The study of Strategic Environmental Assessment and the Water Resource Management Master Plan in the

Northeastern Mekong Basin Project

Executive Summary Report

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1. Background

The Northeastern Mekong River Basin consists of 10 provinces, which are Loei, Nong Bua Lamphu, Nong Khai, Udon Thani, Bueng Kan, Sakon Nakhon, Nakhon Phanom, Mukdahan, Amnat Charoen and Ubon Ratchathani. The total areas are 47,165.08 square kilometers (29.48 million rai) which are divided into 36 sub-basins. The general geography in this region is dominated by the Plateau, a gently rolling area of low hills and shallow lakes drained almost entirety by the Mekong River. The topography is sloped from the south to the north andall rivers and their tributaries flowing into the Mekong River, which is an international natural waterway. Most of the rivers in the Mekong River Basin are less than 50 kilometers long with steep slopes that causing highly eroded.

Most of the land use characteristics are agricultural areas which has irrigation system with a total of 15.6 million rai. It was found that an area size of approximately 1.4 million rai is agricultural drought-prone areas cause of 203 villages at high risk and 175 villages at moderate risk of drinking water scarcity, and Loei estury and Songkhram River Basin area affected by flood in 2014 (B.E.2557). In addition, areas of 3 provinces, which consist of Nakhon Phanom, Nong Khai and Mukdahan that have been declared as special economic zone.

According to the problems of the area, it is necessary to accelerate and prepare the effective water management plan for managing the whole water system, manage water for future cities as it becomes more difficult to develop tools for water management, link water management information with neighboring countries, etc. Therefore, the Office of National Water Resources as the central authority to formulate the water management plans and policies, deemed it advisable to conduct a strategic environmental assessment study in the Northeastern Mekong River Basin in order to ensure that the watershed development is consistent with the environment without any impact or causing impact at an acceptable level and in accordance with the 20-year Water Resources Management Master Plan (2018-2037) together with the preparation of the Water Resources Management Master Plan, prioritization of future development projects, prevention of flood and mitigation of drought to be a framework for water management of the Northeast Mekong River Basin for all relevant agencies to be used to reduce redundancy of plans and establish a framework for water resource management for maximum benefits.

2. Objective of the study

1) To study and prepare a Strategic Environmental Assessment report of the Northeastern Mekong River Basin.
2) To review and analyze water resource development operations in the area for the preparation of the 20-year Northeastern Mekong River Basin Management Master Plan (2018-2037), evaluate the implementation of the master plan during 2018-2020 and prepare the action plan of water resource management of Northeastern Mekong River Basin (2023-2027).

3. Location and topography

3.1 Location, territory and topography

Royal Decree "Determining the Watershed, B.E. 2021", announced to the Government Gazette, Volume 138, Part 12 Kor, dated on February 11, 2021, has determined that there are 22 main watersheds in Thailand. The Northeastern Mekong River Basin (watershed code 03)

has a watershed area size of 47,165.08 square kilometers (approximately 29.48 million rai), located between the coordinates of UTM 47N at 1700000N to 2030000N and 700000E to 1200000E. The Northeastern Mekong River Basin area is adjacent to the neighboring areas as follows:

The north is adjacent to the Lao PDR.
The south is adjacent to the Pa Sak River Basin, Chi River Basin and Mun River Basin.
The east is adjacent to the Lao PDR.
The west is adjacent to the Nan River Basin.

The Northeastern Mekong River Basin is located in the northeast of Thailand. The Mekong River is the main river that originates from the Tibetan Plateau, the river runs through the southern part of China, the eastern part of Myanmar and the northeastern part of Thailand, runs through the Lao PDR and Cambodia, and runs into the South China sea in the southern part of Vietnam. The Mekong River is considered to be the longest river in Southeast Asia and one of the largest rivers in the world. The Northeastern Mekong River Basin has a highland terrain in general. There are mountains in the south and west of the main basin, namely the Dong Phaya Yen mountains, Phu Phan mountains and Phanom Dong Rak mountains. The watershed areas on the west and south are divided between the Mun River Basin and the Northeast Mekong River Basin.

For the Nam Man-Nam San sub-basin group, Nam Mong-Nam Suay sub-basin group and Nam Phung-Nam Kam sub-basin group, it was found that **mountainous and plains along the river in the upper part of the basin**. Others, **most areas are flat and undulating terrain**. The Northeastern Mekong River Basin is between 100-1,800 meters above mean sea level (MSL), which details are shown in **Figure 3.2-1**

3.2 Administrative District

The Northeastern Mekong River Basin has a total area size of 47,165.08 square kilometers, comprising 15 provinces, 108 districts (all areas of 68 districts and some areas of 40 districts are in the watershed area), 668 sub-districts in the Northeastern Mekong River Basin (all areas of 580 sub-districts and some areas of 88 sub-district in the watershed area). Some provinces, which are Phitsanulok, Phetchabun, Kalasin, Roi Et and Yasothon provinces are overlap in the Northeast Mekong River Basin about 0.01-0.26 percent of the total watershed area and the total area of the 5 provinces is 0.65 percent when compared to the total watershed area. The consultant has considered that the preparation of a study report of the specific project that requires analytical studies related to economic and social conditions, administrative boundaries and public relations. The consultants have considered to study the areas with administrative boundaries at the district and sub-district levels in the 10 main provinces, which has total area of 99.35 percent of the Northeast Mekong River Basin, comprising Loei, Nong Khai, Udon Thani, Nong Bua Lam Phu, Bueng Kan, Sakon Nakhon, Nakhon Phanom, Mukdahan, Amnat Charoen and Ubon Ratchathani.

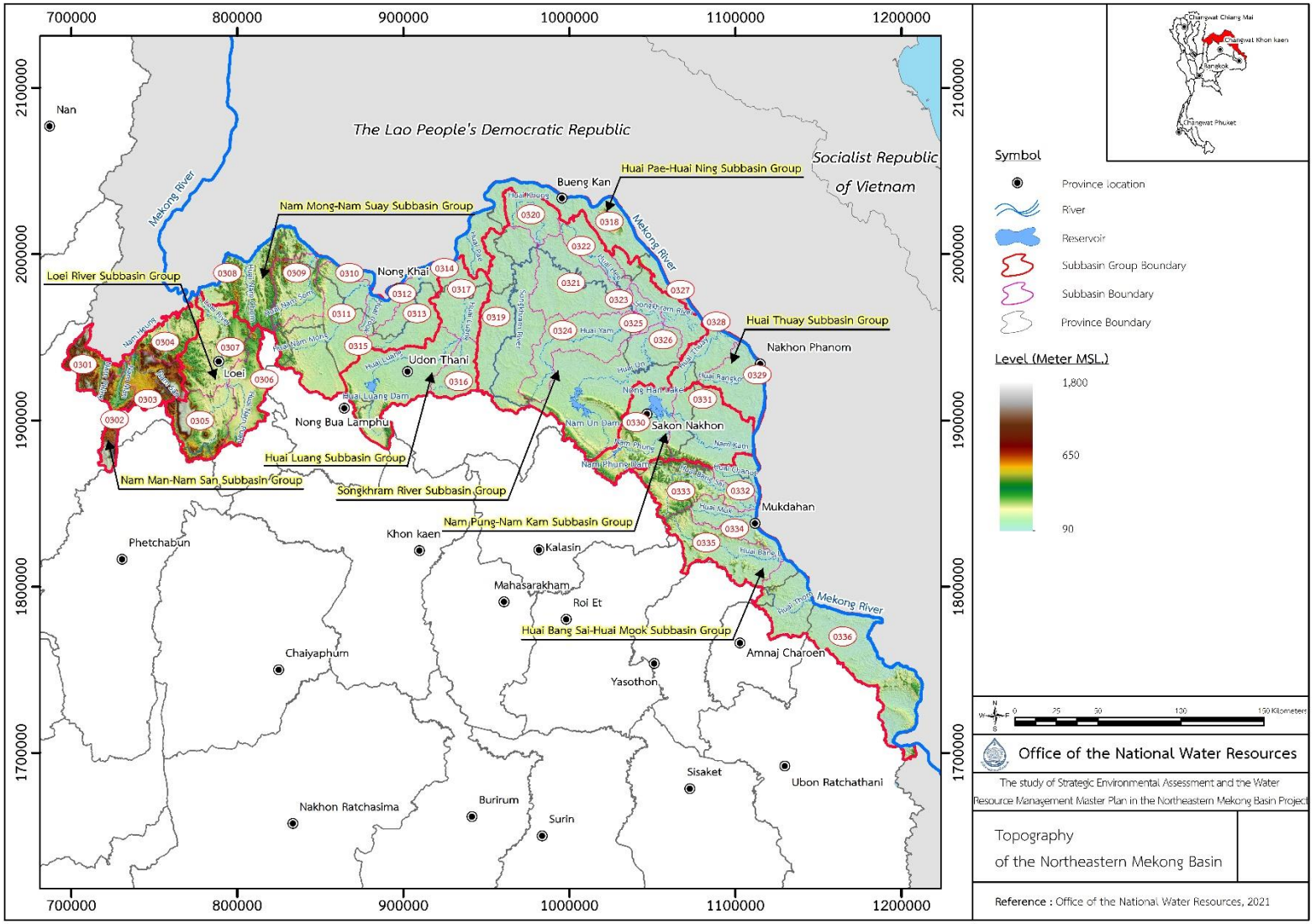


Figure 3.2-1 Topography of the Northeastern Mekong River Basin

4. Summary of current problems and situation of the area

4.1 Water resource situation in the area

The results of the sufficiency analysis of water budget of the Northeastern Mekong River Basin can be summarized as follows:

4.1.1 Water for consumption

1) City water supply system or Provincial Waterworks Authority (PWA), including water demand for tourism. Since the commercial area and a lot of tourists, most areas are already in the service area of PWA which can be seen from the high rate of water use. PWA mostly uses raw water from the Mekong River and its tributaries, reservoirs and natural water sources. In addition, water from groundwater wellsgroundwater wells is reserved for use as raw water in the year that faced water shortage. From the analysis of water balance, it was found that there was no water shortage to produce raw water for PWA in average each year, but in the low water year that faced water shortage, PWA of Udon Thani in Huai Luang sub-basin group lacks water for producing raw water thus water from Huai Luang Reservoir was used. However, other PWA branches have already prepared backup plan to solve such problems.

2) Village water supply system, there was no problem of water shortage for village water supply in average each year during rainy season, but some villages faced water shortage during dry season due to most of the water budget of the village water supply system are groundwater wells and small water resources (swamps) which are storing water during rainy season thus amount of water that can be stored depends on the amount of rainfall in each year. However, the emergency response plan is prepared for solving the raw water shortage is transportation of water from other water resources from time to time.

4.1.2 Water for industry

The water demand for industry is smaller than all activities in PWA's service area. But there are some industries outside PWA's service area which use their own water resources, such as wells, ponds, etc. thus there is no water shortage for industry.

4.1.3 Water for livestock and aquaculture

The water demand for livestock and aquaculture are smaller than cultivation. Most farmers are not raising livestock farms, but rather family farms by leaving their animals in empty space, their own areas, or public areas, such as swamps, ponds and marshes. For aquaculture, farmers are raising their aquatic animals in their own ponds located near water resources where water can be pumped to fill the ponds that is used in small quantities. Therefore, there is no water shortage for livestock and aquaculture in average each year.

4.1.4 Water for cultivation

1) Irrigated area, there are total irrigated area size of 2.42 million rai in the Northeastern Mekong River Basin. The top three sub-basin group with the largest irrigated area are Songkhram River, Nam Mong-Nam Suay and Nam Phung-Nam Kam. Current conditions during the rainy season, whole area of all sub-basins have been cultivating while during dry season, each sub-basin can be cultivated differently depending upon the amount of water budget. From the water balance analysis, it was found that the cultivation area in the irrigated area have water stored in the reservoir for crops farming during drought season. Therefore, there is no water shortage in the irrigated area.

2) Rainfed agricultural area, there are total rainfed agricultural area size of 16.87 million rai in the Northeastern Mekong River Basin. Crops have been raising in whole rainfed agricultural area while about 9.30 million rai (about 55 percent of whole rainfed agricultural area)

have been using for raising crops during dry season (short-term crops, such as maize, long-term crops, such as sugarcane and cassava, and perennial plants, such as rubber tree). Some sub-basin groups, such as Huai Thuay and Nam Phung-Nam Kam, it was found that there was relatively little cultivation area during dry season while more than 70 percent of agricultural area have been using for planting rice during rainy season. Therefore, only agricultural area near water resources has been cultivating in consistent with the amount of water budget in that year.

Crops cultivation in all agricultural areas during rainy season has been facing water shortage during no rain falls period for 10-20 days in some years, which has some effect on crop yields, but does not cause crop deaths. In average each year, the water shortage period during rainy season is acceptable which implied that the water quantity during rainy season is sufficient for agricultural purpose, but during dry season, 963.58 million cubic meters or 103.64 cubic meters per rai of water are needed for rainfed agricultural area. The sub-basin groups that having sufficient water in the dry season are the Huai Pae-Huai Ning, Huai Thuay and Nam Phung-Nam Kam. However, 963.58 million cubic meters of water needed during dry season are additional water from various reservoirs thus various reservoirs need to be improved to be able to store water to its full potential, or the security of water use in rainfed agricultural area need to be increased thus the storage capacity should be increased to be more than 963.58 million cubic meters.

4.2 Area problems condition

According to the review of fundamental information related to the basin area which consists of physical aspect, environmental aspect, socio-economic aspect and infrastructural aspect, including an analysis of the water resource situation in the Northeastern Mekong River Basin, the main problems and causes of problems can be summarized as follows:

(1) Water shortage problem

According to the data analysis of water consumption, it was found that PWA's branches already have service covering important economic areas of the Northeastern Mekong River Basin, such as PWA branches in Udon Thani, Loei, Sakon Nakhon, Nong Khai, Nakhon Phanom and Mukdahan. There are stable water budget resources, such as Mekong River, Songkhram River, natural water resources, such as Nong Han, large and medium-sized reservoirs, such as Nam Un dam and groundwater wells in some areas. Therefore, there is no shortage of water in the service area of PWA. For the village water supply system, it covered more than 96 percent of the total villages. The number of households using tap water year-round is more than 92 percent of the total households and more than 60 percent using groundwater, while the rest use surface water from swamps, marshes, ponds, or shallow wells. Most of the problems found that only 69 percent of all village water supply systems had water quality complied with the standard of groundwater for consumption. Factors that affected water quality, such as geologic diversity of stored water and external contamination, the areas where groundwater quality exceeds the standard are Nakhon Phanom (Pla Bak district, Ban Phaeng district, and Nakae district), Sakon Nakhon (Phanna Nikhom district, Song Dao district, Khok Si Suwan district) and Mukdahan (Muang district, Kham Cha-i district, and Don Tan district). The quality of the surface water depends on the local environment and water contamination. However, in order to meet the tap water quality standard, the water supply system must be regularly maintained.

(2) Drought problem

Most of the drought problems occur in rainfed agricultural area or agricultural area of small and medium-sized irrigated area without reservoirs or water supply systems thus without water for using during dry season or water shortage. There are 4 sub-basin groups with moderate drought

problems, which are Huai Pe-Huay Ning, Songkram River, Huai Thuay and Nam Phong-Nam Kam due to high rainfall, including there are many natural water resources that can be used during the drought. In addition, there are large reservoirs in irrigated areas as an important water budget source, such as Nam Un reservoir and Nam Phung reservoir, etc.

There are 3 sub-basin groups with severe drought problems, which are Nam Man-Nam San, Nam Mong-Nam Suay and Huay Bang Sai-Huai Muk, without large reservoir. In particular, topography of Huai Bang Sai-Huai Mook sub-basin group is unsuitable for building a reservoir or development of medium and large reservoirs in Nam Man-Nam San sub-basin group is difficult due to the limitations of topography as well as social and environmental factors, such as national reserved forest reserves and watershed class 1. However, according to the analysis of agricultural land utilization, it was found that there are agricultural areas mainly planted with rubber trees and field crops in all 3 sub-basin groups thus the severity of the drought problem that affects agricultural products depends mainly on the amount of rain that falls each year.

There are 2 sub-basin groups with extreme drought problems, which are Loei and Huai Luang sub-basin groups. Loei sub-basin group has little rainfall and the ratio of runoff to rainfall is relatively low. In addition, there are small amount of water in natural water resources that can be used during water shortage and dry season thus there is a risk of drought. Although the Huai Luang sub-basin group has a large reservoir (Huai Luang Reservoir) and amount of rainfall is on the average level of the Northeastern Mekong River Basin, but the ratio of runoff to rainfall is low. Therefore, there is an extreme risk of drought.

(3) Flood problem

Flooding occurs regularly in the lower Songkhram sub-basin in Nakhon Phanom, which is caused by the low water level and low slope river bank. In particular, when the water level in Mekong river is high during flood season, the water runs slowly from Songkhram river into the Mekong River. As a result, the water enters to northern tributaries, causing the expansion of flood area. In addition, flooding problems were found in the lower Huai Luang sub-basin group in Mueang Udon Thani District.

5. Summary of Strategic Environmental Assessment (SEA) results

The SEA study process emphasizes on the participation of people who use water resources in order to determine the vision, development goals and development alternatives of the Northeastern Mekong River Basin. From the analysis result of the basin environment (opportunities, limitations and challenges), participation drives the aim of stabilizing and sustaining the development of the basin by providing opportunities for stakeholders to participate in planning and decision-making, and encouraging the coordination in water resource management for maximum benefits.

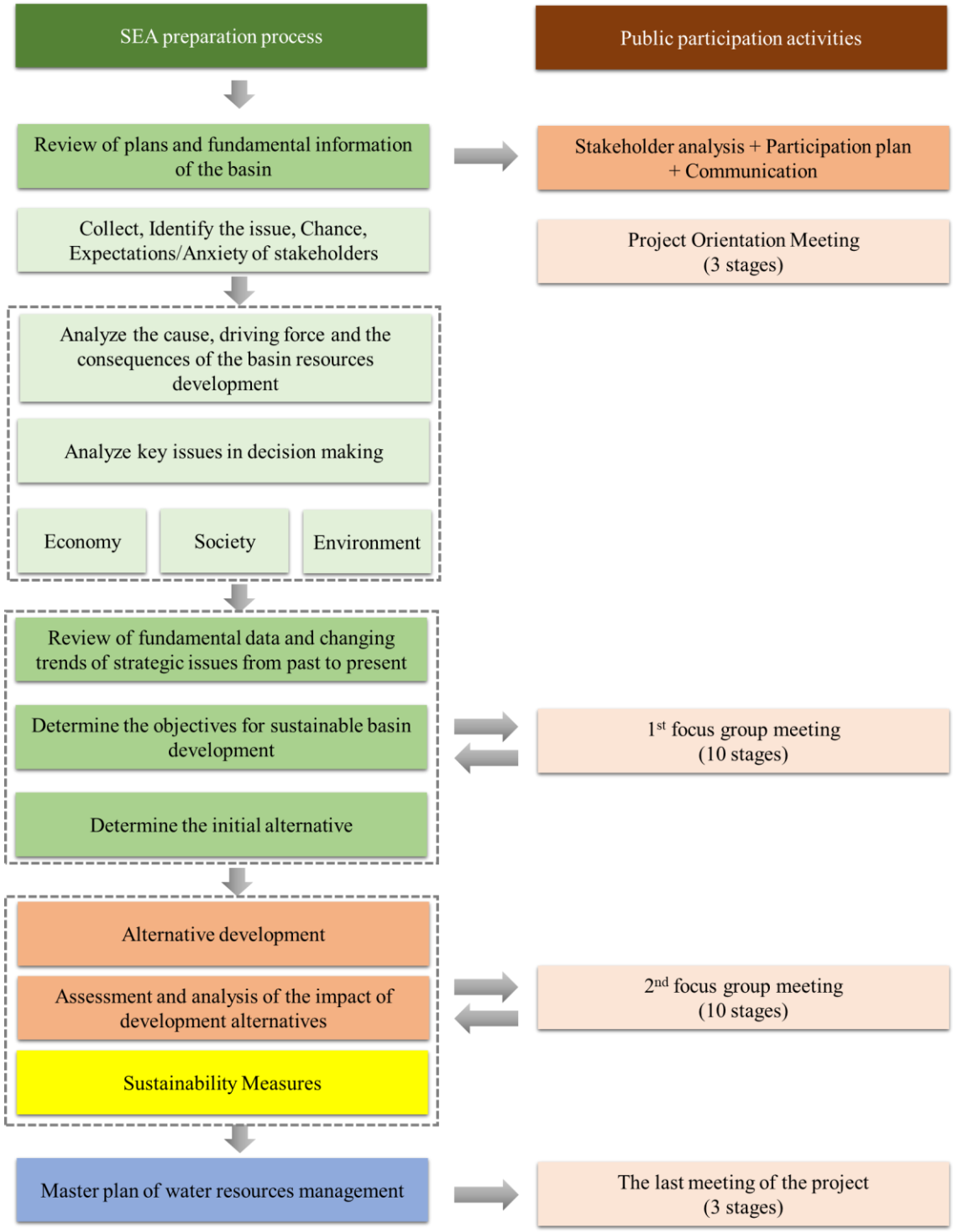


Figure 5-1 Framework for implementation of public participation in the SEA process

Public participation in the SEA process consists of a sequence of meeting for exchanging opinions and brainstorming among water users in all sectors both in earn a living and maintain a lifestyle related to water resources in the 36 Sub-basins of the Northeastern Mekong River Basin as follows:

Project Orientation Meeting

Objective: To analyze stakeholders, gather problems and causes in each watershed and development expectations

Implementation: Conducted 3 meetings on 24, 25 and 26 May 2021 in Udon Thani, Sakon Nakhon and Mukdahan, respectively.

1. Stakeholder
2. Problems related to water resources and their causes
3. Expectations

1st focus group meeting

Objective: To analyze key driving forces, development goals and strategies of the Northeastern Mekong River Basin and listen to opinions and suggestions on plans and others related the project plans

Operations: Conducted 10 meetings on 27 September-8 October 2021 in Loei, Udon Thani, Nong Khai, Sakon Nakhon, Nakhon Phanom and Amnat Charoen, respectively.

4. Trend of fundamental change in the area
5. The draft vision, strategic issues, goals, area development

2nd focus group meeting

Objective: To define the indicators and assess the status of the indicators, consider and compare development options, as well as select a set of projects and a roadmap for each option.

Operations: Conducted 10 meetings on 15-26 November 2021 in Sakon Nakhon, Nakhon Phanom, Mukdahan, Amnat Charoen, Bueng Kan, Udon Thani and Loei, respectively.

6. Development options
7. A set of projects and plans for each choice

The last meeting of the project

Objective: To disseminate the results of the project and listened to suggestions on the 20-year Water Resources Management Master Plan of the Northeastern Mekong River Basin and the 5-year Action Plan

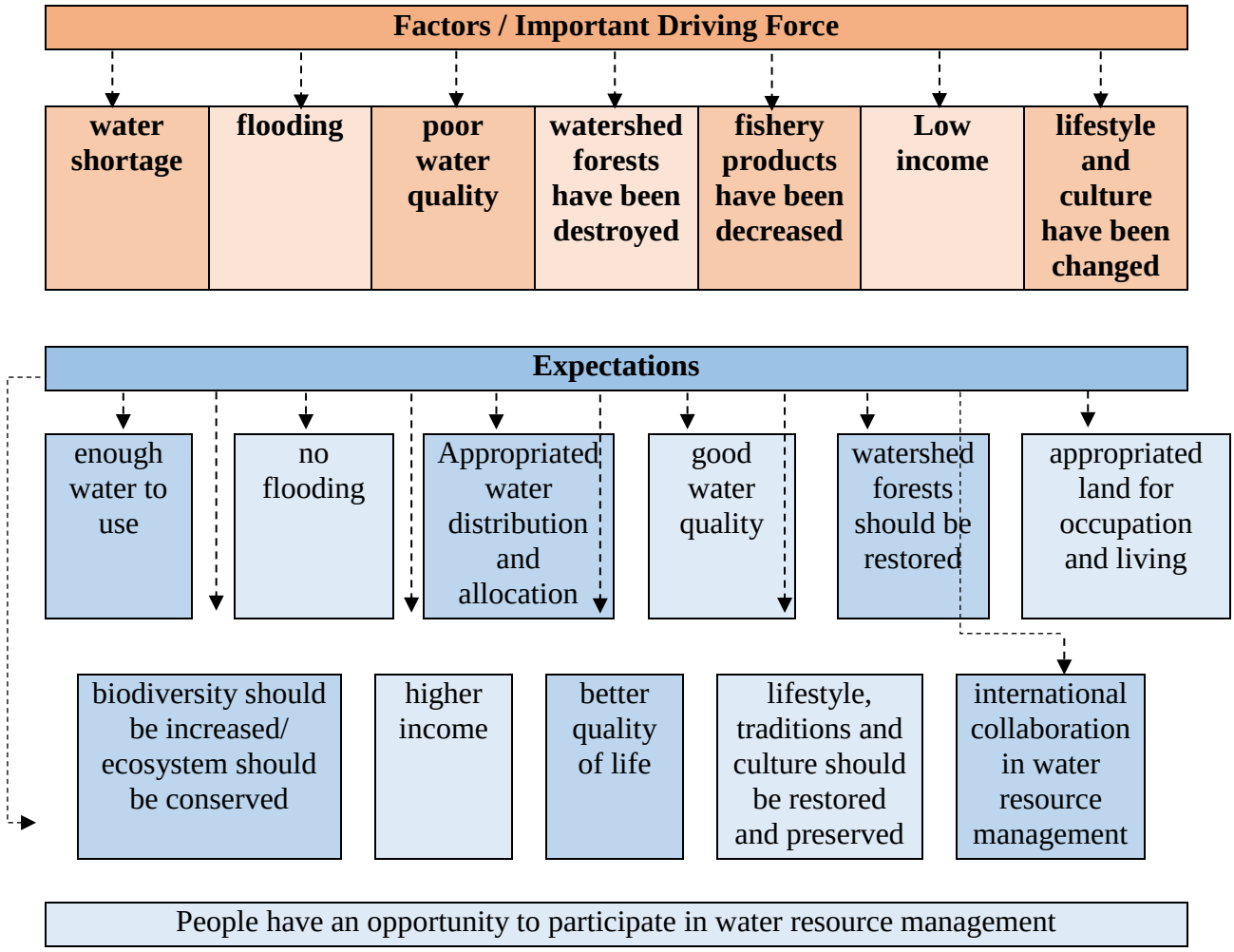
Implementation: Conducted 3 meetings on 17, 19 and 20 May 2022 in Udon Thani, Nakhon Phanom and Mukdahan , respectively.

Recommendations on the 20-Year Water Resources Management Master Plan and the 5-Year Action Plan

5.1 The analysis results of driving forces and development factors

An analysis of the development of the Northeast Mekong River Basin has been conducted to understand the key positive and negative factors affecting to water resource management and identify gaps and opportunities for development. In the analysis process, issues and causes related to water resources have been analyzed by using information obtained from stakeholders and project experts, and secondary data. As for the information from the stakeholders, it is an issue that was discovered through a participatory process that stakeholders who are living in key river areas in the Northeastern Mekong River Basin jointly analyzed, presented and brainstormed about issues, needs and expectations for development the area in consistent with water resources. The problems in the Northeastern Mekong River Basin gathered from stakeholders were used for analyzing problems and causes related to the use of water resources in each sub-basin group.

According to the analysis, each sub-basin group in the Northeastern Mekong River Basin has same problem which consistent with water resource, but problem characteristic may different depending on the area and environmental factors. There are **7 key factors that have been influencing the change, which are water shortage, flooding, poor water quality, watershed resources have been destroyed, fishery products have been decreased, low income and lifestyle and culture have been changed**. These key factors are consistent with the review results of basic information related to drainage basin, but there may be different in each sub-basin group. The main needs and expectations are 1) enough water to use, 2) no flooding, 3) appropriated water distribution and allocation, 4) good water quality that appropriate for agriculture, 5) watershed forests should be restored, 6) appropriated land for occupation/living, 7) biodiversity should be increased/ ecosystems should be conserved, 8) higher income, 9) better quality of life, 10) lifestyle, traditions and culture should be restored and preserved, 11) international collaboration in water management, and 12) people have an opportunity to participate in water resource management.



5.2 Development alternative

The development of alternatives to be strategic alternative for determining the development framework that will help achieve goals or objectives by developing 4 alternatives, which consist of Business as Usual (BAU) and 3 different new developed alternatives that emphasize on different developments of water resource, i.e., 1) water users participate in management of water for fairness and sustainability, 2) water users participate in protection, conservation, restoration and utilization of water and other resources for flexibility and sustainability together with conservation of culture related to water resource, and 3) water user organizations and people in the potential area for water resource management participate in decision-making on important issues in the area.

The 3 alternatives emphasize on different developments of water resource by considering local development direction that determined the development direction and needs linked to water resources, i.e., management of specific water resource problems, solving of insufficient water supply, drought and flooding problems, reduction of disparity, development of agriculture that wants to increase agricultural income, encouragement of agricultural group formation and development of agricultural group, maintenance of ecological balance, especially watershed forest, optimization of resource utilization, development of natural tourism and cultural lifestyles in the

area, promotion of occupation and capacity building for people to self-reliant as well as encouragement of water resource management in the area, increase of water security in the area. All 3 alternatives have been considered to cover and connect with above issues, which details are shown as follows:

Alternative detail

(M : Main operation S : Supportive operation and specific operation for each area)

Business as usual (BAU): Supply and allocation of water resources by the drive of government agencies that supports people according to the plan. Projects that have been approved and water has been managed by people independently and depend on limited water resources.

Alternative strategy	S1.1	S1.2	S1.3	S1.4	S1.5	S2.1	S2.2	S3.1	S3.2	S4.1	S4.2
	-	-	-	-	-	-	-	-	-	-	-

1. Purpose of the alternative:

To supply sufficient water resources for use in various sectors and support the economic development to be better.

2. Description of the alternative:

It is an alternative which implement in accordance with the plan and the original project that has been prepared by focusing on management from relevant government authorities for supplying and allocation of water resources without adding or reducing the implementation of any activity. The development direction is similar to the past development.

3. Method of the alternative:

Water resource supplying and allocation have been managed by relevant government authorities in accordance with the original method, especially the emphasis on the supplying of water resources by using irrigation system.

4. Perspective on sustainability:

If considered in terms of sustainability covering economic, social and environmental dimensions, this alternative is not focus on any development aspect and not sustain the development covering all three dimensions. But the context of development is consistent with the government agencies that have roles and missions focused on the supplying and allocation of water resources for utilization in agriculture, industry and tourism which resulted in the development in the economic dimension that is clearer than other dimensions.

5. Advantages, gaps and risks:

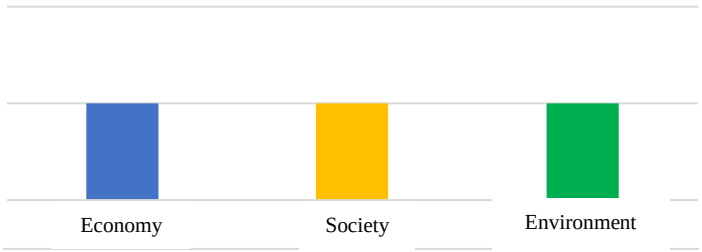
5.1 Advantages:

There are clear plans, projects or activities that can be implemented immediately and relevant government agencies are aware of their roles and missions.

5.2 Gaps and risks:

Determined plans, projects or activities may not be able to properly respond to the needs of local people due to the less opportunities for local people to participate in water resource management.

6. Characteristics of alternatives in the 3 dimensions of development, economy, society and environment:



Alternative 1: Increase of the efficiency of water resource management through the participation of water users and the support of the government sector to provide sufficient water for consumption											
Alternative strategy	**S1.1**	**S1.2**	**S1.3**	**S1.4**	**S1.5**	**S2.1**	**S2.2**	**S3.1**	**S3.2**	**S4.1**	**S4.2**
	M	**M**	**M**	**M**	**M**	-	-	-	-	**S**	**S**

1. Purpose of the alternative:

Effective water resource management with participation of water users to have sufficient water for consumption.

2. Description of the alternative:

This alternative focuses on the initial phase of the plan (first 5 years) together with increase of the efficiency of water resource management by engaging water users in making recommendations and decisions on operations, which supported by government plans and projects. That is to say, it is an alternative that allows local water users to participate in the fair and sustainable supply and allocation of water.

3. Method of the alternative:

Operations under this alternative consist of water storage optimization for increasing the amount of water budget to be sufficient, clustered water management for balancing water use that fairly allocate to various sectors, optimization of water use for the most efficient and cost-effective utilization, supply of clean water at an affordable price for people consumption, including enhancement of the efficiency of water slowing and water storage to prevent and alleviate suffering and damage from drought-flooding. However, this action focuses on water users as the main drivers thus it is necessary to build water user's capacity about organization, knowledge, financial, and capital mechanisms that support water users to have ability in effective management of water resources in the area. Therefore, all areas will have sufficient, fair and sustainable water for consumption.

4. Perspective on sustainability:

If considering the dimension of sustainability that covers economic, social and environmental dimensions, this alternative focuses on the economic dimension by managing water resources to be sufficient and supported the utilization of various sectors, including agriculture, industry and tourism. As a result, water is an important resource that will support the economic dimension and help to improve the quality of life of the people in the area in terms of economy, income, and sufficient water for consumption in the social dimension which is consistent with the Sustainable Development Goals: Goal 1: No Poverty, Goal 2: Zero Hunger, Goal 6: Clean Water and Sanitation and Goal 12: Responsible Consumption and Production. This alternative is mainly focus on driving the economic dimension and link to the social and environmental dimensions, respectively.

5. Advantages, gaps and risks

5.1 Advantages:

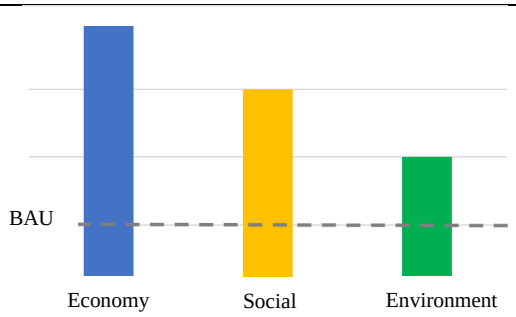
This alternative aims to manage the water resources to be adequete and fair for consumption. The first 5 years implementation of this alternative focuses on water security, which can be benefit the water

users in the area sustainably and water users can join the water resource management and meet the needs of the water users in the area.

5.2 Gaps and risks:

There are gaps or risks that may not be focused on preserving, restoring, or creating balance of natural resource and ecosystem in a time dimension. This issue may carry less weight of action under alternatives than others or it has been prioritized to implement after other issues during the first 5 years of the implementation plan thus it may result in risks during this period. In terms of the balance of the ecosystem in the area might be changed or may cause the value of the benefits of natural resources to be reduced from the original. Some lifestyles and cultures have been changed. In additions, there is also a risk that a unique issue of the Northeastern Mekong River Basin is adaptation for the cahnge of water resource and climate in the Mekong River Basin area, which is out of control issue. As a result, people in these areas may not be able to adapt to the change.

6. Characteristics of alternatives in the 3 development dimensions, economy, society and environment:



Alternative 2: Encouragement of water resource management by engaging water users for a better quality of life and social value and well-being.

Alternative strategy	S1.1	S1.2	S1.3	S1.4	S1.5	S2.1	S2.2	S3.1	S3.2	S4.1	S4.2
	S	-	-	-	-	M	M	M	S	S	S

1. Purpose of the alternative:

To protect and restore water resources and other related resources to keep them alive and able to provide services and use them in a sustainable way, build quality of life, social values, lifestyle, culture and well-being.

2. Description of the alternative:

This alternative focuses on the first 5 years of implementation plan with water resource management that is operated by water users or driven to promote quality of life, social value and well-being. In addition, this alternative is able to encourages local water users to participate in protection and restoration of water resources or other related resources for maintaining the resources. Water users can utilize water resources and other related resources flexibly and sustainably, resulting in a better quality of life and culture that can be preserved and linked to water resources.

3. Method of the alternative:

The implementation under this alternative include protecting and restoring main aquatic ecosystems in order to improve quality of life and preserve cultures and lifestyle linked to water resources and build people's adaptive capacity for resilience to cope with water and climate changes, including provide methods that can enhance water resource management by optimizing water storage driven by local people and pushing the implementation of international river basin cooperation agreements that enhance the management of water resources both domestically and abroad. However, this

implementation focuses on water users as the main drivers thus it is necessary to build water user's capacity about organization, knowledge and financial which supports water users to have ability in effective management of water resources in the area.

4. Perspective on sustainability:

If considering the dimension of sustainability that covers economic, social and environmental dimensions, this alternative focuses on both social and environmental dimensions by conserving, utilizing, and restoring natural resources for maintaining the use and service of the ecosystem that is conducive to life. The presevation of ecosystems that are favorable to the continuation of way of life and culture. This is consistent with the Sustainable Development Goals: Goal 2: Zero Hunger, Goal 12: Responsible Consumption and Production, Goal 13: Climate Action and Goal 15: Life on Land. This alternative is not characterized by emphasizing development in any one dimension, but it is characterized by concurrent development between social and environmental dimensions that are related and complement each other, with the result being linked to the economic dimension.

5. Advantages, gaps and risks

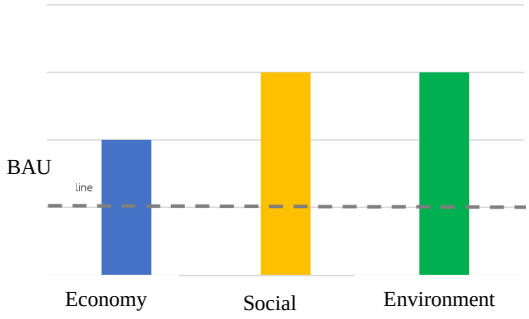
5.1 Advantages:

This alternative aims to protect, preserve and restore water resources or other related resources linked to water resources for sustainable use. People realize the importance of preserving natural resources and ecosystems because the usefulness or value of resources can promote well-being and quality of life, so they must be maintained as a focus during the first 5 years of the plan.

5.2 Gaps and risks:

This alternative also has gaps or risks that may not be focused on weighing the importance of water resources allocation but focused on the natural resources and ecosystems preservation which may show results later than the emphasis on the water resources allocation that have been applied structurally. The sufficiency of water resources, fair distribution and allocation of water may not be achieved during the first 5 years, but will be effective over the longer term.

6. Characteristics of alternatives in the 3 dimensions of development, economy, society and environment:



Alternative 3: Improve water resource management efficiency by strengthening water user organizations and people in the basin to be able to drive appropriate use of water according to the context and situation of the basin.

Alternative strategy	S1.1	S1.2	S1.3	S1.4	S1.5	S2.1	S2.2	S3.1	S3.2	S4.1	S4.2
	S	S	S	S	S	S	S	S	S	M	M

1. Purpose of the alternative:

Water users organizations and people are strengthened. Participate and make decisions on important issues to drive water resource management to suit the local context.

2. Description of the alternative:

This alternative focuses on the initial stage of the plan (first 5 years) with the strengthening of water user organizations and people in the area. Increasing the efficiency of water resource management

and drive utilization according to the situation of the basin. This alternative pushes water user organizations and people in the area to have the potential to be water resource managers in the area in specific issues who can choose and decide how to proceed in the area with important issues, necessary and in accordance with the appropriate needs of the area.

3. Method of the alternative:

Actions under this alternative include strengthening water users in terms of organization, knowledge and financial, which will be the components that help water users organizations to be able to drive efficiently. It also focuses on strengthening farmer's groups, which are considered the most important sectors that use water resources to participate in the efficient water resources management. Water user organizations and people in the area will jointly decide on some of the issues in order to create a development that truly responds to the needs of the area. It also creates real participation in water resource management.

4. Perspective on sustainability:

If considering the dimension of sustainability that covers economic, social and environmental dimensions, this alternative will focus on strengthening the social dimensions through participation of local people to take part in water resource management in their own area. This is consistent with the Sustainable Development Goals: Goal 1: No Poverty, 2: Zero Hunger, Goal 6: Clean water and Sanitation and Goal 12: Responsible Consumption and Production. This alternative is characterized by focusing on driving the social dimension as the main lead and linking it to the economic and environmental dimensions.

5. Advantages, gaps and risks

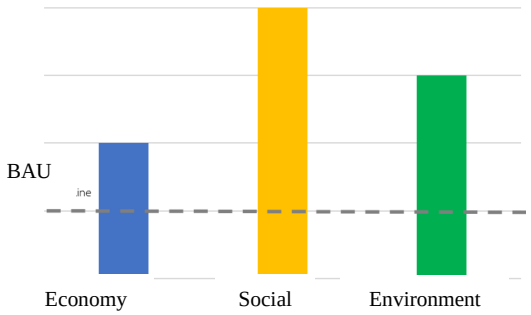
5.1 Advantages:

This alternative aims to strengthen water user organizations and people in the area to be able to manage water resources in the area effectively. This alternative aims to strengthen water user organizations and people in the area to be able to effectively manage water resources in the area. There is a clear management and driving mechanism, as well as a focus on actions that are consistent with the specific context and situation of each area. As a result, it was able to meet the needs of the area and was the operations should be focused during the first 5 years of the plan.

5.2 Gaps and risks:

There are still gaps or risks in this alternative because it focuses primarily on management by water user organizations and the public sector, which may vary in each area. Including, the context of different areas may cause the management potential of water user organizations and people's sectors are different. Strengthening preparations may be delayed in some areas and may affect management during the first 5 years of the plan. During the first five years of the plan, it may only focus on capacity building for water user organizations and the public sector. The rogress on water security in the Northeastern Mekong Basin may not progress much.

6. Characteristics of alternatives in the 3 dimensions of development, economy, society and environment:



For the alternative prioritization, the alternative was compared to determine the most appropriate alternative for the implementation of the Water Resources Management Action Plan 2022-2027 in each subbasin. The stakeholder jointly prioritized and compared each alternative which the most appropriate under the subbasin context and conditions through participation activities in the 2nd focus group meeting. For the alternative comparison, stakeholders analyzed the future changing trends of the various indicators so that they could understand the context and conditions of each alternative before making decision.

For the decision making for the appropriate alternative of the stakeholder, the Analytical Hierarchy Process (AHP) and Pairwise Analysis was applied through Bipolar Questionnaire which allow stakeholder to trade off the detail of each alternative between Business as usual (BAU), Alternative 1, Alternative 2 and Alternative 3. This technique will make it easier to make decisions of weighting the decision scores.

The results of alternatives prioritization in each subbasin group found that the stakeholders of all 9subbasin group decided to select the appropriate alternative is "Alternative 3 Improve water resource management efficiency by strengthening water user organizations and people in the basin to be able to drive appropriate use of water according to the context and situation of the basin."

5.3 Sustainability Measures

Sustainability Measures is a supporting method of the Water resource management action plans 2022-2027 alternative to achieve the development goals, strategic issues and sustainability objectives lead to **"Building the water resources security in the Northeastern Mekong Basin through participatory management".** This measure has a pattern that focuses on enhancing the positive impacts or benefits and emphasizes the importance of avoiding and mitigate or reduce negative impacts that may arise from the alternative implementation.

The Northeast Mekong Sustainability Measure aims to be a measure that will help support the Northeast Mekong Basin system. It can perform the functions of the basin in providing ecosystem services and providing long-term economic and social benefits to the people in the basin. It can define in accordance with the 5 Perspectives (H. Wu and R. Darton and A. Borthwick., 2015) of basin sustainability:

1) Sufficient Resources There should be available to maintain sustaining the ecosystem of water resources and can support the utilization of both social and economic settlements according to their capabilities.

2) Resilience to Water-Related Risks There should be a flexible system that can withstand changes and be able to respond/withstand the risks and disturbances that may arise from development and can recover quickly.

3) Access to Water Supply and Other Services The communities receive sufficient services from water resources consuming, such as safe drinking water, recreation and transportation, etc. to promote good quality of life for the community.

4) Productive use of Water The effective use of water resources to achieve both economic and social development and maintain the good environment.

5) Fairness and Equity between Users and Generation The water resources are distributed fairly. There is equality in the water resources utilization between users and generation by maintaining the availability of renewable water resources in the system.

In addition, the formulation for sustainability measures has also adopted techniques, methods and technologies that can help support sustainability and increase the flexibility of water resource utilization. It helps to adapt to change by techniques, methods and technology to support the 5 goals (UNEP DTU Partnership., 2018), namely, having sufficient water resources, cost-effectiveness and equality (in the case of low water), flexibility and responsiveness to risks (in the case of high water), access to clean water. Adapting and responding to disasters and adaptation and resilience to climate change. The sustainability measures and the agencies that may have roles, missions, are the key principles for the implementation of various measures to be successful, summarized as in **Table 5.3-1**

Table 5.3-1 Sustainability Measures and relevant agencies in the water resource management of the Northeastern Mekong Basin.

Target	Sustainability Measures	Related agencies
Having sufficient, cost-effective and equal water resources (in the case of low water)	**Water Storage**	
	Selecting and constructing the appropriate reservoir size	ONWR/RID/DWR/DGR/MOI/ ALRO/RDPB
	Building multipurpose dams	ONWR/RID/DWR/MOI
	Maintain soil moisture	ONWR/IDD/LAO
	Creating green spaces	MONRE/LAO
	Water Augmentation	
	Water source protection	ONWR/DWR/MONRE/LAO
	Groundwater filling	ONWR/DGR/LAO
	Rainwater storage	ONWR/RID/DWR/LAO
	Water Allocation	
	Sharing of seasonal water resources	ONWR/RID/DWR/LAO/MOI
	Water allocation and sale of water resource rights	ONWR
	Alternative	
	Solar Water Distillation	ONWR/DMCR/DWR
	Clustered water transmission between river basins	ONWR/RID
	Extraction and use of groundwater	ONWR/DGR/LAO/ALRO
	Recycling and reusing water	ONWR/RID/MOAC
	Water Efficiency and Demand Management	
	Increase water efficiency in the industrial sector	ONWR/ICL/IEAT/FTI
	Increase the efficiency of agricultural water use and improve irrigation.	ONWR/RID/MOAC/LAO
	Reducing water loss and leakage	ONWR/PWA
	Conservation campaigns to take care of public water resources	ONWR/MOI/MONRE/PCD/ONEP/LAO
	Progressive Pricing	ONWR/PWA
	Segmentation of water use by hydrological characteristics.	ONWR/DWR/DGR/MONRE/LAO

Table 5.3-1 Sustainability Measures and relevant agencies in the water resource management of the Northeastern Mekong Basin.

Target	Sustainability Measures	Related agencies
	Preparation of water use permits for large-scale water use activities	ONWR/DWR/DGR/MONRE/LAO
Flexible and risk-responsive (in case of high water)	**Riverine Flood Protection**	
	Construction of structures/barriers to prevent floods	ONWR/RID/DWR/LAO
	Proper management of reservoirs	ONWR/RID/DWR/LAO
	Connecting waterways between rivers and flooded areas	ONWR/RID/MD/DOH/ DMCR/SRT/DLA/DWR/DPT
	Preparing a storage area/temporary water storage	ONWR/RID/DWR/LAO
	River restoration	ONWR/MOI/MONRE/PCD/ONEP/LAO
	การจำกัดการพัฒนาหรือการขยายตัวของเมือง	DPT/MOI
	Urban Stormwater Management	
	Improving the drainage system	ONWR/RID/MD/DOH/DMCR/SRT/DLA/ DWR/DPT
	Building structures for temporary rainwater storage	ONWR/RID/DWR/DGR/MOI/ALRO/ RDPB
Access to clean water	**Leakage limitation or contamination of nutrients in water bodies.**	
	Changing farming methods	ONWR/MOAC
	Buffer line creation	ONWR/MONRE/DPT/IDD/VDC
	Restriction of Protected Areas and Land Use	ONWR/DPT/IDD/VDC
	Improving the ability of water treatment	
	Wetland development	ONWR/DWR/MONRE/LAO
	Improve the central wastewater treatment system.	MOI/DLA/PCD/WMA/LAO
Adapting and responding to disasters	**Early Warning**	
	Flood warning system	ONWR /DDPM/LAO/ICT
	Landslide warning system	MONRE/MOAC/VDC/ IDD/LAO
	Drought warning system	ONWR/DDPM/LAO/ICT
	Disaster Response	
	Create a communication style for appropriate responses.	ONWR/ICT
	Create a Map Application for Disaster Notification and Response	ONWR/DDMP/ICT
Adaptation and resilience to climate change	**Adaptation and Flexibility**	
	Evaluate and map out floods	ONWR/DDMP/LAO
	Assess and map out droughts.	ONWR/DDMP/LAO
	Socio-economic assessment and the ability to adapt	ONWR/MSO/MOAC/OTEPC/LAO
	Assess the vulnerability to climate change	ONWR/ONEP/MONRE/MOI/LAO

5.4 SEA outcomes to the Master Plan and Action Plan

Through the SEA process, fundamental data, development factors and development issues combined with data from public participation were analyzed. Vision, mission, development goals and development scope of the Northeastern Mekong Basin Management Master Plan 2023-2037 and plans/projects under the Northeastern Mekong Basin Management Action Plan 2023-2027 are set as shown in **Figure 5.4-1**

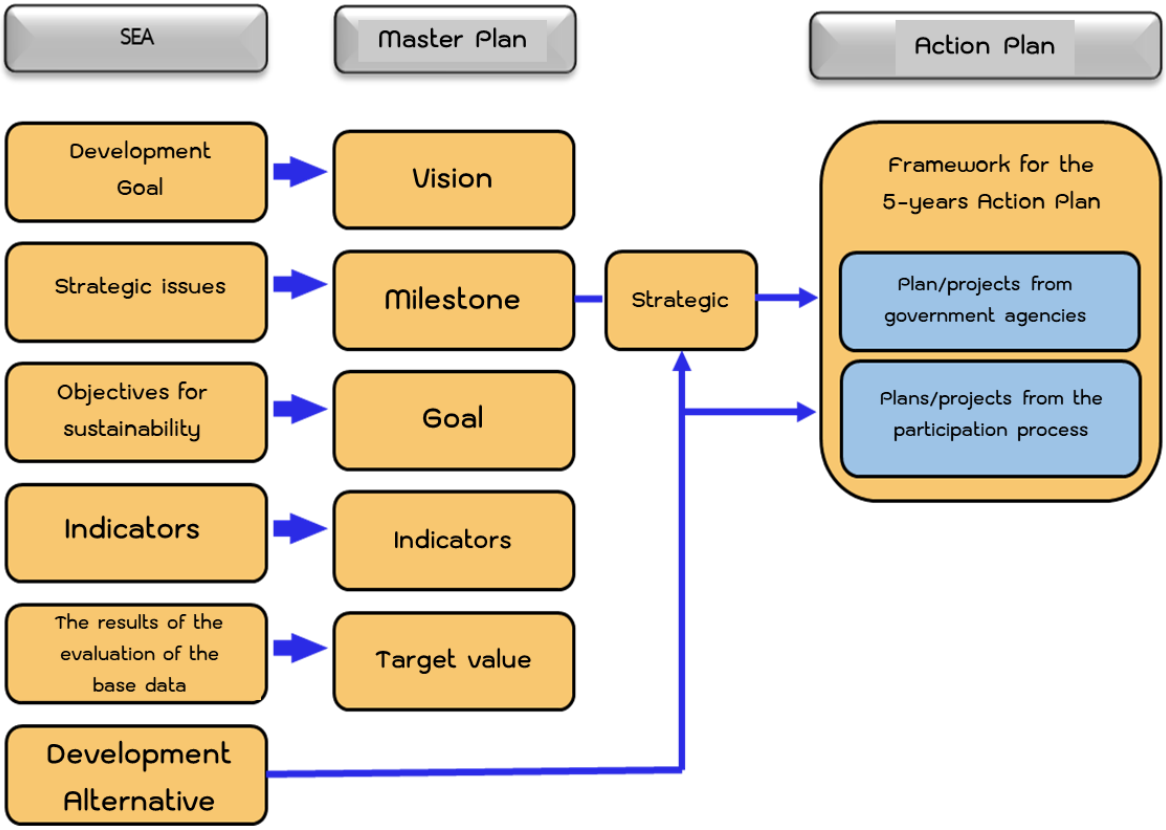


Figure 5.4-1 Integration of SEA results with the Master Plan and Action Plan

6. Preparation of the Water Resource Management Master Plan in the Northeastern Mekong Basin (2018-2037)

The Water Resources Management Master Plan of the Northeastern Mekong Basin (2018-2037) is a Strategic Plan to convey the goals of "The 20-year water management master plan (2018-2037)" of the ONWR in 6 issues, which consists of (1) Consumption water management (2) water security in the production sector (3) flood management (4) water quality management and water resources conservation (5) conservation and restoration of degraded watershed forests and soil erosion prevention and (6) management to be concrete and clear for the most effective implementation in the boundary of the Northeastern Mekong Basin.

The preparation of this master plan is aimed at the management of water resources in the Mekong River Basin with the vision that "The Northeast Mekong River Basin Resources are Sustainable through Participatory Management" consists of 4 key milestones:

Milestones 1: Procurement and mitigation of water disasters driven by 5 strategies which are

***1.1 Water management strategies to balance water budget and utilization*:** The focus is on local and people-driven water storage optimization and government support. Taking action in relation to the amendment and change of the law barrier rules. Knowledge and expertise Support, Promote the integration of community members, and provide the financial support that community members need to contribute to their financial responsibilities.

1.2 Water allocation strategies to all water users fairly: Focus on the distribution of water allocation throughout the basin by applying cluster water management techniques to create a balance of water use between areas / basin and promote flexibility in water allocation, including taking into account the Royal Decree Water Resources 2018 which states that the country's water allocation should take into account water for consumption, preserving ecosystems, disaster relief, transportation, agriculture, industry, commerce and tourism and each group of water users should have different costs for utilizing water resources according to the purpose of water use and affordability.

1***.3 Strategies to promote efficient and cost-effective utilization of water resources:*** The focus of efficient and cost-effective use of water resources is to encourage farmers to appropriately use water for their activities or plant needs including reducing water loss during water delivery and water storage. In addition, increasing the productivity of water per unit and reduce the concentration of water use in the production process.

1.4 Strategies for making people have access to clean water for consumption at an affordable price: It is a strategy that responds to the Sustainable Development Goals (SDGs) Goal 6. Many people have to pay for clean water for their consumption at a relatively high cost compared to the income of the community members. This strategy aims to encourage community members to manage the clean water system for community consumption in order to promote the capacity to provide households with clean water that is sufficient and at an affordable cost.

1.5 Strategy to enhance drought-flood management efficiency: due to drought (water shortage in the dry season) and flooding has become a recurring problem that tends to occur frequently, intensify and affects that cause more damage continuously. This is due to climate change and the efficiency of water management and the problem of slack or incompatibility or inconsistency in the implementation of urban planning regulations in the region. This strategy aims to strengthen management power to prevent and solve drought and flood problems. Local and community-based mechanisms for dealing with problems that require diverse, specific, and adaptive management.

Milestones 2: Sustainability of water resources driven by two strategies:

2.1 Strategies to protect, protect and restore important water resources ecosystems by empowering community organizations: The strategy is focus on protection and restoration ecosystem areas to promote the quality of life of the people by improving the law and promote the community's role in protecting and utilizing the watershed area. Promoting the organization/institution of the community to create sustainability in maintaining the role of the community's watershed protector. Including, supporting the knowledge, Academic skills, practice, and funding sources for institutional strengthening of community organizations that serve protection watershed area.

2.2 Strategies to prevent, protect and restore water ecosystems by relying on culture, traditions and lifestyles linked to water resources: The strategy is focus on protection, and restoration of water resources ecosystems through the promotion and continuation of culture, tradition and way of life that is connected to the water resources of the community. Also, able to sustainably and can generate additional income for community members from cultural tourism activities.

Milestones 3: Coping with changes in water resources, climate and its effects across borders driven by two strategies:

3.1 Strategies for building capacity for people's adaptation: The focus is on building people's adaptive capacity for resilience to the changing water situation caused by climate change and the transboundary impacts caused by international development processes by adjusting the way of living, modifying the source of

water reserve costs, establishing systems and accessing up-to-date information, educating and raising community awareness on climate change problems including the formulation of measures to cope with the impacts of climate change.

3.2 Strategies for enhancing the effectiveness of the implementation of the International Basin Cooperation Agreement: This strategic issue focuses on enhancing the effectiveness of the International Basin Cooperation Agreement to mitigate the transboundary impacts of the Mekong countries on vulnerable and vulnerable Thai communities by pushing the government to coordinate and Negotiate with countries sharing the Mekong River including the determination of remedial measures for people suffering from cross-border impacts. This strategy will have a scope for completion within 10 years (2023-2032).

Milestones 4: Water resource management driven by two strategies:

4.1 Strategy to strengthen water user organizations in comprehensive water management under cooperation with local government organizations: Strengthening water users focus on strengthening water user organizations to transform into organizations that play a role in water management for the water resources stability by coordinating with local government organizations in each area. Improving organizational structure, management approaches, financing and funding mechanisms, and promoting research and innovations that respond to sustainable water resource management, including building a knowledge network on watershed management.

4.2 Strategy to strengthen farmers' groups. The objective is to strengthen integrated watershed management through a strong farmer group mechanism through training to develop agricultural knowledge and skills, promotion of farmers' integration, and short-term loan support with low interest and necessary technology, development of a platform to provide information and marketplace platform, promoting both B2B and B2C online commerce by educating farmers on business knowledge and skills and digital skills.

Each milestones of the master plan linked to the 20-Year Water Management Master Plan (2018-2037) in 6 issues, which can be summarized as follows: Milestones 1 (Procurement and mitigation of water disasters) is linked to the 20-year Master Plan in issues 1-6, Milestones 2 (Sustainability of water resources) is linked to the 20-year Master Plan in issues 4 and 5, Milestones 3 (Coping with changes in water resources, climate and its effects across borders) is linked to the 20-year Master Plan in issues 6 and Milestones 4 (Water Management) is linked to the 20-year Master Plan in issues 2 and 6


Water Resources Management Master Plan
in the Northeastern Mekong Basin (2018-2037)
Vision of the Master Plan: "Water Resources in the Northeastern Mekong Basin have sustainable stability with participatory management"
1st Milestone
Procurement and mitigation of water disasters (5 Strategies)
Procure and allocate water resources fairly and efficiently and sustainably through the participation of water users.
consistent with the master plan
1 2 3 4 5 6
2nd Milestone
Sustainability of water resources (2 Strategies)
Protect and restore ecosystem services connected to water resources by water users.
consistent with the master plan
4 5
3rd Milestone
Coping with changes in water resources, climate and its effects across borders (2 strategies)
Promote adaptation of water users to the problem of water resources and climate change
consistent with the master plan
6
4th Milestone
Water resource management (2 strategies)
Strengthen in integrated watershed management
consistent with the master plan
2 6
1 Consumption water management
2 water security in the production sector
3 Flood Management
4 water quality management and water resources conservation
5 Conservation and restoration of degraded watershed forests and soil erosion prevention
6 Management
Water Resources Management Master Plan 20 years (2018-2037)
Consulting Group

7. Preparation of the Northeast Mekong Basin Management Action Plan 2023-2027

It is to convey the intention of the Master Plan that has been defining the details in the strategic way into more action by linking from Vision, Milestone, Strategy, Goal and Commitment of the master plan. The goals and things that need to be implemented during the years 1-5 are taken as a framework for defining projects for the implementation of the Action Plan which is consistent with the development direction and able to clearly convey the intention of the Master Plan into action

In this action plan, the water management plan is a plan that should be expedited from the beginning, while other plans are still scheduled to be implemented in parallel such as the action plan for consumption water management, water quality management and conservation of water resources, conservation and restoration of degraded upstream forests, including the action plan to improve and restore water security in the production sector and flood management but there may be a different timeline for the process. In addition, it has also proposed additional plans that will help all 4 milestones set in the master plan achieve the stated objectives. The details of the plans for each issue are shown below.

7.1 Action plans for consumption water management

This action plans responds to the 1st milestone with the goal of providing clean water for consumption, developing drinking water to meet standards and accessing reasonable prices for all villages, developing an expansion of water supply for villages.

Table 7.1-1 Action plan for consumption water management

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
1.1 Increase efficiency and expand the village water supply system	• Develop and optimize the existing water supply system and improve water quality to meet the standards of 209 villages • Develop a new water supply system for 695 villages.	565	1	765	1
Develop urban water supply systems/economic areas	• Expansion of 173 urban water supply systems	2,764	3	3624	5
1.3 Developing drinking water to meet standards	• Provide clean water that is thoroughly standardized.	-	1	-	1

and reasonable prices					

- Responsible agencies: ONWR/DOPA/DGR/DLA/PWA/LAO
- Budget during 2023-2027: 3,250 million baht (forecasted budget in 2022)

7.2 Action plans for water security in the production sector

This action plans responds to the 1st and 4th milestones with the goal of developing and improving water storage and water delivery systems with full potential. Developing a water diversion system linking water sources to help allocate and assist inadequate adjacent watershed areas. Optimizing projects in former irrigated areas, developing small water sources for rainwater farming areas, and increasing productivity in the production sector.

Table 7.2-1 Action plans for water security in the production sector

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
2.1 Increase the efficiency of water resources projects and the original water delivery system	Develop and improve the original water storage/water delivery system in the irrigation area 12.298 million cubic meters/80,478 rai	1,466	-	2253	-
2.2 Development of new reservoirs/water delivery systems	Develop new water storage/water delivery systems in irrigation areas 341.955 million cubic meters / 1,068,893 rai	1,344	4	2,411	4
2.3 Water supply in rainfed agricultural area	Providing water in rainfed agricultural area of 10.5 million cubic meters, covering an area of 476 sub-districts.	4017	-	4,349	-

2.4 Promoting technology and knowledge to increase productivity and value of the manufacturing sector	Promoting technology and knowledge for water security	-	8	-	8

- Responsible agencies: RID/DWR/DGR/PWA/DOPA/LDD/DLA/ALRO/MOI/MOAC/MNRE/ LAO
- Budget during 2023-2027: 13,810 million baht (forecasted budget in 2022)

7.3 Action plans for flood management

This action plans responds to the 1st milestone with the goal of increasing the drainage efficiency of the main drainage system / natural water source. Flood mitigation for community and agricultural areas and flood prevention for urban and economic areas and optimize flood management.

Table 7.3-1 Action plans for flood management

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
3.1 Increase the drainage efficiency of the main drainage system / natural water sources.	• Improve natural water sources to be able to drain effectively 67 km.	46	1	100	1
3.2 Flood protection for urban and economic areas	• There is a system to protect economic areas and waterfront communities. especially 33 major cities • Protected area 19,097 rai • Establish a water plan for 1 area. • River bank protection dam 46 km.	94	1	106	1

3.3 Increase the efficiency of management of flooded areas	• Development and improvement the area for 5 projects • Develop and increase the efficiency of water control buildings and a pumping station for flood relief in 3 specific areas	237	-	373	-
3.4 Mitigate flood problem in spatial area	• Prepare flood mitigation plans in the area. systematically at the watershed/critical area level	96	-	221	-

- Responsible agencies: RID/DWR/PWA/MD/DOPA/DOF/DLA/DPT/MOI/LAO
- Budget during 2023-2027: 6,911 million baht (forecasted budget in 2022)

7.4 Action plans for water quality management and water resources conservation

This action plans responds to the 1st and 2nd milestones with the goal of increasing efficiency in treatment and control of wastewater discharge into the environment and conserving and rehabilitating degraded water resources.

Table 7.4-1 Action plans for water quality management and water resources conservation

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
4.1 Improve the drainage efficiency of the main drainage system / natural water sources.	• Construction of two new wastewater and wastewater collection systems. • Expand the area of the waste water collection system for 1 area.	1	-	-	-
4.2 Conservation and restoration of	• Conservation and restoration	754	-	2,038	-

degraded rivers, canals and natural water resources/ecosystem services	of deteriorated water sources.				

- Responsible agencies: RID/DWR/DOPA/DOF/DGR/DLA/MNRE/MOI/LAO
- Budget during 2023-2027: 2,890 million baht (forecasted budget in 2022)

7.5 Action plans for conservation and restoration of degraded watershed forests and soil erosion prevention

This action plans responds to the 1st and 2nd milestones with the goal of conserving and restoring degraded watershed forest areas and preserve watershed forests.

Table 7.5-1 Action plans for conservation and restoration of degraded watershed forests and soil erosion prevention

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
5.1 Conservation and restoration of degraded watershed forest areas	• The number of forest areas that have been restored, an area of 4790 rai • Number of protected areas and reduced soil erosion 17520 rai	1,090	-	1,099	-

- Responsible agencies: DWR/LDD/DNP
- Budget during 2023-2027: 75 million baht (forecasted budget in 2022)

7.6 Action plan for management

This action plans responds to the 1st, 3rd and 4th milestones with the goal of improving the law and water resource management organizations. Every local authority has the ability to create a water resource management plan. Developing an accessible database system supported by government agencies.

Table 7.6-1 Action plans for management

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
		2023-2027		2023-2037	
6.1 Improving laws and water resource management organizations	• Every water user organization can use the law and knowledge of water management. • Improve relevant regulations to increase the role of communities. • Establish a mechanism to monitor water quality for consumption.	-	16	-	
6.2 Preparation of water resource management plans	• Every local authority has the capability to prepare water resource management plans.	2	4	-	
6.3 Development of database system	• Every community has an accessible information system supported by government agencies.	3	1	-	
6.4 Research and development on water resource management	• There is an increased water budget.	-	-	5	-

- Responsible agencies: DWR/PWA/LDD/LAO
- Budget during 2023-2027: 102 million baht (forecasted budget in 2022)

7.7 Additional action plans

This additional action plans responds to the all milestones with the goal of promoting and pushing the locality to protect the resources in the area, there are studies, research and development of water resource

management and transboundary impacts. Promoting knowledge and raising awareness of climate change/water situation. Creating a body of knowledge and gathering groups of farmers to be strong in the production sector. Promoting the capacity to provide financing and to restore value and create sustainability and the existence of culture, tradition and way of life

Table 7.7-1 Additional action plans

Action plan (issue)	Goal	Projects from government agencies (projects)	Project Series from Participation Process (Project Series)
1. Promote and push people to be the protector of resources in the area.	• Encourage communities to be protectors, preserve and utilize resources in the watershed area.	-	12
2. Education, research and development of water resource management (cross-border effect)	• All communities along the Mekong River receive cross-border impact information.	-	3
3. Promote knowledge and raise awareness on climate change/water situation.	• Every community has knowledge and awareness • Building a body of knowledge, awareness and strength in the locality to have the ability to adapt and cope	-	4
4. Build a body of knowledge and gather farmers' groups to be strong in the production sector.	• All groups of farmers have extensive knowledge in the production sector. • Building a body of knowledge and awareness and strength in the locality.	-	29
5. Promote the potential of financing sources.	• Every water user organization has access to funding source both from the public and private sectors.	-	5
6. Restore Value, create sustainability and the existence of culture, tradition and way of life.	• existence of culture, traditions and way of life.	-	5

- Responsible agencies: DOAE/ONWR/RID/DWR/MNRE/OAP/MOAC/MOI/MOC/TAT/ MOE/ONEP/TICA/MRC/LAO
- Budget during 2023-2027: 669 million baht (forecasted budget in 2022)

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Executive Summary Report