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Assessment of Health Impact on Samut Songkram Province:

The Case Study of Project Diverting Water from Mae Klong River (Phase 1)

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1. Abstract

Water scarcity and quality problem in Chao Praya basin has led to project diverting water from Mae Klong Basin to serve the population in Bangkok. For the government, the reason that this diverting has not been a problem thus far is because the Mae Klong River has a surplus of water which is drained into the ocean if not used. And diverting water has not reduced water consumption for Mae Klong water users.

But as for people in Mae Klong basin, we found that most of people did not know about this project and people who get information feel concern about water scarcity and they do not think that Mae Klong river has a surplus of water at present. In the future, the water demand along the Mae Klong increases or more water is needed. The diverting water will surely create more conflict between the water users. This is one case which illustrates a conflict related to scarcity in water resource allocation in Thailand because of seemingly unfair water allocation. People along the lower Mae Klong River have to make sacrifices without any compensation being made.

The purpose of this study is to assess health impact. The study will be an approach based on recognition of rights with participatory process. Assessment of impact might be developed as a tool for future planning and decision-making in the similar project. The results such as negative impact on the health status should be minimized through appropriate mitigation. We chose Samut Songkram province for the area study because this province is at the mouth of Mae Klong River. The results from expert meetings were documented for the last stakeholders meeting that 46 indicators in 4 dimensions (Physical Health, Mental Health, Social Health and Spiritual Health) were introduced.

Key words: Health Impact Assessment, Water scarcity, Diverting water

Conference Topic: Health Impact Assessment

2. Background and Rational

Water resource is very valuable and useful for human being in various ways such as for consumption, agriculture, transportation, fishery and industry. The result of National development and population growth has increased water demand, which is getting more critical especially in the water shortage basin. There are several means of water resources management for water scarcity problems for example water allocation, water source searching and development, water saving campaign etc.

In the past, water resource management in Thailand caused economic, social, environment and health problems. Due to policy making and planing for water resource were constrictively focused. They were lacking of public participation for decision-making leading to conflict among stakeholders as Pak Mun Dam that currently has serious conflict.

Several water resource management policies and schemes widely result in negative and positive effects to community and people in the way of economy, society, environment and health. These impacts have been assessed in the project study report excepting health impact, which has been partially assessed and showed impact level especially water resource management on Diverting Water from Mae Klong River (Phase 1) project.

This project is to allocate raw water followings long-term master plan in order to develop water supply in consistent with city expansion by metropolitan water work. This is done by allocate water from Mae Klong river in the upper area of Mae Klong dam (former name: Vachilalongkorn dam), Tha Muang, Kanchanaburi via water supply canal and water pipe beneath Tha Chin river to Mahasawat water work, Nontaburi for supplying water to Bangkok and environs. This project caused losing water in Mae Klong River to 25% of water discharge from Mae Klong dam.

The previous studies have pointed that there will be more water demanding than allocated water in the future. There is less cultivating area when water scarcity than usual for Na Pee rice 224,790 rai, Na Prung 204,306 rai and sugar cane 206,180 rai, then the total economic loss for cultivation is 1,275 million baht/year. There are also effects on farming, water consumption in other activities, seawater and wastewater dilution, transportation, water right and water utilization conflict. The health impacts on human are physical, psychological, social and spiritual that effect individual, family, community and public.

In Thailand, health impact assessment from public policy process or public project above is very newly. Then the researchers agree to study HIA process of water resource management that is public project. A case study is Diverting Water from Mae Klong River (Phase 1) project and the study area is Samut Songkram province.

The first step of the study will be literature review and assess clear problem issue of HIA process. The design of this study is prospective includes means and assessment indexes. However, the opinions and visions from this project are not limiting only researchers but they try to communicate with stakeholders. It can reflect that really health problems and anyone may accept by using public participation.

3. Objectives

1. To assess Health Impact issue on prospective HIA process for the Diverting Water from Mae Klong River (Phase 1) project
2. To set method, design, stakeholders(in term of individual, people or community) and the index of appraisal for Diverting Water from Mae Klong River (Phase 1) project

4. Research Questions

1. What are effects from water allocation in Diverting Water from Mae Klong River project?
2. Are there any health impacts from Diverting Water from Mae Klong River project? And what is the method using for analyses index of the impact?
3. What are the stakeholder's suggestion from question 1&2?
4. What should be the appropriate HIA procedure in Diverting Water from Mae Klong River project?

5. Scope of the Study

1. Study area is Samut Songkram province
2. Study of human right and public participation in governmental policy and other regulations.
3. Data collection that related to Diverting Water from Mae Klong River project such as waters resource management policy, water allocated quantity
4. Review and analyze data trend of physical, economic, social and environment changing of this project.
5. Review and evaluate in HIA process that related to water resource management.
6. Review and evaluate in guideline of HIA procedure.
7. Identify primary health problem on Diverting Water from Mae Klong River project.
8. Develop research equipment for primary health impact assessment on Diverting Water from Mae Klong River project.
9. Brain storming that leads to determine study issue from this project, which effect to stakeholder's healths.
10. Stakeholder agreement that leads to assess of HIA index on Diverting Water from Mae Klong River project.
11. Modify HIA procedure by using data processing and any suggestion.
12. The already changed of HIA procedure from this study is offer to stakeholder.
13. There is a second step conference in order to develop research proposal.
14. Make a complete report.

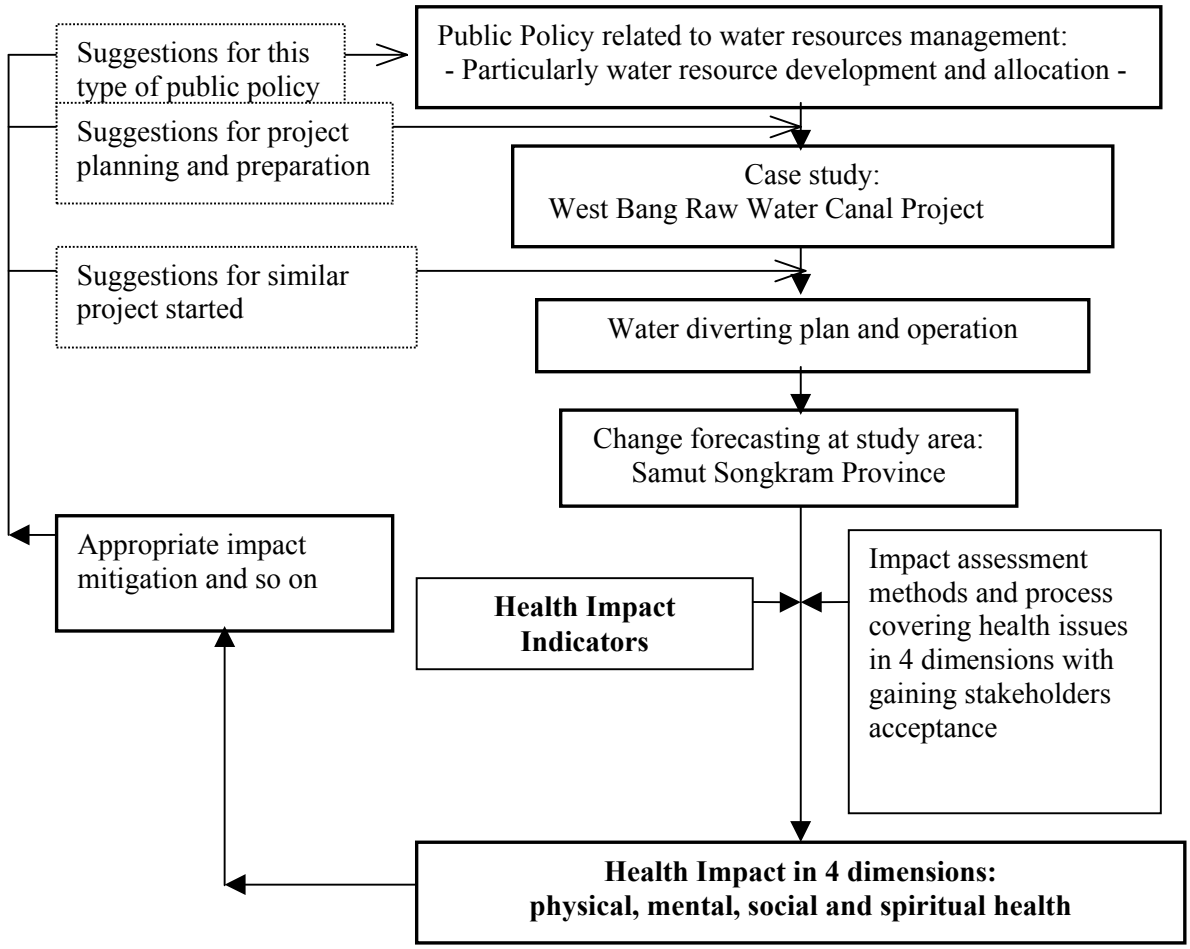

Figure 1: Conceptual Framework

6. Research Methodology

The study team consists of lecturers and researchers of faculty of environment and resource studies, Mahidol University. The title of study is a procedure developing for health impact assessment related to public policy on water resource management: the case of impact from Diverting Water from Mae Klong River (Phase 1) project on Samut Songkram province, which supporting by Health Systems Research Institute (HSRI). Research Methodology is described as below;

- **Literature review**

The researchers collect information of West Diverting Water from Mae Klong River (Phase 1) project, HIA data, water quantity and quality of Mae Klong River, database of Samut Songkram province, HIA index etc. The sources of these data were from document, report, and research result from government and state enterprises, institution, and community association in study area and website.

- **Research meeting**

The researcher team had a meeting in order to plan, arrange discussion each other and analyze data 3-4 times/month.

- **Data exploration in study area**

Study team had surveyed the study area in order to examine water resource information at Mae Klong dam, Mae Klong irrigation project, Samut Songkram irrigation project, Samut Songkram provincial waterworks authority office and Samut Songkram general area.

- **Stakeholder meeting**

Four stakeholder-meetings were organized. The participants of these meeting were from community and public volunteers in a village.

- **Researcher and scholar meeting**

There were 3 meetings between researchers and scholars. These scholars consist of water resource management expert, HIA specialist, health and public health officers.

- **Future research plan**

The researcher team will organize a meeting with stakeholder by public scoping process. The result from next meeting will be used for rewrite complete report and propose the second step research proposal to HSRI.

7. Result

- **Health impact and index from Diverting Water from Mae Klong River (Phase 1) project**

Both quantity and quality change of water resource directly effect to people around public water sources. These impacts depend on severity and protection of impact. These impacts can be classified as life and property impact, natural disaster, landslide due to groundwater using, aquatic ecosystem impacts, which is very important for natural balance especially when water quality and quantity are bad and not enough. Also, there are effects on fishery, health occupation as agriculture, tourism and water supply production will need high amount of chlorine when raw water has low quality. In hot season, there are also problems of seawater intrusion which effect cultivation area, transportation when water level is low and hyacine has grown easily in natural water.

Health impact and index from Diverting Water from Mae Klong River (Phase 1) project converts water from Mae Klong river around 7 m^3/s, which is still lower than the estimated value in 2002 and the maximum converting water could be 40.5 m^3/s. The project was approved by the cabinet in 1993 and agreed to trilateral sub-committee in the study of considering and evaluating impact of water conversion from Mae Klong River following this project. It was concluded from the study that water conversion from Mae Klong River by the Metropolitan Waterworks Authority would not significantly affect people in Mae Klong basin but other studies have got different conclusions.

The study of faculty of public health, Mahidol University found that the amount of converting water that would not affect the Mae Klong basin should be 30 m^3/s and appropriate water resource management is needed for converting water of 45 m^3/s. The result from this study, it can be converted water to 45 m^3/s because it hardly happen lack of water. However, if there is lack of water, it can use appropriate water resource management.

The study of Asian Institute of Technology stated that increasing of long-term water demand in several sections including water allocation for the Metropolitan Waterworks Authority, if there is high losing of water in pipeline then irrigation area might be decreased for water allocation to Metropolitan Waterworks Authority. This study also mentioned that the West Bank raw water canal project that demands more water than the affordable water in the Mae Klong basin. This will affect people in the basin even in the initial stage of the project especially in the agricultural section.

Water drainage record from Mae Klong dam to Gulf of Thailand showed that the drainage amount in hot season (January-June) has been much lower than the criteria sometimes. This referred that if water is still allocated for the West Bank raw water canal project, the severity of water scarcity in the basin increases.

The result of meeting between researchers and stakeholders found the existing water resource problem in the area. The project will create concerning among people even it is not launched. The initial health problem from project is studied by mind mapping apart from the mentioned point. The researchers use this information as initial guideline for consideration of appropriate index.

- **Health Impact Assessment from Water Decreasing in Mae Klong River**

<u>Problem (due to water decreasing in Mae Klong river)</u>

1. Water consumption
1.1 diarrhea
1.2 increased expenditure (buy and water sucking)
1.3 inadequate water
1.4 lack of water supply
1.5 low water supply quality

2. Environment
2.1 insufficient water on canal bank, border collapses, canal shallows
2.2 water pass through canal decreasing
2.3 changing of ecosystem
2.4 high seawater level
2.5 water flows decreasing

2.6 high pollutants
2.7 soil deterioration
2.8 waste increasing

3. Transportation
3.1 inconvenience transportation by water
3.2 raising of street construction (high pollutant)

4. Occupation
4.1 disabled from occupation
4.2 unwilling for working
4.3 run out of water on canal so that fish died
4.4 there is sludge in canal then shrimp died (community conflict)
4.5 changing of occupation
4.6 agricultural products damaging and decreasing
4.7 fishery impact (shellfish died)
4.8 needed more labor (physical and mental impacts, using drug addictive)
4.9 migration (change occupation)
4.10 good effect of fishery
4.11 high cost of agriculture
4.12 ecosystem tourism decreasing
4.13 losing of work's area
4.14 losing of work
4.15 water used for work is not enough

5 Others
5.1 skin irritation from wastewater
5.2 anxiety
5.3 depressing
5.4 nervous
5.5 lack of expectation
5.6 decreasing of dignity
5.7 more pressure
5.8 high sadness
5.9 high debt
5.10 conflict in family
5.11 community disharmony
5.12 low income
5.13 lose of accommodation area
5.14 drug addition (losing of work)
5.15 family collapsing
5.16 decrease life style
5.17 lack of resolved problem skill
5.18 decrease sailing
5.19 changing of tradition
5.20 there is not cherish of land owner
5.21 proprietor decreasing
5.22 lose of kindness
5.23 decrease of community responsibility
5.24 lack of Mae Klong Symbol

- **Health Indexes from Water decreasing in Mae Klong River**

Physical health indexes

1. Illness rate (communicable disease, non- communicable disease, local disease (diarrhea))
2. Birth rate
3. Mortal rate
4. Growth rate
5. Accident rate from drown
6. Frequency from health service using
7. Rate of patience's bed
8. Environment of house
9. Disable condition
10. Lack of water
11. Accident rate

Mental health indexes

1. Psychological illness
2. Nervous
3. Anxiety
4. Work satisfaction
5. Stress from family/community/public
6. Satisfy for new friends
7. Life stability
8. Suicide rate
9. Safety in life and property
10. Mental severity

Social health indexes

1. Incomes
2. Employment and unemployed
3. Social traditional changing
4. Life style changing
5. Drug addictive rate and smoking
6. Social vigorous
7. Family relationship
8. Social relationship
9. Conflict in society and others community
10. Migration rate
11. Family development
12. Occupation changing
13. Water consumption cost
14. Expenditure

Spiritual health indexes

1. Respect of anyone
2. Life's goal
3. Community responsibility
4. Life expectation
5. Changing of social ethics and moral
6. Skill for resolved problem

7. Feeling of social owner
8. Traditional changing
9. Emotional wise

Added indexes

1. Salinity
2. Water using quantity

8. Conclusion and Suggestion

Water scarcity and quality problem in Chao Praya basin has led to project diverting water from Mae klong Basin(which is used mainly for agriculture) to serve the population and industrialisation in Bangkok. The project is named as West Bang Raw Water Canal Project. At present water has also been diverted from Mae Klong river to Mahasawas water treatment plant at the approximate rate 7.5 cu.m. per second or 650,000 cu.m. per day. According to diverting plan, the rate will increase until 40 cu.m. per second or 3,200,000 cu.m. per day in 2015.

For the government, the reason that this water diverting has not been a problem thus far is because the Mae Klong river has a surplus of water which is drained into the ocean if not used. And diverting water has not reduced water consumption for Mae Klong water users. But as for people in Mae Klong basin, we found that most of people did not know about this project and people who get information feel concern about water scarcity and they do not think that Mae Klong river has a surplus of water at present. In the future, the water demand along the Mae Klong increases or more water is needed. The diverting water will surely create more conflict between the water users. This is one case which illustrates a conflict related to scarcity in water resource allocation in Thailand because of seemingly unfair water allocation. People along the lower Mae Klong river have to make sacrifices without any compensation being made.

The purpose of this study is to assess health impact which is focused on 4 dimensions: physical, mental, social and spiritual health. The study will be an approach based on recognition of rights with participatory process. Assessment of impact might be developed as a tool for future planning and decision-making in the similar project. The results such as negative impact on the health status should be minimized through appropriate mitigation. We chose Samut Songkram province for the area study because this province is at the mouth of Mae Klong river. A lot of farmers here got damage before from construction of Srinakarin Dam located at the upper Mae Klong river. They had a bitter experience of water scarcity. Diverting water directly affects them and this area. Other stakeholders were also considered.

Emphasis in Phase1 (Scoping Phase) is placed on identification of hazard when we consider the 4 dimensions, comprehensive assessment methods and impact assessment process in detail. Open, transparent and participating acceptance procedures will be considered. The conceptual framework of this study is shown in Fig.1.

In this study, we had used mind mapping, time-line study techniques during meeting. Meeting with experts and stakeholders was carried out 3 times and 4 times, respectively. The experts and stakeholders were representatives from government and province public health sectors, water treatment plant, people from various occupations who live in Samut Songkram Province, university and so on. At first 2 meetings with stakeholders who live in the province,

we discussed about existing problems related to water resources in Mae Klong Basin. And after presentation of the diverting water project, we got information of their thought about indicators. As for meeting with experts, we discussed about health impact in the 4 dimensions from the project, appropriate indicators, assessment method and process.

The results from expert meetings were documented for the last stakeholders meeting that 46 indicators in 4 dimensions were introduced. The feedback from the last meeting was considered for appropriate indicator selection. We have been screening indicators available to collect and considering assessment methods.

At the end of this study in phase 1, we can propose the step-by-step approach needed to set up an appropriate assessment process in a different population, making sure that all the technical method required are available. We hope that finally recommendations such as appropriate implementation of the mitigation will be found out.