradation due to human activities, other alternative livelihood measures have also been introduced to reduce illegal activities in the park and ensure the sustainable management of natural resources, such as Tram Chim National Park (TCNP) allows select impoverished families to enter the park from August - December, which partially overlaps with the Monsoon season (June – November), to fish and collect non-timber forest products (NTFPs). The list of approved resources that were accessible to struggling families include fisheries, grass, vegetables (e.g. water lily and morning glory), dead trees, and invasive species (e.g. mimosa and golden snails) that would improve livelihood of some families and reduce pressure to the biodiversity of the park due to illegal exploitation activities.

In order to cope with lower water level in Mekong Delta, living check dams and better water gates should be built to better regulate the water level in the park. The past, some pilot project to restore hydrology was implemented such as a pilot restoration hydrology to mimic hydrologic rhythm of the plain of reeds through an Integrated Fire & Water Management Strategy (Figure 13), grassland recovered from 800 ha before 2006 to 2400 ha in 2008.

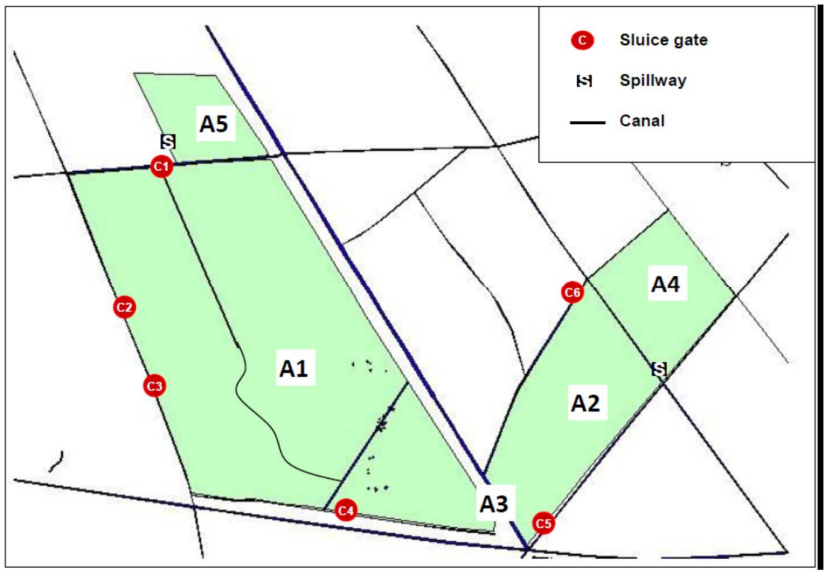

Figure 13. Location of sluice gates built in Tram Chim national park

5.2 Coping strategies for communities

Income losses from farming activities and from harvesting NTFPs from TCNP have been compensated partly by some innovative livelihood options. For example, WWF helped retrain these individuals with other skills by providing 6 alternative livelihoods training

modules below, hired trainers and purchased the tools, seeds and necessary equipment to train local people in one of 6 alternative livelihood modules:

1. Mushroom growing;
2. Tree farming (*Sesbania sesban*);
3. Beekeeping;
4. Gourd, melon tree and bitter melon tree cultivation ;
5. Making handicrafts from locally grown water hyacinth; and
6. Water Lily growing (one kind of leafy vegetable).

These training courses have provided initial skills for local communities living around the national park to have alternative livelihood activities to reduce the pressure to the park and to better coping with climate threats. There are 160 people attended the training courses but the demand are high and new livelihood models should be established in all villages in order to create a sufficient and sustainable supplies to the market.

Ecotourism has been introduced recently to provide other livelihood activities in the region to cope with changes, particularly to better uses of national park advantages. WWF Vietnam with the support from CoCa-CoLa Foundation supported Tram Chim to develop an eco-tourism development plan. The plan has proposed a number of sites, trails and services in the park, in which rowing boat and bird watching towers were also included (Figure 15). Number of tourists come to visit the park has increased dramatically recently, for example, in 2011 only 7,300 visitors, in 2016 there were 183,000 visitors came to Tram Chim (Table 13).

Table 13. Number of visitors and contribution to the local economy[12]

YEAR	NUMBER OF VISITORS	PERCENT INCREASE OVER 2011 BASELINE	CONTRIBUTION TO THE LOCAL ECONOMY (USD)
2011	7,300	-	data not available
2012	15,600	↑114%	data not available
2013	26,000	↑256%	$110,000
2014	61,000	↑736%	$170,000
2015	130,000	↑1,681%	$223,000
2016	183,000	↑2,407%	$236,000
2017*	130,803*	↑1,791%*	$364,000*

[12] WWF, 2018. Final project report on *Ecotourism Development and Sustainable Use of Tram Chim Wetlands for the Community and Biodiversity*

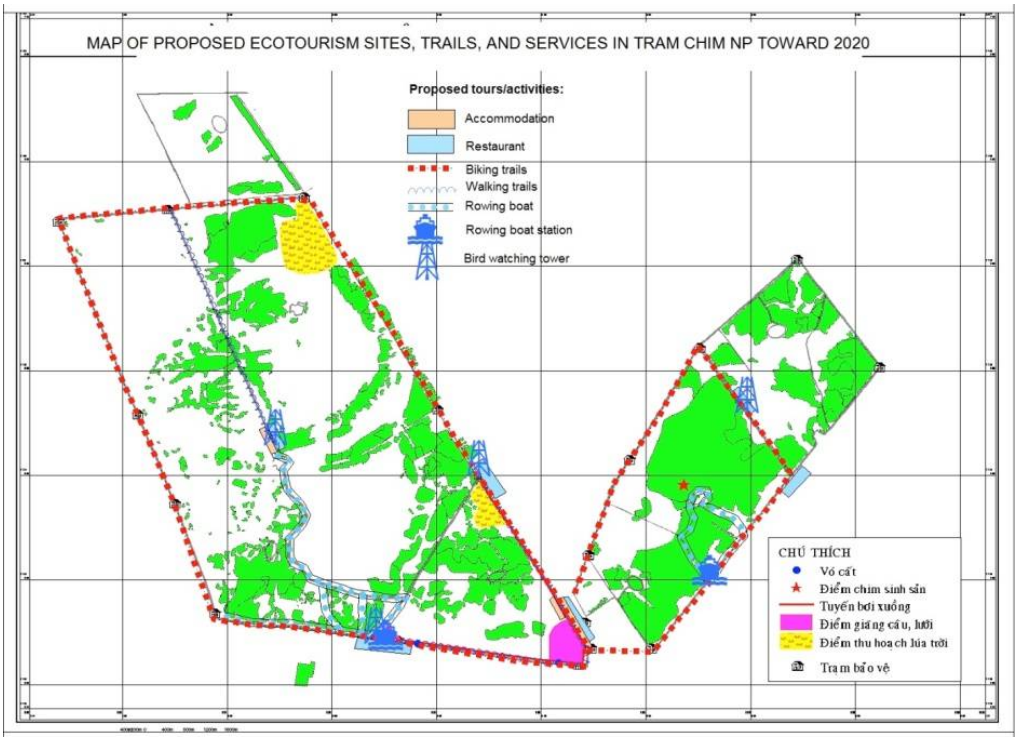

Figure 14. Map of proposed ecotourism sites, trails and services in Tram Chim national park by 2020

In addition, pilot Resource Users Groups (RUGs) also established which shows increased income and less poaching, for example in 63 cases in 2009 to 6 cases in 2016. It means that RUG helps to reduce conflicts between the park and local communities.

6. Interventions

6.1 Tram Chim National Park

EbA intervention	Extent of intervention	Estimated cost (USD)[13]
Elimination and re-control of invasive species inside to park to increase the function of the ecosystem or Habitat restoration through removal of invasive species in all park zones (A1-A5)	Target is to remove *Mimosa pudica* in 300 hectares of total 600 hectares occupied by *Mimosa pudica* in the park in order to improve the development of local vegetable species → Increase the landscape	The total cost is USD 500 x /hax300 hectares = **USD 150,000**
Restore Melaleuca forest ecosystem naturally (200 hectares)	Survey, design and reforestation to increase function of the forest in regulating services. The restoration will be on A2 zones	Each hectares of restoration will cost about 1000 USD. The total cost

[13] The exchange rate: 1 USD is equivalent to VND 22,700

	of the national park.	is 1000$ x 200 ha =***USD 200,000***
Restore 200 ha of *Oryza rufipogo*n in the park to improve landscapes and to provide foods for birds as well as to conserve the biodiversity (indigenous genes).	Survey, design and reforestation to increase function of grass/wild rice covers in regulating ecosystem services (providing foods for birds, biodiversity conservations)	The total cost is USD 500 x /hax 200 hectares = **USD 100,000**
Restoration of 500 hectares of *Eleocharis ochrostachys Steud* in A1	Increase indigenous species to improve biodiversity and provides foods for birds as well as to reduce water evaporation	Each hectares of restoration will cost about 200 USD. The total cost is: **500 ha x 200 USD = 100,000 USD**
Restoration of *Eleocharis ochrostachys Steud* in zones A1, A4 and A5 of the park	70 hectares of *Eleocharis ochrostachys Steud* will provide food for Sarus Crane and	Each hectares of restoration will cost about 200 USD: **70 ha x 200 = 14,00 USD**
Restoration of other indigenous plants/grasses in 3 zones (A1, A2, A4 and A5).	Restore 70 hectares of *Eleocharis dulcis* A1; 70 hectares of *Leersia hercandra. SW* in A2; 20 hectares of *Xyris indica L;* 50 hectares of *Eleocharis dulcis* in A4 and 5 hectares of *Utricularia punctata Wall* in A5 to improve development of indigenous species in order to provide better food chains for fauna communities, particularly birds	225 hectares of indigenous grassland **x 200 USD = 45,000 USD**
Setting up the water monitoring system to support water management in the park in order to increase the ecosystem services of the region	The monitoring system install in 4 zones include A1, A2, A3 and A4 to monitor water quality and quantity in park in order to better regulate the water level.	Each zone installs one system which cost about 7,000 USD/each. The total cost is **4 x7,000 =28,000 USD**
Provide fish eggs and fingerlings to increase fish communities in the park	Focus on core protected zone and other zones that allow fish catching activities (A4) in order to increase eco-tourism	5,000 USD per year x 3 year = **15,000 USD**

Develop a climate action plan CAP) for the park and buffer zone	30,700 ha and 47,000 people benefited	**30,000 USD**
Total estimated cost		**USD 682,000**

In the park, A4 and A5 have been planned to be ecological restoration areas, meanwhile the largest zone A1 will be the core protected areas. Phu Tho and Phu Thanh B communes are communities located close by the core protected zone (Figure 15). In order to promote ecological restoration area in A1 and A5, it requires carefully planning and a comprehensive intervention in hydrological and biological aspects. The role of local communities in restoration process should be taken into account as the future benefits of the restored areas will be shared by the communities in the regions.

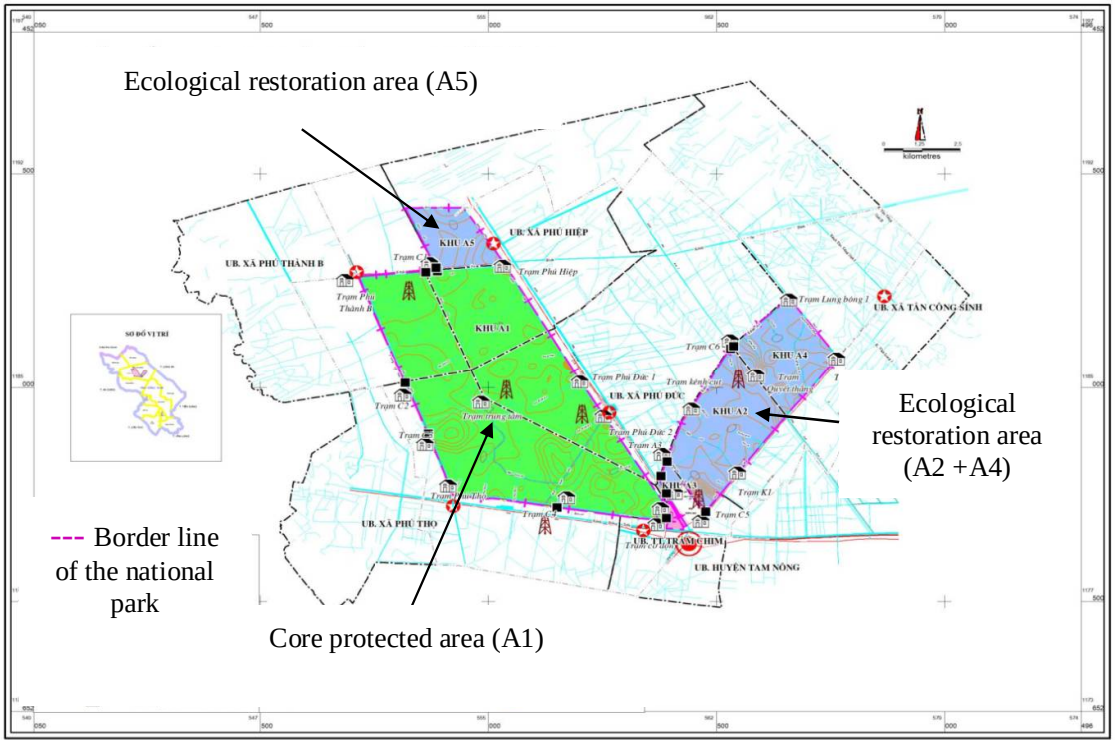

Figure 15. The project site and the national park

6.2 Community or buffer zones (6 villages/communes)

It is essential to support local communities living around the national park to cope with climate threats and other challenges. Located in flat areas with canals interconnected and depends on the water level in the park. In order to increase climate resilience of communities around the national park, a number of interventions are proposed by on consultation with local leaders and communities (Table 14).

Table 14. Interventions of communities in Tram Chim

Interventions	**Beneficiaries**	**Estimated costs (USD)[14]**

[14] The exchange rate of May 2018, is 01 USD= 22,740 VND

Introduce smart agriculture practices, particularly rice + fish + lotus cultivation rotating model/system	12 models (2 models for each village) = 12 groups of farmers	2,000 USD per model: 12 x 2,000 = **24,000USD**
Establish trial models for drought- resistance crops (For example, paddy rice) to cope with drought	3 families in each village in the project area are directly benefited from the intervention but thousands of farmers are also indirectly benefited.	Each trial model receives 1,000USD. Total cost 3 x5x 1,000USD = **15,000 USD**
Promote mushroom cultivation to cope with off-season rains	60 families (10 households in each villages)	Each family needs support of 500 USD from the project. Total: 60 x 500USD = **30,000 USD**
Establish organic home gardening which apply available mulching materials from the wetland to increase water availability cope with droughts as well with off-seasonal rains (Expanding the model initiated by WWF)	20 families in each village in the project areas	Each garden receives 500USD supports, total cost will be: **20 x5 x 500 = 50,000 USD**
Develop handicraft village/groups to cope with climate threats and better utilisation of non-time forest products (water hyacinth or Eichhornia crassipes[15]; lotus or Nelumbo nucifera).	6 handicraft villages/groups with established with at least 10 members	Each groups needs support of 8,000 USD in 3 year. 6 x 8,000 = **48,000 USD**
Develop a co-management plan to use services of ecosystem provided by TCNP contributing sustainable uses of ecosystem services of the park.	6 villages/communes around the park	The management plan will be developed after a study: Total cost for the development process and first year operation will be: **50,000 USD**

[15] Currently available inside the national park as well as in the surrounding villages. Some people concern on the sustainable use of this source of raw materials for handicraft may harm to the environment. However, it is a fact that many products have been made from water hyacinth or Eichhornia crassipes in Tram Chim

Improve connectivity of Phu Hiep and Phu Hiep – Phu Duc canals	4,000 households in Phu Duc and Phu Hiep communes	20 km x 2,000 USD = **40,000**
Improve connectivity of Phu Thanh 1,2,3 and Phu Thanh B- Phu Hiep canals	3,500 households in Phu Tho and Phu Thanh B communes	20 km x 2,000 USD = **40,000**
Integrated pest and disease management for farming crops in 6 villages/communes	9000 household in 6 villages in the project areas	50 training course x 1.500 USD = **75,000 USD**
Establish natural resource user groups in Phu Thanh B + Phu Tho communes + Tram Chim town; and Phu Hiep+ Phu Duc communes (set up regulation, operation protocols, monitoring and evaluation,..)	- Fishing group - Bee keeping group - Handicraft group - Ecotourism group	4 groups, each group needs supports of 10,000 USD. **Total cost will be 40,000 USD**
Total		**402,000 USD**

Total cost for ecosystem and community adaptation will be: **USD 682,000 + USD 402,000 = USD 1,084,000**

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3. Validation Workshop

Highlights from the WS:

Participants from different line Ministry, NGO attended the validation workshop. They highly appreciated the project proposal, particularly the projects objectives and contents. However, the project need to be revised a bit to be better and more appropriate to local context. The key comments from the participants are summarized as following:

- The tasks (in the component 1.2) are still vague and need to be more specific to the local context.

- Currently, the project must not overlook the shock/short-term impacts from Climate Change. These also create recognizable damage and loss to the people. Thus, resilience from short term and long term impacts should be included.

- The proposal should differentiate the roles of ecosystem in the Park and human ecosystem and their relationship. (i.e. What does the Park provide? What do the people receive from the Park? How would such services from the Park be affected by Climate Change? What kind of livelihoods depend/could be benefited from the Park services, what kind of mechanism or mandates should be provided for people to harvest the park resources)?

- For the interventions in the Park: proposal should include/integrate the targets in the development plan or strategies of the Park; need to elaborate more details on each intervention (why doing that and how to do that). Other than drought, threats such as alum contamination and salt intrusion could impact the ecosystem in and off the Park; should using the park infrastructure to for education and raising awareness for people; should identify the way for regulating the water in the park to preserve the ecosystem/wetland characteristics in the Park and benefit the livelihood of the people off the Park.

-For intervention outside the Parks: currently, the proposal focuses too much on rice cultivation while strategies for agriculture in Vietnam are going to reduce the area of rice cultivation and replace rice cultivation by other agricultural activities such as aquaculture or other crops; should identify the market potential for products from each livelihood provided to communities.

- Tourism service could be a good option that the Park provides to the communities. However, the proposal need to identify specific tourism models that could be applied in the area which could benefit people in Tram Chim Neighbourhood and still can preserve the Park well.

More details of the comments could be found as bellowing:

Mr. Hung delivers an opening remark

Ms. Moon, Mr. Anh and Mr. Linh deliver presentation of the project

Mr Trinh (From MARD):

- An EBA project would normally follow these 5 steps: status assessment, inventory, risk assessment, vulnerability assessment, and solution. However, the Climate Change impact assessment here is rather limited, with lack of objects under impact. Also, flash flood does not happen in this region.
- Salinity intrusion and drought should be closely discussed; especially, the first is more severe in Mekong Delta.
- Production activities in the Tram Chim National Park area is very varied; however, aquaculture is not mentioned in the report. Also, rice production is on a changing trend in term of varieties, models.
- Agroforestry model is not able to apply in this region (rather be in coastal area)
- What is the scientific basis of the solutions provided in the full proposal?
- You have mentioned the rice's resilience to drought. What about resilience to alum and salinity?
- It is crucial to assess the adaptation capacity of different ecosystems. Ecosystems capable of adapting Climate change impacts shall be chosen for extension.
- Possibility of other solutions: exploitation quotas from the Park for residents? Fire prevention?
- Off season rains is to impact trees and ecosystems. Example: Farmers in Ben Tre has to skip 1 plantation session to avoid off season rains. Thus, it is necessary to develop a new planting plan under the new context (climate change)

Mr Chiêm:

- Should discern/clarify the roles of ecosystem in the Park and human ecosystem surrounding the Park. What does the Park provide? What do the people receive from the Park? How would such services from the Park be affected by Climate Change?
- How do the sand excavation activity affect the ecosystem in the Park

- Lack of alluvial due to the lack of floodwater. This needs assessment.
- Need a plan to control alien invasive species
- The embankment of the National Parks is right in the sense of forest management, yet problematic in the sense of water resource management; as this makes the Park run the risk of losing its wetland characteristics.
- Eleocharis grass is an essential part of the National Park, without it, the crane will not come to the Park.
- It is important to resolve the conflicts between in-Park and off-Park communities.
- Different models should be tested for expansion. Local creatures should be used. The Park shall be the testing ground for ecosystem improvement.
- The Park's education and training centers should focus on building capacities, engaging communities.
- The Park's infrastructure should be used for raising awareness.
- The relation/connection between the communities and the local government should be improved in implementing and upscaling the interventions.

Mr Võ Thanh Sơn (from National University) :

- The project design phase lack the description of Climate Change impact in terms of space and time.
- Identify which livelihood depends on which ecosystem service and how would they be changing through time: tourism, fisheries, etc
- Project implementation should be adherent to the regional development plans; furthermore, intervention should be following natural dynamics.
- The roles of stakeholders: the people and the Park authorities: The Park authority shall maintain and improve its current and future ecosystem service; while the people shall not harm the ecosystem service, giving part of their profit to contribute to ecosystem conservation.
- Lack of logical frame (DPSIR framework is advised) for Climate Change impact assessment.

Mr Vĩnh:

- It is remembered that in this situation, there are two ecosystems: the natural one (in Park) and the artificial one (off Park) Mekong Delta water resource is under strong influence of the external source. Thus it is necessary to be aware of salinity intrusion and alkaline soil. The relation between soil, climate and ecosystem should be noted for comprehensive solution.

- What is the criteria for selecting livelihood models around the National Park, the efficiency and competition capacity of the models should be calculated to avoid failure?
- Plantation distribution and process calculation should be well-noted for feasible solutions.

Mr Việt (WWF)

- In an EBA project, it is necessary to assess vulnerabilities, ecosystem relation, climate future and local socio-eco developments.
- This area has frequent change of flood regime, however, embankment tends to affect water quality. WWF once proposed spillway construction to keep the water and receive flood water to replenish for ecosystem. However, the cost and the process to construct the spillway were too complicated, so we couldn't make it.
- Illegal exploitation of the resources in the Park is common in the area; the authority then allow the people to exploit several items under the quota of 100 ton/year. However, the actual exploitation capacity is 4 ton/year at best.
- Burning eleocharis grass is common in the ancient time. It is also a way to facilitate the grass development; consequently, cranes will visit more often. 3 months is the duration for full recovery. Mangrove burning at the rear will cause no recognizable damage.
- In-Park water should be discharged every year to provide water for people living surrounding the Park and nutrition for ecosystems.
- Before making the plan (section 1.2.2) it is important to have a specific assessment report on the vulnerability and the relation between different livelihoods. In the National Park, tourism is at high demand. Therefore, should develop new tourism models or could create other tourist sites to reduce the tension in the Park's central area and support people income.
- In-park and off-park impacts should be carefully assessed.
- Dong Thap people once take saltwater for shrimp cultivation; therefore, salinity intrusion risk to ground water, alien creature, water pollution risk are present
- 3rd rice season is removed, moving toward rotation of crop/cultivation.
- Recovery of eleocharis grass (mentioned in the proposal) should be prioritised over mangrove recovery as mangrove has low ecosystem value; while eleocharis grass could be the inhabitant of crane.

Ms. Tĩnh:

- Lack of approach to ecosystem, no relation to Mekong Delta and Mekong River Basin. Relation between ecosystems should be clear.

- Identify the loss and damage, time duration caused by change of rainfall regime. How is the people's livelihood affected?
- Engage community and make use of local knowledge and experience.
- What is the impact of Mekong river flow?
- Key issue of eleocharis grass management: water and fire management. What is the water regime? Volume and impact? High water level prevents the crane from finding eleocharis grass.
- Good mechanism to harmonize between people's profit and ecosystems development => sustainable development.
- Solutions for project expansion?
- The area's resilience to tourist activities should be assessed to prevent overload.

Mr Cảnh:

- We could divide into 3 categories of ecosystems: natural, agricultural, and artificial. Each category will have its corresponding solutions (section 1.2.1 and 1.2.3) The current rice cultivation area of Vietnam is 3.8 million hectar; however, with the current context – rice having higher productivity and climate change impacts, should that figure be reduced?
- How could mangrove recovery be done (natural way or planting)? Is it according to the forestry law? However, eleocharis grass has a fast recovery pace, what is the plan for the grass recovery? (Detailed plan is required.)
- As the national park has no mediation ground, how would the National Park boundary be precisely identified?
- Alien plants like Mimosa pudica and Eichhornia crassipes are dangerous plants that may harm ecosystems.
- Is it necessary to build a training center for this project? Instead, should training courses be organized in local schools to save project budget.

Mr Thịnh:

There are 3 main issues of Mekong Delta:

Climate change: drought, flood, rising temperature, off-season rains

- Flood is dependent on the upstream area, hydrological plant discharge.
- The area is currently lack of flood, even in the event of flood, the alluvial in the floodwater is not enough to desalinize the water and replenish alluvial resource.
- Impacts on people's livelihood.

Upstream development:

- Construct many dikes in different river streams
- Water movement in upstream area reduce the total water volume, contact with the Mekong commission office for more data.
- Structure transformation in rice cultivation?

Adaptation with the development of upstream nations

Mr Lanh (ISPONRE):

Be more specific in the intervention and solutions. Ex: What kind of crop combination? What kind of crop rotation? How many people are involved? How much money do the people receive to support their livelihood? It is better if a number of specific model are provided, then one is chosen for each sector.

Mr Linh and Mr TA give response:

Highly appreciate the comments and will try their best to improve the quality of the report.

Mr Michael:

- In agreement with the comments on alien invasive species, careful supervision and the benefit conflicts. Thus it is important to support activities with mutual benefits such as eco-tourism, homestay. Currently, the project must not overlook the shock/short-term impacts from Climate Change. These also create recognizable damage and loss to the people. Thus, resilience from short term and long term impacts should be included.
- Regarding the sedimentation in the floodwater, it is very difficult to cure this situation – thus, nutrition should be given by hand. Seawater intrusion is even worse; leaving groundwater to run the risk of salinization. Additionally, some farming management could be adopted.
- MONRE intended to invest on natural solutions for Climate Change adaptation, in this case, being wet land. Wet land has many benefits such as decontamination (heavy metal) Many countries around the world have their artificial wet land area to decontaminate the water, reducing water treatment cost. In the case of Vietnam, water for agricultural use will benefit from this.

Mr Chiem:

We also have to be promote the relation between:

- Land management and forest management/ Parks authority and MARD/ MONRE and MARD.
- Education center should be built for the long-term objective of raising people's awareness.

- Beware of the aquaculture polluting the water resource.

Ms Moon:

Thanks everyone for the comments. Notice that there are differences between Vietnam and Thailand in the project implementation.

Mr Hung gives closing remark.

Gender Assessment

Introduction

This Gender Assessment is prepared as an input to inform the design and implementation of the project titled "Mekong EbA South: Enhancing Climate Resilience in the Greater Mekong Sub-region through Ecosystem-based Adaptation (EbA) in the Context of South-South Cooperation". With a budget of US$7 million and duration of four years financed by the Adaptation Fund (AF), the project identifies adaptation interventions to address the vulnerabilities faced by the inhabitants of the Greater Mekong sub-region (GMS) due to the interacting effects of climate change and ecosystem degradation.

Given the objective of strengthened awareness and action of governments and communities in the GMS to climate change through ecosystems-based adaptation (EbA), and three expected outcomes (towards: managing climate change impacts; establishing regional cooperation, planning and implementation of EbA solutions in the GMS; and strengthening resilience opportunities), the proposed project holds the potential to strategically contribute to the gender baseline in Vietnam and Thailand. The following avenues for gender mainstreaming can be ensured through the project's results framework and implementation priorities –

1. promoting gender-responsive climate-resilient development and adaptive actions;
2. delivering gender-sensitive policy inputs for climate change adaptation actions and information systems, particularly at the regional level;
3. establishing a gender-aware approach towards dialogue, cooperation and decentralised climate intervention (planning, funding, implementing and monitoring) in the region; and,
4. providing a gender mainstreaming framework for both improving the capacities of climate-vulnerable sectors and gearing medium- and long-term climate risk management strategies towards environmental and social co-beneficial outcomes.

Rationale

The effects of a changing climate and environmental stressors present multiple dynamics for both men and women: including on livelihoods, health, migration, adaptation capacity, participation, and decision-making. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) notes that impacts on these aspects differ according to disproportions experienced among population groups – particularly deriving from gender and socioeconomic relations.

In the context of the project, existing empirical studies of the Mekong sub-region consistently show that women tend to lack access to and control over resources, productive assests and income – leading to gender needs and constraints undermined or unaccounted for in adaptation decision-making. The study of these existing gender relations will be fundamental to capture and effectively address cross-cultural variations in gender-specific needs and constraints through EbA. Since the Mekong Delta has been identified as a climate risk hotspot with expected losses around 30% of rural GDP[1] in the lower region, a gender mainstreaming perspective becomes imperative.

To elucidate, employing such an intervention framework will highlight and help amend persistent inequalities and unequal access through the project outcomes and prevent the perpetuation of specific and entrenched vulnerabilities – a set of general characteristics that impair the ability of a social group to cope with external shocks, to respond effectively to them, and to adapt to a situation of climate change or environmental stressors or disasters.[2]

This project adopts an intervention framework with a complementary or alternative approach to

[1]Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.

[2] Deutsches Institute für Entwicklungspolitik (d.i.e.). 2009. "Climate Change Adaptation from a Gender Perspective". Discussion Paper.

traditional hard infrastructural flood and drought risk reduction measures (for example: dykes that can cause harmful side effects on communities depending directly on natural resources), namely ecosystem-based adaptation or EbA.[3] EbA is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change[4.] EbA can be a cost-effective alternative strategy to traditional climate change adaptation methods, which is accessible to and inclusive of vulnerable groups such as women. Consequently, EbA is a promising means of strengthening the role of women in climate change adaptation. Moreover, EbA can –

1. support the integration and maintenance of traditional knowledge and cultural values into adaptation; and,
2. generate multiple social, economic and cultural co-benefits for local communities.[5]

However, there is limited knowledge and existing reserach available on how to design and implement gender-responsive EbA measures.

Understanding gender relations in Thailand and Vietnam, in the context of EbA, thus will require the unpacking of the complex and overlapping social, economic and cultural roles in the two countries. Such roles have kaleidoscopic facets, reflecting the –

1. geopolitical and geographical specificities of these countries (such as: being located on the southeast Asian monsoon belt; exposure to floods, typhoons and other disasters; dependence on the agro-economy);
2. traditional norms of Thai and Vietnamese societies and cultures (such as: gendered division of care work within the household; gendered access to resources and capital); and,
3. gendered phenomena in economic opportunities and political capital, which determine access to and allocation of resources (such as: improving socioeconomic conditions for women in these two countries, though political representation in devolved decision-making bodies have stalled[6]).

Without the consideration of the above aspects and –

1. stereotypical views of climate change being gender-neutral and having a pan-population effect[7];
2. lack of incorporation of gender needs or ethnic vulnerabilities in adaptation opportunities, resilience capacities and mitigation services[8]; and,
3. lack of financial means, gender budgeting and dedicated resources towards mainstreaming gender action,

the project may not reach the full potential of adaptive actions. Benefits of increased support and capacity building, as well as awareness raising, may accrue to better-off households or more mainstream groups, that are able to capitalise on new opportunities and respond better to changes ushered in by the project. On the other hand, it is also important to recognize the role

[3] ISPONRE. 2013. Operational framework for ecosystem-based adaptation to climate change for Viet Nam. A Policy Supporting Document. Hanoi.

[4] Source: https://www.cbd.int/.

[5] CBD Secretariat. 2009. Connecting Biodiversity and Climate Change Mitigation and Adaptation. Report on the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. CBD Technical Series No. 41.

[6] Choy N. 2019. "Women's political pathways in Southeast Asia" in *International Feminist Journal of Politics* (Vol. 2, Issue 2). Journal Article.
Available at: https://www.tandfonline.com/doi/full/10.1080/14616742.2018.1523683

[7] Current literature on climate change, and its effects and emergent risks, are predominantly produced in scientific circles. Yet, there is increasing evidence that adopting social science methods, and situating resilience and adaptation practice within a broader science-policy interface and right-based perspectives, can gear projects towards environmental and socioeconomic co-benefits. Particularly, this could better prepare communities to avoid resource strife and respond to the complexity of social arrangements, reducing far-reaching impacts of climate risks. See Butterfield, R. 2018. 'Bringing rights into resilience: revealing complexities of climate risks and social conflict' in *Disasters.* Journal Article.

[8] Poor or missing gender analysis, or the lack of gender-responsive action, may lead to planners or personnel depending on women to assume a central role in their coping strategies, which may not be the practical reality for many vulnerable communities. Further, this also glosses over the existing burdens on women (time poverty, for example) among such groups. See Nelson. V., Meadows. K., Cannon, T., Morton, J., & Martin, A. 2002. 'Uncertain predictions, invisible impacts and the need to mainstream gender in climate change adaptations' in *Gender and Development.* (Vol. 10, No. 2). Journal Article.

marginalized and vulnerable groups can play, and not simply stylise them *a priori* as 'victims', – they are often able to contribute traditional and artisanal knowledge of coping and improvising strategies, which can either be strengthened and mainstreamed as well as used as a basis for further capacity development.

Thus, a gender-responsive intervention framework is both necessary and relevant for the project to maximise its outcomes, particularly creating accessible capacities for tackling climate change impacts that cannot be avoided, and establishing institutional structures as well as broad-based political and socioeconomic coalitions to mobilise medium- and long-term EbA and resilience action.

Methodology

This Gender Assessment has *three* major building blocks –

1. A comprehensive desk-review of existing literature was conducted on gender, EbA, climate change adaptation and resilience processes. Literature was drawn from: organizational gender mainstreaming strategy documents (as defined by the AF and UN Environment – see following section); research reports from international organizations or platforms (United Nations Development Programme – UNDP, Poverty Environment Initiative – PEI etc.); multilateral development banks (the World Bank and the Asian Development Bank – ADB); journals (*Gender and Development, Ecology and Society* etc.); and grey literature (government reports and policies). The literature review revealed useful data and research, which were informed by varied methodologies and perspectives. Thus, a derivative baseline (Gender and EbA Baseline in Thailand and Vietnam) from these readings was inferred to identify the gender barriers and dynamics in Thailand and Vietnam, and the potential entry points for this project.
2. The next section (Gender Priorities for the Design and Implementation of the Mekong EbA South Project) presents gender-responsive elements to be incorporated within project outcomes to reduce climate vulnerability, particularly of at-risk households and ethnic minority groups; gender considerations and actions for stakeholders; and, presents normative information to gear the overall proposal towards better socioeconomic, gender and environmental co-benefits.
3. Subsequently, the policy environment in Thailand and Vietnam is explored, and presents a potential list of gender collaborators, relevant for project activities and stakeholder consultations during project implementation.

Gender Focus at the Adaptation Fund and UN Environment

Gender mainstreaming and promoting women's empowerment, by delivering environmental results, have been prioritised by both the Adaptation Fund (AF) and UN Environment.

Having approved its principles-based Gender Policy and its accompanying Gender Action Plan in March 2016, the Fund ensures that projects and programmes provide women and men with an equal opportunity to build resilience, address their differentiated vulnerabilities and increase their capability to adapt to climate change impacts.[9] Further, the Fund stipulates the interrelated and mutually reinforcing mandates of the Gender Policy and the Environmental and Social Policy, ensuring gender equality and women's empowerment considerations are mainstreamed in project/programme planning and design through risk and impact analysis. Futher, it expands the performance monitoring and reporting requirements of accredited agencies towards the inclusion gender-specific results, allowing for tangible evaluation of a project/programme's gender mainstreaming efforts.[10]

[9] Adaptation Fund (AF). 2017. *Guidance document for Implementing Entities on compliance with the Adaptation Fund Gender Policy.* Policy Document.
[10] Adaptation Fund (AF). 2019. *Further compliance with the Environmental and Social Policy and the Gender Policy of the Fund: Update of the Project/Programme Performance Report and guidance for unidentified sub-projects.* Policy Document.

UN Environment recognizes the role of gender equality as a 'driver of sustainable environmental development'[11], to not only assuage the stresses on natural resources, impending climate risks and adopting adaptive and mitigating actions, but as well to increase the visibility and capacity of vulnerable and social groups in sustainable development and climate resilient policy- and decision-making. To that end, the organization has sought to formalise and bolster agency-wide gender mainstreaming efforts through its *Gender Equality and the Environment*[12] policy, *Global Gender and Environment Outlook*[13] research study, and inclusion of gender-responsive elements in preceding and upcoming projects, undertaken in conjunction with the AF.

Thus, in keeping with the policies and prerogatives of both the AF and UN Environment, the imperative of this Gender Assessment is the inclusion of more gender-responsive elements throughout this project. Alongside, the development of a dedicated Gender Action Plan in the preparation stage (with clear timelines, responsible parties, indicators and budgetary allocations to be defined in the implementation phase) based on the Assessment, will ensure that the project generates gender-equitable and accessible benefits, promotes greater gender equality, and the empowerment of vulnerable gender demographics in context-specific locales.

Gender Baseline and EbA in Thailand and Vietnam

Thailand

Thailand has made significant strides in closing gender gaps in certain sectors: primary school enrolment rates show gender parity; women outnumber men in secondary and tertiary education; maternal mortality ratio has steadily declined from 110 to 48 per 100,000 live births (2005 to 2010).[14] However, certain sectors (especially climate-vulnerable ones) have either stalled or not experienced equivalent progress rates: female participation in the labor market (65.5% as compared to 80.7% for men) and their representation in public decision-making and governance structures remain lower than men; vertical segregation in the market tends to concentrate women in low-paid, low-skilled jobs or in agricultural production; gender-based violence (GBV) remains high and underreported due to societal norms.[15] Thus, impacts of climate change, particularly increased intensity and frequency of floods and droughts, will have a dual effect on this baseline: hard-earned advances in closing the gender gap are likely to be undermined while existing inequities could be reinforced.

A study of climate change-related vulnerability, impacts and adaptation in Thailand[16] (Chiang Mai and Chiang Rai) shows that although men and women play significant but varied roles in agricultural production: control over water resources, for example, differ greatly. This generates livelihood-related challenges as well as water insecurity, and increases in women's unpaid workload or time poverty (defined as the long work hours and limited or none leisure time arising from labour-, time- and energy-intensive tasks, which create opportunity cost for productive or remunerative activities) for household water procurement. Climate change impacts, such as floods and droughts, exacerbates this situation by worsening water access and availability, and burdening existing levels of gendered time poverty.
Another study among Thai fishing communities[17] further corroborates how having gender differences in roles affected perceptions of climate-related risks among men and women. To

[11] UN Environment. 2015. *Gender Equality and the Environment: Policy and Strategy.* Policy Document.
[12] *Ibid.*
[13] UN Environment. 2016. *Global Gender and Environment Outlook.* Policy Report.
[14] Asian Development Bank (ADB). 2013. Gender Assessment for the *Country Partnership Strategy (2013 – 2016)*. Report.
[15] *Ibid.*
[16] Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.
[17] Lebel, P., Whanchai, N., Chitmanat, C., Promya, P., & Lebel, L. 2015. "Perceptions of climate-related risks and awareness of climate change of fish cage farmers in northern Thailand" in *Risk Management* (Vol. 17, No. 1). Journal Article.

elucidate, since women performed tasks such as feeding and taking care of the fish population, whereas men were more invested in physical activities (such as installing cages or harvesting cropes), the former showed greater levels of concern with climate impacts. Women also tended to classify risks as serious concerns (requiring risk management), as opposed to male counterparts who identified them as 'acceptable' risks (requires no action).

Thus, these studies reveals that the perceptions of climate change impacts, and concomitantly the ability to harness adaptation options varies across society, communities and population groups – particularly in the case of EbA, which is interlinked with access to ecosystem services, resources and agency.

Vietnam

Similar to Thailand, observable and empirical changes in Vietnam's gender baseline includes positive trends: labor force participation rate stands at 83% for women as compared to 85% for men, high and near equal adult literacy rates, as well as robust political representation; and, the following gaps: ethnic minorities, especially women, have lagged behind, occuptional streaming especially for women in less skilled positions with scarce decision-making power, and gendered division of care and unpaid work (expected to increase with the rise of number of dependents in the household).[18] These gender equalities indicate and relate to the different ways in which climate change, particularly climate-induced and natural disasters (floods and droughts), can affect Vietnamese men and women differently.

A UN Vietnam policy brief[19], for example, finds that 64% of rural women and 53% of rural men are engaged in crop production and are highly vulnerable to loss from drought and uncertain precipitation. Climate change, in this scenario, adds to water insecurity: particularly increasing the workload (atop the burden of unpaid care work) of rural women involved in small scale farming, as they need to spend more time and effort on land preparation, fetching water, watering, and protecting crops from disease. Further, women and men experience threats on their ecosystems from floods and typhoons differently – especially since the former (in rural areas) are agriculture- and natural resource-dependent, in the absence of out-migration opportunities (mostly availed by men). The destruction and damage caused by typhoons and floods specifically impacts their livelihoods and compounds the vulnerability and marginalization they face.

Access to resources, assets and benefits (from ecosystem services) determine the capability of different population groups to incorporate EbA-based solutions and climate change adaptation practices.[20] In central Vietnam, for example, the integration of EbA into and strengthening the role of women in flood risk management is currently being explored under two projects of the Global Resilience Partnership Water Window (GRP).[21]
The planned activities include the joint implementation EbA with women's groups and local authorities, capacity building for women, a holistic valuation of the multiple benefits of EbA measures and research on the impact of floods on the well-being of women, both in an urban and coastal environment. An important barrier for a systematic shift towards a more inclusive approach to climate change adaptation comprising EbA-measures is the lack of awareness and evidence of their cost-effectiveness and benefits. The multi-faceted economic, social and cultural benefits of EbA measures are difficult to determine through traditional cost-benefit analyses. This often results in the reluctance to implement EbA[22]. The two GRP seed projects are attempting to overcome this barrier by providing evidenced-based support on the holistic

[18] Asian Development Bank (ADB). 2006. *Country Gender Assessment: Vietnam*. Gender Report.
[19] United Nations Vietnam (UN Vietnam). N.D. *Gender and climate change impacts in Vietnam*. Desk Review.
[20] Ethan Yang, Y. C., Passarelli, S., Lovell, R. J. & Ringler, C. 2018. "Gendered perspectives of ecosystems service: a systematic review" in *Ecosystem Services* (Vol. 31). Journal Article.
[21] Global Resilience Partnership (GRP). 2017. Website: http://www.globalresiliencepartnership.org/news/2017/03/15/Water-Window-Challenge-Winners-Announced.
[22] ISPONRE. 2013. Operational framework for ecosystem-based adaptation to climate change for Viet Nam. A Policy Supporting Document. Hanoi.

value of EbA at the local level.

Gender Priorities for the Design and Implementation of the Mekong EbA South Project

Reviewing existing empirical and qualitative studies on Thailand and Vietnam, as the above examples show, demonstrates the complexity and protracted nature of socioeconomic challenges and gender disparities in the two countries. To enhance the landscape being painted, this section adopt a mixed methods approach to analyse the existing (secondary) data and information related to EbA and gender issues in the two countries. This approach will be informed by a concurrent triangulation design: quantitative and qualitative data has been compiled from secondary sources in tandem, and used to confirm, corroborate and cross-validate findings. Thus, this section borrows from United Nations Development Programme (UNDP)'s Human Development Index (HDI), Gender Inequality Index (GII) and Gender Development Index (GDI). Additionally, it makes references to the Global Gender Gap Index (GGGI) (World Economic Forum), and national-level poverty statistics (conducted by the World Bank or national institutions such as the National Statistical Office of Thailand and General Statistics Office of Vietnam). These indices have differing methodologies, and are being employed, as indicative (and *not* conclusive) measures of current levels of development, gender equality, and poverty and labour force participation.

TABLE 1
National Aggregate Statistics and Indices

INDEX METHODOLOGY	RANK	
	THAILAND	VIETNAM
HUMAN DEVELOPMENT INDEX (HDI)		
This index measures and combines three basic dimensions of human development (long and healthy life, knowledge and decent standard of living) and provides an overall socioeconomic landscape of a country. In line with Booysen's argument, however, the HDI should be treated as indicative, not conclusive. It provides an overview of relative degree of development in a particular country but remains a 'synthetic indicator'. Recent research has shown the need to supplement the HDI with other indicators associated with economic and social cohesion, sound development strategies, and sustainability in growth models.[23]	(out of 188 countries – United Nations Development Programme – UNDP, 2017)	
	83rd[24]	116th[25]
GENDER INEQUALITY INDEX (GII)		
This index, showing inequality in achievement between men and women in three aspects (reproductive health, empowerment and labour market), provides a useful gender baseline in terms of health equity, economic capital and financial	(out of 159 countries – United Nations Development Programme – UNDP, 2016)	
	93rd[27]	67th[28]

[23] Bilbao-Ubillos, J. 2011. "The Limits of *Human Development Index"* in *Sustainable Development,* (Vol. 21 No. 6). Journal Article.
[24] UNDP. 2017.
[25] *Ibid.*
[27] UNDP. 2017.
[28] UNDP. 2017.

access, speaking to the gender opportunities of men and women in the countries. It provides a primary understanding of the different levels of achievements on basic development indicators between men and women. This displays useful features towards the gender status quo hypotheses, which could then be derived in the context of this project. GII should be treated as indicative, since Pernmayer finds that the functional form of the index could be unclear, particularly the inclusion of indicators of relative performance of women vis-à-vis men, along with absolute women-specific indicators.[26]		
GENDER DEVELOPMENT INDEX (GDI) & GLOBAL GENDER GAP INDEX (GGGI)		
The GDI (UNDP) index shows the ratio of female to male HDI values. GDI expresses values in deviation, hence, in order to facilitate understanding GDI grouped categories have been used (as grouped by UNDP) to show the absolute deviation from gender parity in HDI values. This further reiterates the results of the HDI and GII (also by UNDP), and shows the real gender gap in human development achievements. The GGI (WEF) benchmarks 144 countries on their progress towards gender parity on four thematic dimensions – economic participation and opportunity, educational attainment, health and survival, and political empowerment. The Index benchmarks national gender gaps on economic, political, education- and health-based criteria, and provides country rankings that allow for effective comparisons across regions and income groups, over time. Since the GDI and GGI use different methodologies, and are conducted by different agencies, this report does not suggest a	GDI (grouped in 5 sections, Group 1 signifies high equality, Group 5 signifies low equality)	GGGI (out of 144 countries – World Economic Forum – WEF, 2018)
	Group 1[30] (high equality in HDI achievements)	Group 1[31] (high equality in HDI achievements)

[26] Pernmayer, I. 2013. "A Critical Assessment of UNDP's Gender Inequality Index" in *Feminist Economics* (Vol. 19 No. 2). Journal Article.
[30] UNDP. 2017.
[31] *Ibid.*

causality between the two indices. However, a correlation is undeniable, and both indices pick up similar rates of gender disparity in the Lao PDR. Geske Dijkstra and Hanmer find that although gender-related development indices have increased attention towards 'feminization of poverty and underdevelopment', more robust data needs and indicators are required to create aggregate indices that are sensitive to contemporary trends in gendered privation, particularly with the categorization of 'women'.[29]	Group 1[32] (high equality in HDI achievements)	Group 1[33] (high equality in HDI achievements)
MULTIDIMENSIONAL POVERTY INDEX (MPI)		
Calculated by the Oxford Poverty and Human Development Institute (OPHI), and UNDP, the global Multidimensional Poverty Index (MPI), measures acute poverty in developing countries. It complements traditional income-based poverty measures by capturing the severe deprivations with regard to different indicators: education, health, and living standards. The index not only identifies those living in multidimensional poverty, but the extent (or intensity) of their poverty. The MPI can help the effective allocation of resources by making possible the targeting of those with the greatest intensity of poverty; it can help address some SDGs strategically and monitor impacts of policy intervention.[34] Persistence increasing intensity of poverty reflects a tendency to heighten natural resource dependency for the rural poor, in turn exacerbating vulnerability towards climate-induced changes to resource bases.[35]	7.2% of the population vulnerable to multidimensional poverty	5.6% of the population vulnerable to multidimensional poverty

As Booysen's research[36] shows, composite indices present both challenges and advantages. It should be noted that numerous fallacies have been identified in the methodologies employed in composite indexing. These indices are mainly quantitative, and present empirical and aggregate measures of complex development phenomena, making values apparently objective, at the cost of subjective nuances. Yet, these also remain invaluable as useful supplements to income-based development indicators, understanding relative degrees of development across different regions, simplifying complex measurement constructs as well as providing access to non-technical audiences. To enhance the national-level information presented by Table 1, Table 2 forays into sectoral issues (and specific/related data) and attempts to draw indicative conclusions regarding EbA and gender for the design and implementation of this project.

[29] Geske Dijkstra, A. & Hanmer, L. C. 2002. "Measuring Socio-Economic Gender Inequality: Towards an Alternative to the UNDP Gender Index" in *Feminist Economics,* (Vol. 6, No. 2). Journal Article.
[32] *Ibid.*
[33] *Ibid.*
[34] See UNDP's Technical Notes (2018) for more.
[35] Lee, D., Neves, B., et al. "Rural Poverty and Natural Resources: Improving Access and Sustainable Management" *ESA Working Paper 09-03* for FAO. (2009)
[36] Booysen, F. 2002. "An Overview and Evaluation of Composite Indices of Development" in *Social Indicators Research* (Vol. 59 No. 2). Journal Article.

TABLE 2
EBA AND SECTORAL ISSUES

ISSUE	CURRENT BASELINE		RELEVANCE TO EBA & PROJECT OBJECTIVES
	THAILAND	VIETNAM	
Panel data analysis of Thai and Vietnamese rural households[37] reveal heterogeneity in poverty dynamics: *de facto* female-headed households (FHHs) tend to be consumpion richer, though more vulnerable to poverty exposure (due to the lack of *ex-ante* and *ex-post* adaptation strategies) than male-headed households (MHHs); *de jure* FHHs (in Vietnam) are consumption poorer than MHHs, while in Thailand the data does not show statistically significant	The Climate Vulnerability Assessment conducted by UN Environment and the Ministry of Natural Resources and Environment (Thailand) in Young River Basin shows that household-based automonous adaptation is not uncommon. However, such practices are primarily the preserve of households with integrated farming systems of mixed crops and raising animals – households with farm areas <10 *rai* were exposed to greater exposure impacts and income shocks from climate-related risks. Juxtaposing this finding with the following from the Plan International report – increase in FHHs due to male urban migration results in women being increasingly responsible for paid labour, unpaid household labour, as well as unpaid male village labour – shows us that climate change adaptation and ecosystems-based	The Climate Vulnerability Assessment conducted by UN Environment and the Ministry of Natural Resources and Environment (Vietnam) in Tram Chim National Park shows that more households (20% more than the national average) tend to be below poverty line. Panel data analysis reveals that Vietnamese *de jure* FHHs are consumption poorer than MHHs, and *de factor* FHHs.[38] The former difference is due to both widow- and single-headed households whereas the latter is mainly driven by single-headed households.[39] Descriptive analyses of bivariate relationships from a gender perspective by a World Bank Vietnam Household Living Standard Survey Report[40] shows that the gender difference in the overall poverty rate is small, large disparities exist by region, ethnicity, and age. Men and women in rural areas, for example, are five times more likely than their urban counterparts to live in	Introducing heterogeneity in household-level data indicates the differences in intra-household distribution in access, consumption, income and other entitlements; relative dependence and dynamics among members; and problematises conclusions drawn unitary model of household behaviour.[43] For EbA and broader climate change adaptation, adopting this approach is important to capture the different facets and levels of vulnerabilities, as well as the burdens faced by the population groups to overcome them. EbA opportunities and solutions, in a multidimensional

[37] Klasen, S., Lechtenfeld, T., & Povel, F. 2018. "What about women? Female Headship, Poverty, and Vulnerability in Thailand and Vietnam". Courant Research Centre: Poverty, Equity and Growth in Developing and Transitioning Countries, University of Göttingen. Discussion Paper (No. 76).
[38] *Ibid.*
[39] *Ibid.*
[40] The World Bank. 2006. A Gender Analysis of the Vietnam Household Living Standard Survey. Gender Report.
[43] Boudet, A. M. M., Buitrago, P., Leroy de la Briere, B., Newhouse, D., Matulevich, E. R., Scott, K., & Suarez-Becerra, P. 2018. "Gender Differences in Poverty and Household Composition through the Life-cycle". The World Bank (Poverty & Equity Global Practice/Gender Global Theme). Policy Research Working Paper (No. 8360).

differences.	solutions can become dependent on the present levels of access, resources and entitlements of different households.	poverty (20% vs. 4%).[41] More than half of ethnic minorities still live in poverty, compared with only one out of ten Kinh/Chinese majority.[42]	scenario, can be dispensed effectively only with an in-depth knowledge of intra-household dynamics, access and resources.
Many empirical studies indicate greater agency and intra-household decision-making rights in recent times among Thai and Vietnamese households – however this may not reflect economic empowerment – women are increasingly burdened by time poverty due to domestic and economic commitments. Accrued time poverty, due to such social and livelihood dynamics, is often a hindrance in incorporating autonomous or technical ecosystems-based adaptation solutions.	Shifting roles and responsibilities within the households of vulnerable Thai communities, as evinced particularly from studies of out-male migration, has not necessarily increased decision-making powers or resource access for women. In fact, this tends to compound pre-existing vulnerabilities for women by placing greater time burdens, as women must continue to fulfil their previous roles and compensate for lost male labour. For example, young women engaged in farming invariably handle work roles together with (rather than instead of) their more traditional roles of childcare and household maintenance.[44] Some women bring babies or young children to work and carrying them on their backs in lieu of childcare support, which increases the physical burden of manual work for women.[45] Women	Combining surveying and micro-simulation techniques, a World Bank report[46] finds that: high population growth, low productivity growth for unskilled agriculture workers, a relatively high share of jobs in agriculture (more than 33%) and low redistribution levels (less than 12% of GDP) are poverty-related factors that will the determine outcome of climate change impacts on households by 2030. Juxtaposing this finding with the conclusion from Klasen et al. (2018) study that: Vietnamese *de-jure* FHHs tend to be consumption poorer, more prone to lose assets during shocks or extreme scenarios, and have scarce access to viable coping strategies; it can be concluded that climate change will compound (especially when EbA alternative strategies are lacking) pre-existing vulnerabilities of certain households in the country. Women also tend to experience greater levels of high dependency burdens and economic immobility caused by traditional norms of care	For the project's overall objectives and component, being cognizant of exisiting time-use patterns and resultant time poverty among women and men is crucial. This will help in designing interventions and activities that work harmoniously with current status quo, particularly eliminating the risk of burdening the beneficiaries further. Buy-in and incorporation of EbA measures among communities, especially across cross-culturally variegated households, can only be ensured when these are dispensed according to the existing capacities, assets and vulnerabilities among the communities.

[41] *Ibid.*
[42] The World Bank. 2006. A Gender Analysis of the Vietnam Household Living Standard Survey. Gender Report.
[44]Plan International, Stockholm Environment Institute (SEI) & Sustainable Mekong Research Network (SUMERNET). 2018. *Climate Change, Young Women and Girls: Vulnerability, Impacts and Adaptation in northern Thailand.* Report.
[45] *Ibid.*
[46] The World Bank. 2016. "Modeling the Impacts of Climate Change on Future Vietnamese Household".

	continue to also be the ones primarily responsible for household-related duties in homes that might inhabited by extended family members, young children, parents-in-law or elderly people, further increasing time poverty.	and domestic work, particularly as FHHs, leading to a compromised position when technical adaptation strategies may be introduced in their vicinity.	
Climate-vulnerable sectors, particularly agriculture, are affected by extreme weather events and climate change impacts, in turn creating an aftermath for income, food and water security, etc. Women, particularly poor women, are actively engaged in and dependent upon agricultural incomes (such as: paddy cultivation,) in the Mekong region – leading to magnification of ecosystem risks[47]	Agricultural livelihoods, in Thailand, are increasingly threatened by climate impacts (such as: intensification and elongation of the dry season, erratic rain patterns). This is occuring in tandem with an increased amount of out-migration from rural areas, wherein younger women are left in charge of agricultural labour (and income), leading to earmarked exposure to climate-related risks. Lack of occupational multiplicity and livelihood diversity, low-input and labour-intensive agricultural practices, as well as existing domestic care work set these women back in access to knowledge and information, financial services, market and adaptation opportunities.	Rural and urban poor Vietnamese households are agriculture-dependent for income generation, and also spend a higher proportion of their income on food. Labour force participation rates show that women are primarily involed in agriculture or related activities, leading to greater exposure which requires urgent streamlined and targeted adaptation activities for these stakeholders. Women are also usually responsible for providing the family with basic nutrition, yet they rarely have access to and control over the resources required to fulfill this task when cultivation conditions deteriorate. Decreasing availability of clean water, decreasing agricultural production, decreasing access to crop residues and biomass for energy, and increasing risk of famine are all areas where women are primarily at risk of experiencing severe negative impacts.	There are significant limitations placed on the adaptive capacity of communities by their connectedness to complex and uncertain environmental, economic, and socio-political systems at macroscales.[48] EbA solutions offered in this context have to prioritise and target the communities, as well as the social groups and demographic trends within them, with entrenched vulnerabilities. This can be achieved through coordination with local governance, and streamlining project activities.

(Environment and Natural Resources Global Practice Group). Policy Research Working Paper (No. 7766).

[47] Lien, T. T. K. & Brown, K. 2018. “Perspectives from a Participatory Vulnerability Assessment in Mountainous Rural Vietnam” in *Handbook of Climate Change Resilience.* Deutsche Gesellsschaft für Internationale Zusammenarbeit (GiZ), GmBH, Ha Noi, Viet Nam.

[48] Bennett, N. J., Dearden, P., Murray, G., & Kafdak, A. 2014. “The capacity to adapt? Communities in a changing climate, environment, and economy on the northern Andaman coast of Thailand” in *Ecology and Society* (Vol. 19; No. 2).

Policy Environment, Legal Framework and Gender Bodies

The SIGI Index, calculated by the Organization for Economic Cooperation and Development (OECD), charts the health and strength of formal and informal laws, and access to rights, justice and empowerment opportunities for women and girls by combining qualitative and quantitative variables to understand how a woman's life could be determined by discriminatory social and legal institutions. It classifies Thailand and Vietnam as 'medium' (35%) and 'low' (20%) respectively, where Higher values indicating higher inequality are calculated with allocated scored for each type of inequality. This section explores these features more extensively:

Legal framework

Thailand ratified the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) in 1985, as well as its Optional Protocol in 2000. In addition, the country endorsed the Beijing Platform for Action (BPFA) and has made considerable efforts to integrate international gender principles and instruments into its policy and programming framework. This is evident in the country's Protection of Victims of Domestic Violence Act B.E. 2550 (2007), which includes anti sex discrimination and gender equality provisions. This act provides for protection and rehabilitation of victims, requiring members of the public to report alleged abuse, and obliging law enforcement officers to respond to reports of violence. Furthermore, the country's penal codes and sex discrimination laws have largely been revised.[49,50]
Thailand's constitution guarantees equality between men and women and prohibits discrimination on multiple grounds, including on the basis of sex (Article 30 of the Constitution of the Kingdom of Thailand). Based on this, legislative amendments have been made to enhance the rights of women. In 2005, the Name Act was amended to allow women the right to choose a family name. The Penal Code was amended in 2007 to criminalise marital rape, and the Civil Code amended to provide women and men with equal grounds for divorce. The Prevention and Suppression of Human Trafficking Act was passed in 2008.
Thailand has also developed and is currently implementing The Memorandum of Understanding on the Campaign and Promotion of Women's Participation in Local Politics and the Protection of Women's Rights, recognising that the participation of women in decision-making, especially at the political level, is crucial for generating political will for the promotion of gender equality.[51]

Vietnam is committed to gender equality and women's empowerment, as reflected in the Law on Gender Equality, 2006, which guarantees equal rights to women and requires gender strategies at the ministerial level. In 2007, parliament passed the Domestic Violence Prevention law and subsequently launched a public awareness-raising campaign targeting men. This was followed in 2011 by the adoption of the National Program on Gender Equality (2011–2015). Other relevant legislation to protect the rights of women includes the Anti-Human Trafficking Law, which was passed in 2011. Vietnam's penal code provides the legal framework for prosecuting crimes of rape, including marital rape under the Domestic Violence Law.[52]

Gender Bodies

The Office of Women's Affairs and Family Development (OWAFD; established in 2002), Ministry of Social Development and Human Security, is the national body responsible for promoting gender equality and the empowerment of women. It serves as the secretariat of the National Inter-ministerial Committee on Policy and Strategy for the Improvement of the Status of Women, chaired by the Prime Minister. The office is responsible for the development of

[49] UN Women. 2018. Asia Pacific countries: Thailand. Source: http://asiapacific.unwomen.org/en/countries/thailand
[50] Asian Development Bank (ADB). 2013. Gender Assessment for the *Country Partnership Strategy (2013 – 2016)*. Report.
[51] UNESCAP. Source: http://www.unescapsdd.org/files/documents/Beijing15_questionnaire_Thailand.pdf
[52] Asian Development Bank (ADB). 2012. Gender Assessment for the *Country Partnership Strategy (2012 – 2015)*. Report.

policies and measures aimed at enhancing women's social security, as well as setting up mechanisms for promoting coordination between relevant government departments. It is also responsible for the implementation of the National Women's Development Plan, which is revised every five years.[53,54] Within each of Thailand's 131 government departments and agencies, a chief gender equality officer and gender focal point are responsible for providing and coordinating gender mainstreaming support.[55]

The Gender Equality Department was established under the Ministry of Labour, Invalids and Social Affairs to implement Vietnam's Gender Equality Law. Vietnam's Women's Union (VWU), a mass organisation, includes a vast network of members from the national to the sub-national level, with branches in every province and commune. The VWU implements an array of programmes in a range of sectors, including those related to health, education, credit, and training, to support women's development. Women have to become members of the VWU to receive support, with special attention given to the poor. The VWU is an effective vehicle for the enhancement of gender equality, but uneven capacity among VWU officials constrains effectiveness, particularly in ethnic minority areas.[56]

Gender and Environment

Through capacity building on links between gender and biodiversity, provided by UN Environment, the Governments of Thailand and Vietnam have developed specific actions to mainstream gender into the implementation of their National Biodiversity Strategy and Action Plans (NBSAP).[57] For example, Thailand[58] and Vietnam's'[59] NBSAPs include gender-related measures such as raising awareness on the importance and roles of women in conservation and the sustainable utilisation of biodiversity. These are aligned with Aichi Biodiversity Target 14[60]: "Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable".

Gender and Climate Change

The participation of women and gender equality are included in Thailand's Climate Change Master Plan (2015–2050), as well as its 12th National Economic and Social Development Plan (2017–2021). Despite these legislative provisions, action related to the integration of gender equality into climate change adaptation activities remains limited. However, it is expected that gender equality, and the participation of women will be mainstreamed further in the activities of Thailand's National Adaptation Planning process.

The importance of gender equality within the context of climate change is acknowledged in Vietnam's: National Target Program to Respond to Climate Change (NTP-RCC; 2008); National Strategy on Climate Change (2011–2020); and, National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2007). These policies are considered to be an important basis for mainstreaming gender equality into climate change adaptation, although

[53] Source: http://asiapacific.unwomen.org/en/countries/thailand
[54] Asian Development Bank (ADB). 2013. Gender Assessment for the *Country Partnership Strategy (2013 – 2016)*. Report.
[55] *Ibid.*
[56] Asian Development Bank (ADB). 2012. Gender Assessment for the *Country Partnership Strategy (2012 – 2015)*. Report.
[57] UN Envrionment Asia Pacific. "Promoting Gender Quality and Environment". Official UN Environment website. Source: https://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/promoting-gender-quality-and-environment
[58] Office of Natural Resources and Environmental Policy and Planning, MoNRE. Master Plan for Integrated Biodiversity Management B.E. 2558–2564 (2015–2021).
[59] MoNRE. Vietnam National Biodiversity Strategy to 2020, Vision to 2030.
[60] Convention on Biological Diversity (CBD)ic. Under Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services. Source: https://www.cbd.int/sp/targets/

related actions are currently limited in scope.[61] Policy and programme planning, budgeting, implementation and monitoring procedures should allow for the integration of gender equality and women's empowerment principles into climate change adaptation across all levels and sectors in Vietnam. A multi-stakeholder approach involving gender expertise, both genders, ethnic minority groups, as well as representatives from government, civil society, the private sector and the broader development community.[62]

Conclusion

A gender-sensitive, inclusive and participatory approach to EbA is at minimum low-cost and no-regret, with the potential to contribute considerably to gender equality, social inclusion and community buy-in. As gender equality gains precedence in the work of the Adaptation Fund and UN Environment amongst others, the proactive gender approach of the proposed project, if implemented effectively, has the potential to become a good practice to shed light to other climate resilience projects in Thailand, Vietnam and the rest of the Greater Mekong Sub-region, as well as globally. UN Environment is committed to working closely with DWR-MoNRE (Thailand) and DLA-MoNRE (Vietnam), and to provide any support needed to implement the gender actions.

[61] Ray-Ross, S. 2012. USAID/Vietnam Gender Analysis.
[62] *Ibid.*