4.2.3 Part 2-3) Summary of Situation and Issues of NRE

a. Summary of Issues, Cause, Impact and Measures for Solving Issue

In the previous section, current issues and impact from socio-economic development were analyzed based on data on the situation and issues in the province, in order to show the seriousness and trend of each issue. The summary of issues, area in which the issues occur, their cause, impact and past/future measures for solving issues are presented in the following table:

Table 4-84: Summary of Issues, Cause, Impact and Measures for Solving Issues, for Natural Resources

Natural Resources	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
1. Soil and Land Resource	Decrease of natural land such as "wetland and rangeland" and active extraction of soil and sand	• See Figure 4-11 in Main Report (Land Use) • See Figure 4-15 in Main Report (Location of Sand/Soil Pit)	Demand for soil and sand to reclaim land are very high	• Degradation of natural resources and loss of flood mitigation function of nature. • There may be an impact to neighboring areas from landslides	Provincial industrial office supervises and LAs checks in initial stage before giving permission	Promotion of appropriate land use with consideration to both environmental protection and social and economic activities
	Deterioration of soil quality	Bang Bal district, Pak Hai district, Lad Bualuang district, Wang Noi district, Nakhon Luang district	• Increase in agriculture cycles per year results in more fertilizer and chemicals • Salt damage to soil and contaminated groundwater due to overdrawing of groundwater by industrial complexes	Deteriorated soil lowers agriculture production	Provincial agriculture office promotes organic farming	• Benefit of proper land use and soil conservation shall be disseminated to the residents • Develop a standard for groundwater usage to control over-pumping
	Erosion of rivers and channel embankments, and sedimentation of eroded soil in river and channel beds	Whole AYP	• Lack of embankment protection • Frequent river and channel traffic	• Risk to land and property • Transportation problems and risk of flood	-	Protection of riverbanks such as slope protection

Natural Resources	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
2. Forest Resource and Wildlife	Greenery area in towns needs to be increased	Whole AYP	Insufficient effort for having greenery areas in urban areas	Poor urban environment	-	Support for increasing greenery areas in urban areas
3. Water Resource	Floods in rainy season	Outside world heritage area and along main rivers	Whole province is low-lying land and receives water from northern part	Residents face difficulties from long-term floods	Canal digging, flood prevention system for world heritage area	Formulation of comprehensive provincial flood prevention and mitigation plans
	Natural and artificial canals are not well maintained	Whole AYP	Lack of maintenance system at provincial level	Cause of floods and insufficient water intake	-	• Rehabilitation and improvement of natural and artificial canals • Support water hyacinth removal
4. Mineral Resource	Usage of excavated holes after extracting soil and sands is a major environmental issue	See Figure 4-15 in Main Report (Location of Sand/Soil Pit)	Demands for soil and sand to reclaim land are very high	• Since many of the holes are used as waste disposal sites without proper protection, they have adverse impacts on the surrounding area • There may be an impact to neighboring areas from landslides	-	Monitoring usage of borrow pit sites, evaluation and approval of appropriate development plans for the sites
5. Marine and	Ayutthaya is an inland province and there are no marine and coastal resources.					

Natural Resources	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
Coastal Resource						
6. Biodiversity	Lack of supervision and awareness for preservation of biodiversity, especially wetlands and sanctuaries	Tal Aen Temple, Bang Pahan district	No interest from community	Population decrease in endangered bird species	Monks and residents around Tal Aen Temple take care	• Formulate conservation plan • Support residents and organizations actively conserving biodiversity

Table 4-85: Summary of Issues, Cause, Impact and Countermeasure for Solving Issues, for Environment

Environment	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
1. Water Quality	Safe and quality water supply is not assured	Water supply facilities which use water are affected by water pollution sources as shown in Figure 4-23 in Main Report (Location Map of Major Water Utilization Facilities)	Inappropriate treatment and/or lack of treatment of wastewater from various sources	• Increase in water purification costs • Deterioration of purified water quality	-	• Formulation of water distribution plan in Province • Formulation of master plan on domestic water supply
	Water quality of public water bodies is not preserved	Various public water bodies affected by water pollution sources as shown in Figure 4-22 in	Inappropriate treatment and/or lack of treatment of wastewater from various sources	• Increase in water purification costs • Deterioration of purified water quality	-	• Pollution source survey • Formulation of Water Quality Preservation Plan in Public Water

Environment	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
		Main Report (Location Map of Water Pollution)				Bodies
2. Air Quality	PM10 concentration exceeds environmental standards for 11-16 days a year	Agricultural areas	• Burning of agricultural waste after harvesting • Vehicles on the road	Possible impact on public health due to air pollution	Request cooperation from related agencies	Develop a cooperative system among stakeholders to treat agricultural wastes appropriately
	Dust and smoke from river ports, and dust, smoke and odor emitted from factories	See Figure 4-26 in Main Report (Location Map of River Port)	Dust and smoke results from loading and unloading of coal and flour using backhoes at river ports	Possible impact on health of residents in vicinity	Provincial water transport office coordinates with ports to take control measures before giving permission to operate	Agencies that issue business licenses to river ports should warn operators to take preventive measures such as installing a dust collector or planting trees for protection
	The level of pollution from mobile emission sources such as vehicles is not properly monitored	Whole AYP	Lack of monitoring for mobile emission sources	No evaluation of the adverse impact by mobile emission sources, especially along trunk roads	-	Regularly analyze air quality of major roadways to investigate impact of vehicles and other mobile emission sources
3. Noise Quality	Loud noise from cargo river port and factories	See Figure 4-26 in Main Report (Location Map of River Port)	Loading and unloading operations from boats using backhoes, trucks and motorboats with boat engines	Possible impact on local residents' quality of life	Provincial water transport office coordinates with ports to take control measures before giving permission to operate	Stricter control by Provincial water transport office before giving ports permission to operate

Environment	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
4. Solid Waste	Open dumping operation at most disposal sites	See Figure 4-30 in Main Report (Location of Disposal Site in Flood Prone Areas)	Lack of knowledge in sanitary disposal system by all players, including local administration officials, has led to the lack of attention to sanitary disposal	• Contamination of surface and underground water by leachate • Air pollution by spontaneous combustion of wastes	Orborjor conducted master plan study for waste disposal system	Implement the proposed projects in the master plan
	Improper municipal Solid Waste Management (SWM)	Most LAs in AYP	Lack of knowledge in proper and sustainable SWM	• Unsanitary conditions in LAs such as heaps of waste • Inactive 3Rs (Reduce, Reuse and Recycle) activities	-	Implement the proposed projects in the master plan
5. Hazardous waste and toxic substance	The amount of hazardous wastes generated from factories (HIW) is estimated at 224 tons/day in 2005 and information on their disposal has not been identified; improper HIW management could have significant impact	Whole AYP	Lack of studies to assess the current situation	• Significant negative impact on environment of AYP by improper HIW management • Multiple instances of illegal dumping of HIW	-	• Carry out investigation on industrial wastes, especially hazardous wastes, with cooperation from Provincial DIW Prioritize HIW treatment among industrial waste issues

Environment	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
	Information on medical waste disposal has not been identified; but the amount of medical waste generated is limited to less than 1 ton/day in 2005	Whole AYP	Lack of studies to assess the current situation	• Significant negative impact on environment of AYP by improper medical hazardous waste management	-	Intensive education activities promoting proper disposal, aimed at sources of medical waste generation
6. Urban Environment	Urban area is expanding without appropriate direction and tends to cause physical and visual congestion: specifically the expansion of residential areas near industrial estates lack proper basic infrastructures	U-tai district, Bang Pa-in district, Phra Nakhon Si Ayutthaya district, Sena district, Nakhon Luang district	The industrial sector expanded rapidly, causing the spread of slums which lack basic infrastructures	Impact on the quality of life to urban residents	Promote the expansion of green areas in public areas and around government agencies	• Develop community areas according to comprehensive urban planning • Government agencies and citizens cooperate in the development of green boulevards, urban neighborhood parks, recreational facilities, etc.
7. Natural Environment and Culture	Restoration, maintenance, management, use, and conservation of cultural assets is not done properly	See Figure 4-34 and Table 4-78 in Main Report (Locations of Natural and Cultural Heritage; List of same)	Inappropriate of land use, change of goodwill, spread of less traditional lifestyles in Thai society, lack of public awareness, utilities construction and pollution	Deterioration of cultural assets	Related agencies follow master plan of historical city	• Conserve the natural environment • Inform the public on the protection of cultural assets through educational activities and community participation

Environment	Summary of Issue	Area in which Issue Occurs	Causes	Impact	Measures Taken	Measures to be Taken
	Insufficient and improper conservation of nature where it intrudes into the living environment	Whole AYP	Inappropriate land use, change of goodwill, spread of less traditional lifestyles in Thai society, lack of public awareness, utilities construction and pollution	Deterioration of natural environment	-	• Inform the public of the importance of tourism resources in providing income for management and conservation • Strengthen the capacity of staff in local administrations
8. Global Warming	The countermeasures set up in the National Strategy on Climate Change (NSOCC) are not implemented well; for example, afforestation is hardly done in spite of extremely few greenery areas remaining	Whole AYP	Lack of knowledge on global warming issues	Deterioration of environment	-	Implement countermeasures which are set up in NSOCC, especially the following: • Increase forest area by afforestation • Enforcement of land use laws to preserve "Rangeland/ Wetland" which has flood control functions • Implement sanitary landfill operation measures and promote 3Rs by public relation and education activities in cooperation with REO 6
	Rangeland/Wetland decreased significantly					
	Final disposal sites are operated using open dumping methods despite significant GHG emissions from waste, and 3Rs (Reduce, Reuse and Recycle) activities are hardly taking place					

b. Vision, Goal, Issue and Measure of NREM in AYP

It is impossible to address all of the issues and implement all of the measures to be taken discussed in the section above by the PEQMP target year of 2011. Therefore, the ideal state of NREM that the Province should aspire to on the long term was expressed through Vision and Goals, and the Issues and Direction of Measures sorted accordingly. Vision and Goals must reflect the opinions of as many stakeholders as possible, and it is only presented here to stimulate discussion. In this summary version, Visions, Goals, and Strategies are presented below.

b.1 Vision and Strategy

b.1.1. Vision

The vision is to realize a secure and abundant social environment with World Cultural Heritage at its nexus through conservation and rehabilitation of natural resources and the propulsion of sustainable industrial development.

b.1.2. Goals

1. Conservation of World Cultural Heritage in harmony with industrial development.

   The following issues should be resolved to realize this harmonious relationship.

   - Social infrastructure is prepared according to demand by confirming the non-registered population.
   - Agricultural land covering 87% of provincial territory is made more productive.
   - Industrial development is promoted which is sympathetic to environmental conservation.
   - The environment is protected from deterioration due to increase of tourists.
   - Industry is encouraged to use local wisdom and property efficiently.
   - A prosperous coexistence is created of the urban environment and the conservation of World Cultural Heritage.
   - Nature and cultural heritage is conserved and utilized effectively.

2. The creation of a secure and abundant social environment.
   - Safe and good quality water is provided to all residents in the province.
   - Safe and good quality of water is secured.
   - An appropriate and sustainable system of solid waste management is constructed.
   - Good air quality is maintained.
   - Adverse impact by noise and vibration is prevented.
   - Appropriate system for hazardous waste management is constructed.
   - A system is set up to confront global warming problems.

3. Provincial development is harmonized with conservation and rehabilitation of natural resources.
   - Soil and land resources are used effectively and conserved according to the local features.
   - Forest resources are conserved and rehabilitated.

- The lives and property of residents in the province are protected by setting up a management system of water resources.
- The management system of mineral resources is set up and maintained.
- Biodiversity is ensured.

b.1.3. Strategies

The following six strategies were established based on National EQMP in order to reach the goals shown above.

Strategy 1: Allow joint ownership of environmental data, public access to information and knowledge of NREM, and encourage public participation in NREM.

Basic information of NREM is disseminated to residents in the province, residents' awareness is developed and they are encouraged to participate in NREM. Especially facts on adverse impact on health and living by degradation of environmental quality are clarified so that residents may monitor and protect local natural resources and environment by themselves. In order to realize this, the opening of information on natural resources and environment to the public is promoted. Moreover, a monitoring committee is set up including representatives of local residents and Business Enterprises so that they can join the meeting for evaluation of the progress of PEQMP implementation.

Strategy 2: Improve the efficiency of NREM and develop stakeholder capacity.

Jurisdiction of the organizations related to NREM is made clear and duplication of activities can be avoided in addition to strengthening the linkage among each organization. Information of NREM is unified and owned in common, and the capacity of the organizations and their staff is developed.

Strategy 3: Support local administrations to manage NREM.

The organization for NREM in local administration is strengthened and its administrative capacity is developed. Local administrations are given support to establish their regulations to strengthen the organization for NREM. Moreover, in order to support and strengthen weak local administrations, joint investment and cooperative management are driven forward for NREM with Orborjor at its nexus.

Strategy 4: Reduce poverty through the fair utilization of natural resources so that they reach grassroots society.

Win-Win measures by which all stakeholders can gain profit are introduced by promoting empowerment to local residents based on the principle that beneficiaries should pay part of cost.

Strategy 5: Promote efficient and sustainable use of natural resources with consideration to environmental conservation.

The mechanism of cost burden is developed to rehabilitate natural resources and environment (NRE), in cooperation with local residents and relevant organizations, by setting up rules and regulations prescribing the provision for payment to an agency to manage NRE.

Through a variety of study processes, whether official or unofficial, education is conducted for all members of the younger generation and knowledge of natural resources and environment is disseminated. In order to set up the production target

taking a serious view of natural balance, research and development are actively conducted regarding sustainable and effective use of natural resources.

Strategy 6: Conduct balanced and sustainable environmental development through conservation, monitoring and the rehabilitation of nature.

Based on Social Measurement, which applies the Polluter Pays Principle (PPP) and Beneficiary Pays Principle (BPP) and published information of impact on natural resources and environment, etc., conservation, monitoring and rehabilitation of the natural environment are conducted. Protected areas are managed according to the principle of biodiversity, and wildlife habitats are managed according to forest classifications.

b.2 Ideal State of NREM, Issues, and Direction of Measures

All of the above suggestions are represented in the following figure, which depicts the ideal state of NREM that AYP should aspire to on the long term, current issues, and the direction of measures:

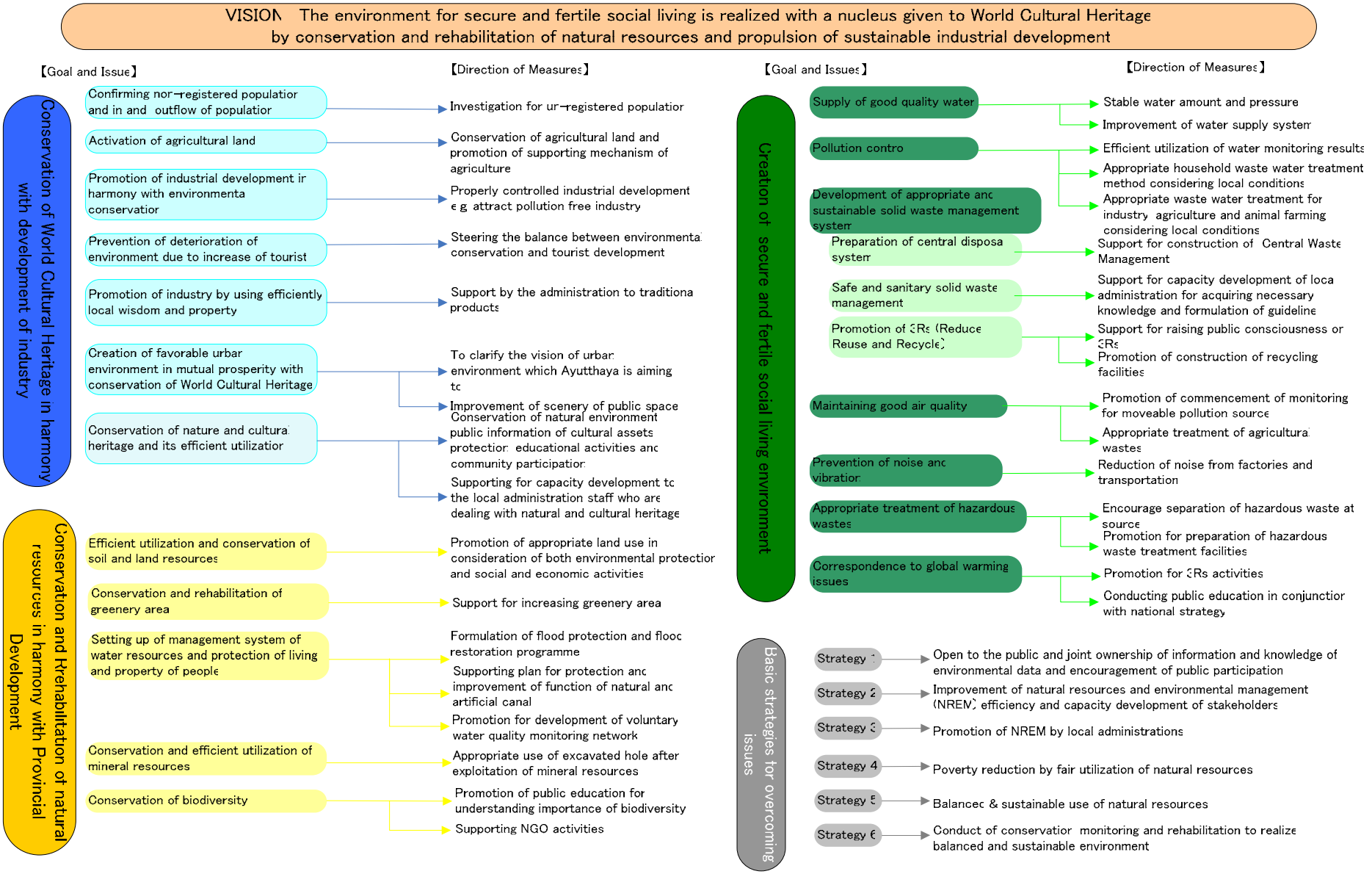


Figure 4-36: Vision, Goals, Issues and Direction of Measures for NREM in AYP

4.2.4 Part 2-4) Priority Setting of Issues

As mentioned above, there are many issues to be resolved in NREM in AYP. However, there are limited financial and human resources available. In this section, we examine the priority issues to be resolved by the target year 2011 in PEQMP (2008-2011) for AYP.

a. Opinion Survey of Stakeholders

a.1 Target Groups

An opinion survey was conducted among the following four stakeholder groups. Their answers were collected, added and analyzed according to target group.

Table 4-86: Target Group for Opinion Survey

Target Group	Abbreviation	Number
Local Administration	OP-LA-AYP	54 LA
Resident	OP-RE-AYP	226
Business Enterprise	OP-BE-AYP	97
NGO	OP-NGO-AYP	5 NGO

a.2 Problems within Local Administration (LA)

The most serious problems within LAs were indicated as follows:

Table 4-87: Problem in LA

Target Group	Most Serious Problem	Reply Rate (%)	Second Most Serious Problem	Reply Rate (%)
LA	Deterioration of NRE	41.1	Insufficient administrative capacity of LA	29.6
Resident	Deterioration of NRE	44.7	Stagnation of Economy	31.4
Business Enterprise	Stagnation of Economy	45.4	Deterioration of NRE	39.2
NGO	Deterioration of NRE	40.0	Insufficient administrative capacity of LA	20.0

a.3 Problems of NREM

Serious problems of NREM according to each target group are listed in the following table. The percentage value shown in the table is the ratio of respondents who selected “4 Very Serious” among six possible choices (1 Not serious at all, 2 Not very serious, 3 Somewhat serious, 4 Very serious, 5 Can’t choose, 6 No response).

Table 4-88: Problem of NREM

Target Group	Most Serious Problem	Reply Rate (%)	Second Most Serious Problem	Reply Rate (%)
LA	Water Resources Management	53.7	Solid Waste Management	42.6
Resident	Water Resources Management	38.5	Global Warming/Climate Change	19.5*1
Business Enterprise	Water Resources Management	35.1	Global Warming/Climate Change	15.5*1
NGO	Solid Waste Management	60.0*2	Water Resources Management	60.0*2

*1: A slightly larger number of interviewees actually chose "4 Very serious" for Water Quality than Global Warming. However, those who said Global Warming was "3 Somewhat serious" clearly outnumbered those who considered Water Quality as "3 Somewhat serious", so Global Warming is shown here as the overall second most important problem.

*2: While the reply rates for the most/second important problem are the same in the "4 Very serious" category, Solid Waste Management is shown here as the overall most important problem, as more interviewees ranked it as "3 Somewhat serious".

The respondents indicated the following reason for their choice of which item was the most serious problem, as follows:

Table 4-89: Reason for Selecting Most Serious Problem

Most Serious Problem	Specific issue	Reason for choice
Water Resources Management	• Flood	• Loss of agricultural land and property • Disruption of transportation
Solid Waste Management	• Non-sanitary landfill	• Occurrence of environmental and sanitary problems

The respondents indicated the following reason for their choice of which item was the second most serious problem, as follows:

Table 4-90: The Reason for Selecting the Second Most Serious Problem

Second Serious Problem	Specific issue	Reason for choice
Solid Waste Management	• Improper disposal of huge amounts of waste • Difficulty of acquisition of disposal site	• Occurrence of serious environmental problems
Global Warming	• Rise in temperature	• Health problems • Increase of energy costs
Water Resources Management	• Flood	• Loss of agricultural land and properties • Loss of fertile land

a.4 Resident requests to LA

There are 42 LAs in which residents request improvement of the local area (78% of all LAs). The request for "Construction of infrastructure like roads and bridges" is the most common

request (requested in 69.0% of LAs) and "Lighting of public areas" is the second one (38.1% of all LAs), with "Socioeconomic development" is the third (31.0% of all LAs).

b. Priority Examined in SWOT Analysis

The PEQMP-KPI Formulation Committee was held at the AYP Conference Room on 27th June 2007 chaired by the Vice Governor, and a SWOT Analysis was conducted with 20 relevant participants directed by a moderator from AY University. SWOT Analysis analyzes the Strengths (S), Weaknesses (W), Opportunities (O) and Threats (T) of AYP to resolve the problem of NREM.

In addition to SWOT Analysis, the priority among issues to be resolved for NREM was examined in the PEQMP-KPI Formulation Committee.

The results of the latter discussion are as shown below:

Table 4-91: Priority Issues on NREM in AYP Discussed in SWOT Analysis Meeting

Priority	NREM Problems	Suggestion for Preventive Measures and/or Solution
1.	Solid Waste Management (SWM)	1. Promote integrated SWM system in LAs 2. Support LAs to gain knowledge and guidelines for appropriate SWM 3. Study form and method of SWM appropriate for LAs 4. Support establishment of a waste disposal center 5. Create public awareness for residents to reduce, separate and recycle waste 6. Support LAs to join together to construct waste disposal system and support recycling activities
2.	Surface Water Resources and Flood Control	1. Support residents to use septic tanks for primary treatment of wastewater 2. Support LAs to have wastewater treatment system in their communities 3. LA should exert control over building construction in accordance with Building Control Act regarding wastewater treatment from buildings 4. Exert control over business enterprises so that they will not discharge wastewater to public water bodies without treatment 5. Establish volunteer network to monitor environmental quality 6. Rehabilitate and improve canals and natural water courses in order to receive water and drain water effectively 7. Support activities to remove weeds in canals in order to reduce pollutants from water sources 8. Formulate flood prevention and disaster mitigation plan
3.	Tourism Places for Art, Culture and History	1. Follow master plan of historical city 2. Conduct campaigns directed at tourists to keep tourist sites clean 3. Systematic cooperation and coordination between LAs and related agencies 4. Build up capacities of LA staff to conserve and protect art, cultural and historical places

4.	Air Pollution and Noise	1. Promote agricultural technology without open burning 2. Increase efficiency in control burning of vacant lots in urban areas in order to reduce impact to air quality 3. Control activities or enterprises that cause air pollution problems, noise and vibration in residential areas
5.	Biodiversity	1. Support residents who participate in conservation and rehabilitation of biodiversity in important areas 2. Support knowledge exchange among community network in the field of biodiversity
6.	Groundwater Resources	1. Prepare guidelines to prevent groundwater contamination 2. Improve quality of contaminated groundwater to a level suitable for drinking and domestic use 3. Rehabilitate water sources which were damaged due to flood
7.	Soil Resources and Land Use	1. Educate local residents in land use benefit, soil conservation, and water quality management, and also develop volunteer network
8.	Urban Environment	1. Develop community areas in accordance with comprehensive city plan 2. Increase green areas, vacant areas and public parks in urban areas and around government agencies, and also conduct scenery improvement in public recreational areas 3. Support residents in community environment management by development of public land 4. Create understanding and awareness among all stakeholders so that they take part in community environment management

Source: PEQMP-KPI (2008-2011), AYP

c. Examination of Priorities

Since NREM encompasses a wide-ranging variety of sectors, it is quite difficult to determine the priority ranking among projects from differing sectors. Additionally, individual NREM projects routinely require a huge sum of money to implement. Thus it becomes important to conduct sufficient survey, research, and planning activities and to exhaustively consider the feasibility of each project, in order to make each individual NREM project cost-effective. Specifically, priority among projects should be determined only after extensive comparative analyses between sector *master* plans. AYP lacks these basic master plans in various NREM sectors. Therefore, the Study Team suggests the following regarding priorities:

- First of all, top priority should be given to the formulation of master plans for each NREM sector.
- In the case of solid waste management and conservation of cultural heritage, the opinion survey among stakeholders and SWOT analysis have confirmed their high priority status and their master plans (Provincial Master Plan for Solid Waste Management and Master Plan for Historical City) have been already formulated. Therefore, we recommend that priority projects in these two respective sectors be implemented according to their master plan.

- For master plan formulation, the priority among NREM sectors aside from solid waste management and cultural heritage can be ranked as follows, based on the result of the opinion survey among stakeholders and examination of priority issues conducted during SWOT analysis.
  - Flood protection
  - Preservation of water quality
  - Tackling global warming
  - Air pollution protection measures
  - Preservation of biodiversity
  - Conservation of water resources
  - Conservation of soil and land resources
  - Improvement of urban environment
- This Study has confirmed that surface water quality is deteriorating, and thus water quality improvement measures and improvement of the water supply system, in areas where surface water is utilized as a water source for tap water, have top priority. It is recommended that the current situation be urgently examined and an improvement plan be formulated as a top priority issue.
- Finally, strengthening the NREM administrative capacities of LAs has equal priority with any urgent individual issue, as they hold responsibility over NREM in their respective localities.

4.2.5 Part 2-5) Provincial Potential Analysis by SWOT Analysis

a. Consideration of all Factors

Internal Factors of Province	**Strengths; S** 1. Places of tourism, history, and culture that are admired as world heritage 2. Main industrial area 3. City of abundant food 4. Location is good, near Bangkok and important whole sale market 5. Has transportation network connected to all parts of country 6. Has enough area to support city expansion from Bangkok and vicinities 7. Important water transportation place	**Weaknesses; W** 1. Lack of tourism management 2. Environmental problems (waste, wastewater, air pollution, land subsidence) 3. Traffic problem/accidents 4. Lack of awareness, morals 5. Social problem from drugs, crime including non-registered population 6. Lack of education curriculum that meets requirement of labor market
External Factors of Province	**Opportunities; O** 1. Industrial policy target of government in 5 fields (agriculture, tourism, industry, commercial, One Tambon One Product (OTOP))	**Threats; T** 1. NGO is not strong enough 2. Lack of continuous action following master plan of historical city

b. Results of Internal Factors Analysis

b.1 Solid Waste Management

Internal Factors Analysis	Analysis Score			
	Strengths (S)	Weakness (W)	Total Score	Average Score
1. Administration Structure of Province	3	-2	1	0.125
2. Regulation/Law	2	-1	1	0.125
3. Personnel	3	-2	1	0.125
4. Database	2	-1	1	0.125
5. Coordination	2	-1	1	0.125
6. Cooperation	2	0	2	0.25
7. Equipment	2	-2	0	0
8. Awareness	1	-3	-1	-0.25
Total	17	12-	2	0.625

b.2 Places for Tourism, Art, Culture and History

Internal Factors Analysis	Analysis Score			
	Strengths (S)	Weakness (W)	Total Score	Average Score
1. Administration Structure of Province	4	-1.5	2.5	0.31
2. Regulation/Law	2	-1.5	0.5	0.062
3. Personnel	2	-1	1	0.125
4. Database	4	-1	3	0.375
5. Coordination	3	0	3	0.375
6. Cooperation	2	0	2	0.25
7. Tool and Equipment	2	-1	1	0.125
8. Data Assessment	2	-2	0	0
Total	23	-8	12	1.622

b.3 Surface Water Resources, Quality, and Flood Problem

Internal Factors Analysis	Analysis Score			
	Strengths (S)	Weakness (W)	Total Score	Average Score
1. Administration Structure of Province	5	0	5	0.71
2. Regulation/Law	5	0	5	0.71
3. Personnel	4	0	4	0.57
4. Database	3	-1	2	0.29
5. Coordination	3	-1	2	0.29
6. Cooperation	4	-1	3	0.43

7. Tool and Equipment	1	-5	-4	-0.57
8. Data Assessment	25	-8	17	2.43
Total	5	0	5	0.71

b.4 Biodiversity

Internal Factors Analysis	Analysis Score			
	Strengths (S)	Weakness (W)	Total Score	Average Score
1. Administration Structure of Province	1	-5	-4	-0.5
2. Regulation/Law	2.5	-2	0.5	0.0625
3. Personnel	1	-5	-4	-0.5
4. Database	1	-5	-4	-0.5
5. Coordination	1	-5	-4	-0.5
6. Cooperation	1	-5	-4	-0.5
7. Tool and Equipment	1	-5	-4	-0.5
8. Data Assessment	1	-5	-4	-0.5
Total	9.5	-37	-27.5	-3.43

b.5 Air Pollution and Noise

Internal Factors Analysis	Analysis Score			
	Strengths (S)	Weakness (W)	Total Score	Average Score
1. Administration Structure of Province	5	0	5	0.625
2. Regulation/Law	5	0	5	0.625
3. Personnel	3	0	3	0.375
4. Database	2	-1	1	0.125
5. Coordination	2	-1	1	0.125
6. Cooperation	2	-1	1	0.125
7. Tool and Equipment	5	0	5	0.625
8. Data Assessment	3	-3	0	0
Total	27	-6	21	2.63

Remark: Giving score (X or Y) for internal factors
Score of Strength (S) If = 5 Maximum = 4 Medium =3 Less = 2 Least = 1 None =0
Score of Weakness (W) If = -5 Maximum = -4 Medium = -3 Less =- 2Least = -1 None =0

c. Results of External Factors Analysis

c.1 Solid Waste Management

External Factors Analysis	Analysis Score			
	Opportunities (O)	Threats (T)	Total Score	Average Score
1. Economic	4	-2	2	0.4
2. Social Culture	1	-3	-2	-0.4
3. Politic State Policy Law	3	-1.5	1.5	0.3
4. Technology	2	-4	-2	-0.4
5. Population	1	-3	-2	-0.4
Total	11	-13.5	-2.5	-0.5

c.2 Places for Tourism, Art, Culture and History

External Factors Analysis	Analysis Score			
	Opportunities (O)	Threats (T)	Total Score	Average Score
1. Economic	4	-2	2	0.5
2. Social Culture	4	-1	3	0.75
3. Politic State Policy Law	4.5	-0.5	4	1.00
4. Technology	4	-1	3	0.75
Total	16.5	-4.5	12	3

c.3 Surface Water Resources, Quality, and Flood Problem

External Factors Analysis	Analysis Score			
	Opportunities (O)	Threats (T)	Total Score	Average Score
1. Economic	1	-5	-4	-1
2. Social Culture	0	-4	-4	-1
3. Politic State Policy Law	2	-3	-1	-0.25
4. Technology	1	-4	-3	-0.75
Total	4	-16	-12	-3.00

c.4 Biodiversity

External Factors Analysis	Analysis Score			
	Opportunities (O)	Threats (T)	Total Score	Average Score
1. Economic	0	-5	-5	-1.25
2. Social Culture	0	-5	-5	-1.25
3. Politic State Policy Law	2	-3	-1	-0.25
4. Technology	0	-5	-5	-1.25
Total	2	-18	-16	-4.00

c.5 Air Pollution and Noise

External Factors Analysis	Analysis Score			
	Opportunities (O)	Threats (T)	Total Score	Average Score
1. Economic	3	-2	1	0.25
2. Social Culture	4	-1	3	0.75
3. Politic State Policy Law	0	-4	-4	-1.00
4. Technology	5	0	5	1.25
Total	12	-7	5	1.25

Remark: Giving score (X or Y) for external factors
Score of Opportunity O) If = 5 Maximum = 4 Medium =3 Less = 2 Least = 1 None =0
Score of Threat (T) If = -5 Maximum = -4 Medium = -3 Less =- 2Least = -1 None =0

d. Summary of Provincial Potential Analysis

Problem	SW	OT
1. Waste Management	0.625	-0.500
2. Places for Tourism, Art, Culture, and History	1.625	3.000
3. Surface Water Resources, Quality, and Flood Problem	2.375	-3.000
4. Biodiversity	-3.4375	-4.000
5. Air Pollution and Noise	2.625	1.250

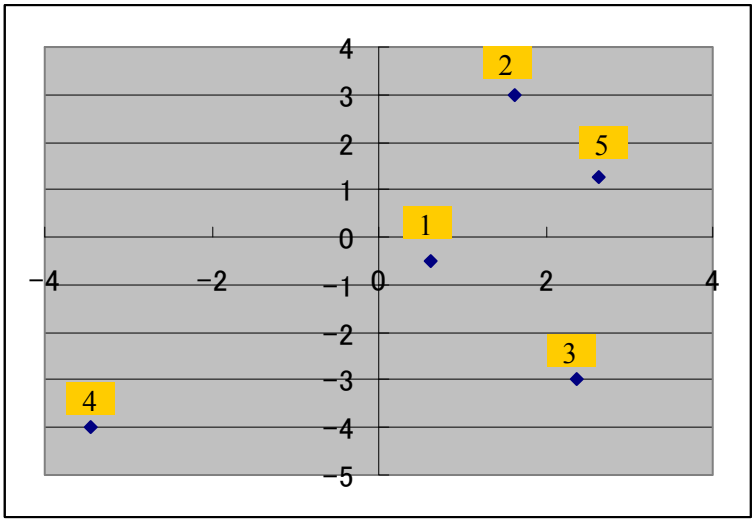


Figure 4-37: SWOT Analysis of AYP

4.2.6 Part 2-6) Selection of Priority Programs

Priority Projects in PEQMP are projects that will be implemented by year 2011, and can be sorted into two major categories:

- Improvement in individual NREM sectors
- Strengthening of NREM administrative capacities in AYP

The contents of this chapter have been used as a basis for discussion with relevant stakeholders, and through such discussions, the following Priority Programs (common-goal clusters of related Priority Projects) were chosen for implementation by year 2011:

a. Improvement in individual NREM sectors

1. Program for improvement of solid waste management
2. Program for flood prevention and disaster mitigation
3. Program for safe and quality water supply
4. Program for water quality preservation in public water bodies

b. Strengthening NREM administration capabilities in AYP

1. Program to strengthen linkage between Central Government agencies and LAs
2. Program to strengthen NREM capacities of LAs

4.3 Part 3: Details of the PEQMP

In response to the comments of the PEQMP-KPI Evaluation Committee, a Project Design Matrix (PDM) was made for each Priority Program:

- A PDM was made for each Priority Program, which is a common-goal cluster of individual projects for solving priority NREM issues by 2011.
- A PDM shows the relationship between priority issue and individual projects (i.e. Priority Projects) formulated to solve these issues.
- A PDM shows indicators to monitor and evaluate each individual project (i.e. Priority Project).
- A PDM shows the responsible and supporting agencies for each individual project (i.e. Priority Project).

Then, the corresponding implementation and budget plan for each Priority Project is shown in a single corresponding table.

4.3.1 Priority Programs and Priority Projects

a. Program for improvement of solid waste management

The current system of municipal SWM mainly consists of a collection system and final disposal system. An important point is that there are over 18 disposal sites for a population of about 750,000 in the province; an incredibly redundant situation. Almost all of disposal sites are open dump operations as shown in the photos below. Consequently, the adverse impacts of the disposal site are very serious to the surrounding environment, especially among disposal sites located in the flood-prone area as shown in the figure below. In addition, although the national EQMP promotes 3R (Reduce, Reuse and Recycle) as important activities for sustainable SWM, LAs do not promote 3R activities well.

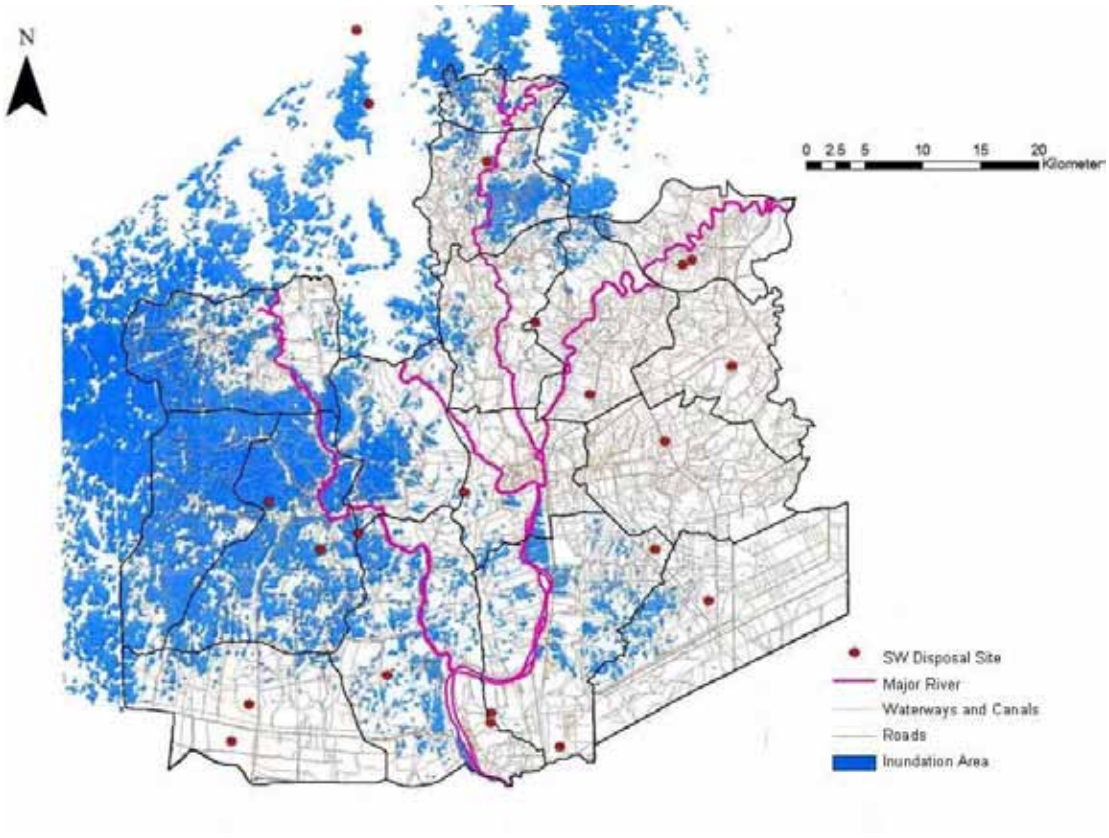


Figure 4-38: Location of Disposal Sites and Flood Prone Area in AYP (2006)

Nakhon Si Ayutthaya Disposal Site

Nakhon Luang Disposal Site

Table 4-92: Project Design Matrix (PDM) for Program for Improvement of Solid Waste Management in AYP

Program Name: Improvement of Solid Waste Management (SWM) in Ayutthaya Province (AYP)
Target Area: Ayutthaya Province
Target Group: Residents of Ayutthaya Province

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Construct a sustainable SWM system in AYP that affects the environment minimally	The clustering of LAs are implemented and a wide-area waste disposal system is established	Questionnaire to LAs	AYP does not change its SWM policy
Program Purpose 1. Urban waste generated in AYP is disposed in sanitary landfills 2. 3R activities are firmly established	1. The central disposal centers (CDC) and their environment 2. 30% of urban waste generated in AYP is recycled	1. Operation records and questionnaire to nearby residents 2. Questionnaire to LAs	AYP does not change its policy of building central disposal centers
Outputs 1. CDCs are constructed with - suitable volume for 20 years sanitary landfill operations. - recycling facilities (i.e. sorting and composting factory) - incineration of medical waste 2. School recycling system is developed	1. The disposal capacities of two new CDCs; recycling facility capacities; medical waste incineration facilities. 2. Number of schools implementing waste bank and their recycling record	1. Design drawing of the CDCs 2. Recycling report from school	Agreement among residents is established for the construction of CDCs
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Construction of two CDCs 1-1. Land purchase for CDC 1-2. Site preparation for construction 1-3. Detail design of CDCs 1-4. Construction of CDCs	Orborjor in collaboration with all LAs	PC, PCD, DOLA	 25,000,000 4,000,000 25,000,000 474,646,000
2. Development of school recycling system	Orborjor in collaboration with all LAs	PEO, PCD, DEQP,MOE	5,300,000

DOLA: Department of Local Administration

PEO: Provincial Environment Office

PCD: Pollution Control Department/MNRE

DEQP: Department of Environment and Quality Promotion

MOE: Ministry of Education

b. Program for Flood Prevention and Disaster Mitigation

According to the opinion survey, LAs, residents and business enterprises replied that the most serious problem of NREM in AYP is water resources management, specifically the management of floods. The reasons given were that floods cause "Loss of agricultural land and property" and "Disruption of transportation". In fact AYP had experienced considerable flood damage as shown in the table below, according to the Office of Disaster Prevention and Mitigation of MOI in AYP.

Table 4-93: Flood Damage in AYP

Year	Number of Affected People	Number of Deaths	Number of Damaged Houses	Affected Agriculture Area (rai)
2006	378,891	70	10,252	303,507
2007	50,140	7	1,879	42,432

Main rivers, canals, and flooded areas in AYP in 2006 are shown in the following figure and photos of flood disaster are presented below.

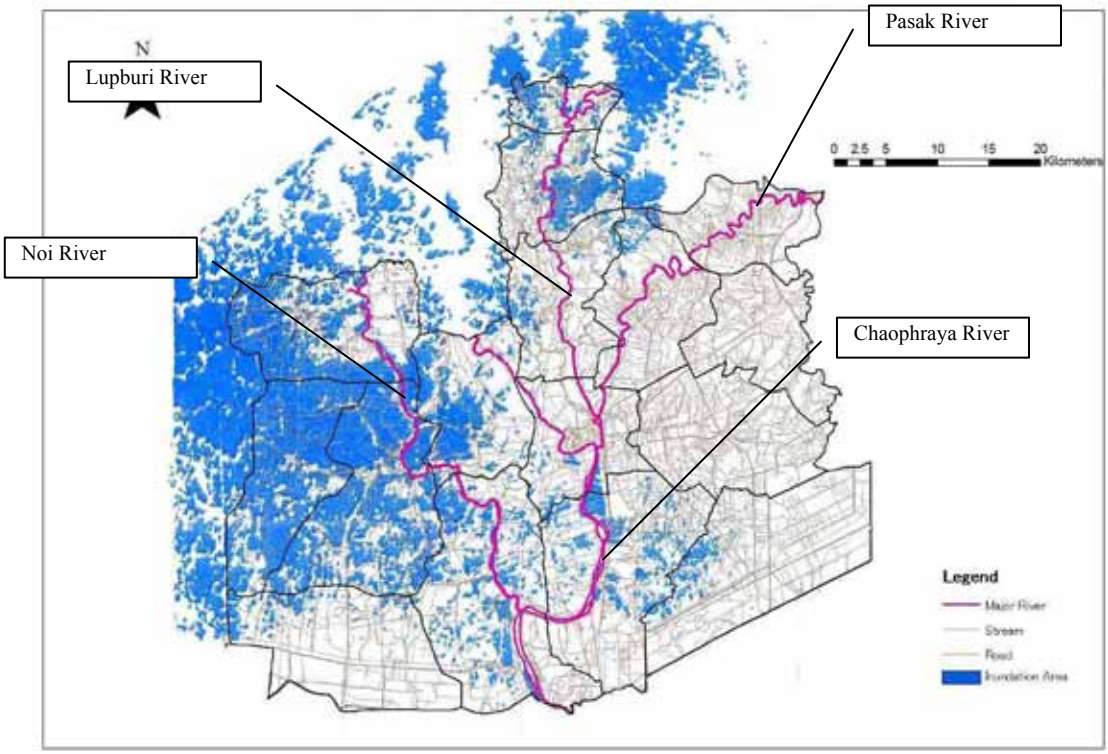


Figure 4-39: Main Rivers/Canals and Flood Disaster Area in AYP (2006)

Flood in AYP

Flood in AYP

Figure 4-40: Conditions of Flood in AYP

Table 4-94: Project Design Matrix (PDM) for Program for Flood Prevention and Disaster Mitigation in AYP

Program Name: Flood Prevention and Disaster Mitigation (FP/DM) in Ayutthaya Province (AYP)
Target Area: Flood risk areas of Ayutthaya Province
Target Group: Residents, organizations, and other relevant stakeholders in flood risk areas of Ayutthaya Province

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Strengthen AYP against flood.	Flood damage amount; awareness of relevant stakeholders	Statistics on flood damage; questionnaire	AYP does not change its FP/DM policy
Program Purpose An effective FP/DM plan that considers cost-benefit is formulated	Prioritization and action plans for flood FP/DM measures	Provincial FP/DM plan	
Outputs 1. A FP/DM plan that considers cost-benefit is chosen 2. River and canal function be improved and maintained to reduce the effect of floods. 3. Measures for flood damage mitigation will be outlined and risk of disaster will decrease	1. FP/DM plans and their EIRR/FIRR (Economic./Financial Internal Rate of Return) 2. Management and responsibility structure of various river and canal sections 3. Contents of flood damage mitigation plan	1. FP/DM plan study report 2. River and canal management plan report 3. Flood damage mitigation plan report	
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Formulation of FP/DM plan by 1.1 Study of hydrology in the area 1.2 Research and analysis of past damages and their costs. 1.3 Examination of flood disaster mitigation measures 1.4 Selection of priority measures	ODPM	MS, IPO, PWO, PAO, PFO, PLO	7,000,000
2. Formulation of action plan on renovation and maintenance of river and canal.	Orborjor, Tessaban, Orbortor	DOLA, RID	3,000,000
3. Formulation of action plan on flood damage mitigation	Orborjor, Tessaban, Orbortor	DEQP, DWR	3,000,000

ODPM: Office of Disaster Prevention and Mitigation

MS: Meteorological Station

IPO: Irrigation Project Office

PWO: Public Works and City Planning Office

PAO: Provincial Agricultural Office

PFO: Provincial Fishery Office

PLO: Provincial Livestock Office

DOLA: Department of Local Administration/Ministry of Interior

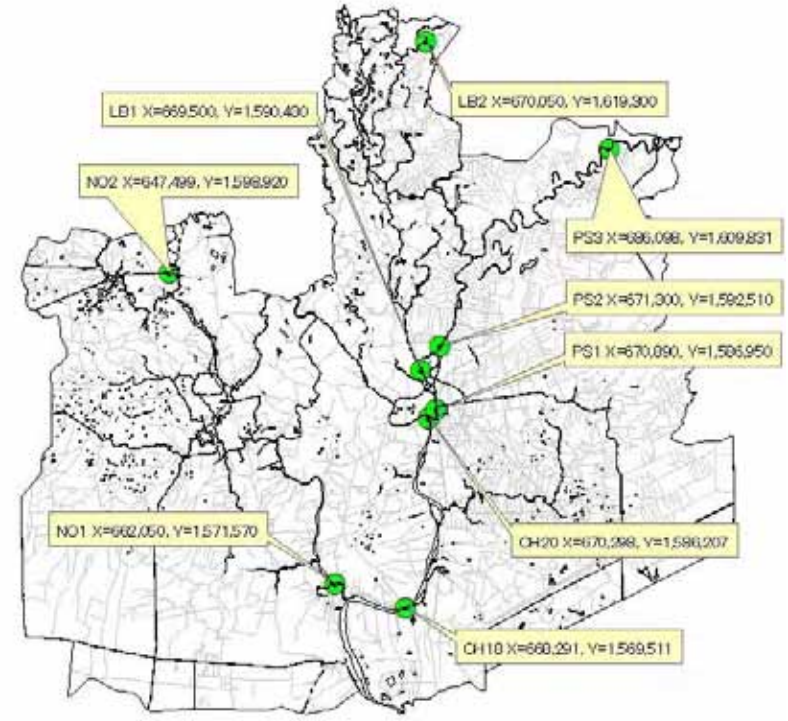
RID: Royal Irrigation Department/Ministry of Agriculture and Corporative

DEQP: Department of Environment and Quality Promotion/MNRE

DWR: Department of Water Resources/MNRE

c. Program for water quality preservation in public water bodies

There are nine water quality monitoring stations in AYP as shown in the Figure below: two in Noi, two in Chao Phraya, three in Pasak, and two in Lopburi River.



According to the results of past monitoring data, the water quality of all four main rivers shows a worsening trend. Based on the assumption that the same conditions (amount of pollutant, treatment, etc.) would continue in the future, water quality of all four major rivers will worsen compared with the current situation. According to the water quality class of PCD, the water quality of all four major rivers in 2006 was Class 4 or Class 5, which meant that the water required a special water treatment process before being used.

Table 4-95: Summary of Water Quality Class Results (2006) for Four Main Rivers in AYP

River name	Point	DO P20	BOD P80	TCB P80	FCB P80
Noi	NO 01	Class4	Class2	Class3	Class3
	NO 02	Class4	Class4	Class4	Class4
Lopburi	LB 01	Class5	Class4	Class4	Class4
	LB 02	Class4	Class5	Class4	Class4
Pasak	PS 01	Class4	Class4	Class4	Class4
	PS 02	Class4	Class4	Class3	Class4
	PS 03	Class4	Class4	Class4	Class4
Chao Phraya	CH 18	Class4	Class3	Class3	Class3
	CH 20	Class4	Class4	Class3	Class3

Note; P20: 20 percentile value, P80: 80 percentile value, TCB: Total Coliform Bacteria, FCB: Fecal Coliform Bacteria

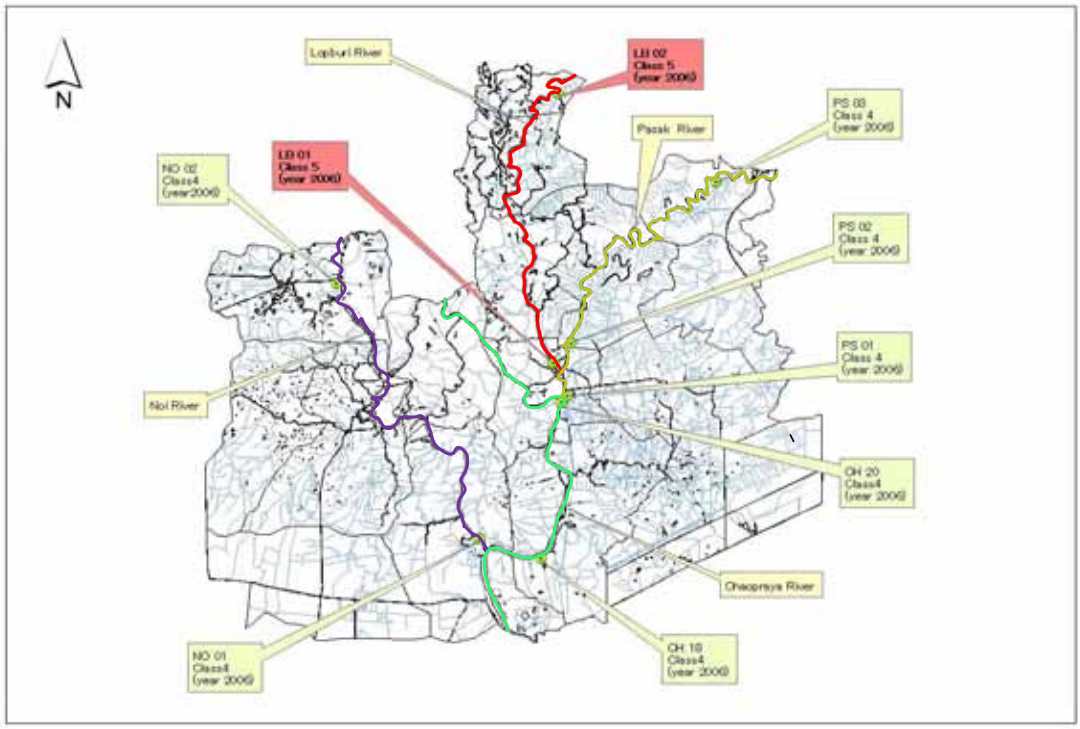


Figure 4-41: River Water Quality Monitoring Stations in AYP and Water Quality Class

Water pollution of public water bodies can seriously affect human health through water utilization facilities, in particular water supply facilities such as water purification plants and wells. If water pollution becomes serious, it raises the cost of purification or makes the water unsuitable for consumption and use. Also, as shown in the photos below, river water volume is greatly reduced in the dry season while pollution sources remain constant, resulting in worse water quality in the dry season. The serious effect of water pollution on water supply facilities using rivers as their water source must be kept in mind.

Water Purification Plant of Ayutthaya City on October 22, 2007

(Rainy Season: Water quality is better)

Water Purification Plant of Ayutthaya City on December 20, 2007

(Dry Season: Water quality is worse)

In fact there are several water purification plants along the Lopuburi River (such as three plants in Tessaban Tambon Rong Chang) which changed their water source from the Lopuburi River to underground water sources. Since the scale of these plants was small (about 1,000 m^3/day capacity on average), changing the water source was not difficult. The water source for a large scale plant like the one in Tessaban Nakhon Si Ayutthaya (City of Ayutthaya), however, is very difficult to change as the capacity of the plant is about 40,000m^3/day. Furthermore, water demand of AYP, especially around the City of Ayutthaya, is considerably high due to growth in the economic and tourism sectors, and it is expected that a switch to groundwater sources will be highly difficult.

A map showing the location of major water pollution sources and water utilization facilities in AYP was developed using the overlay function of GIS.

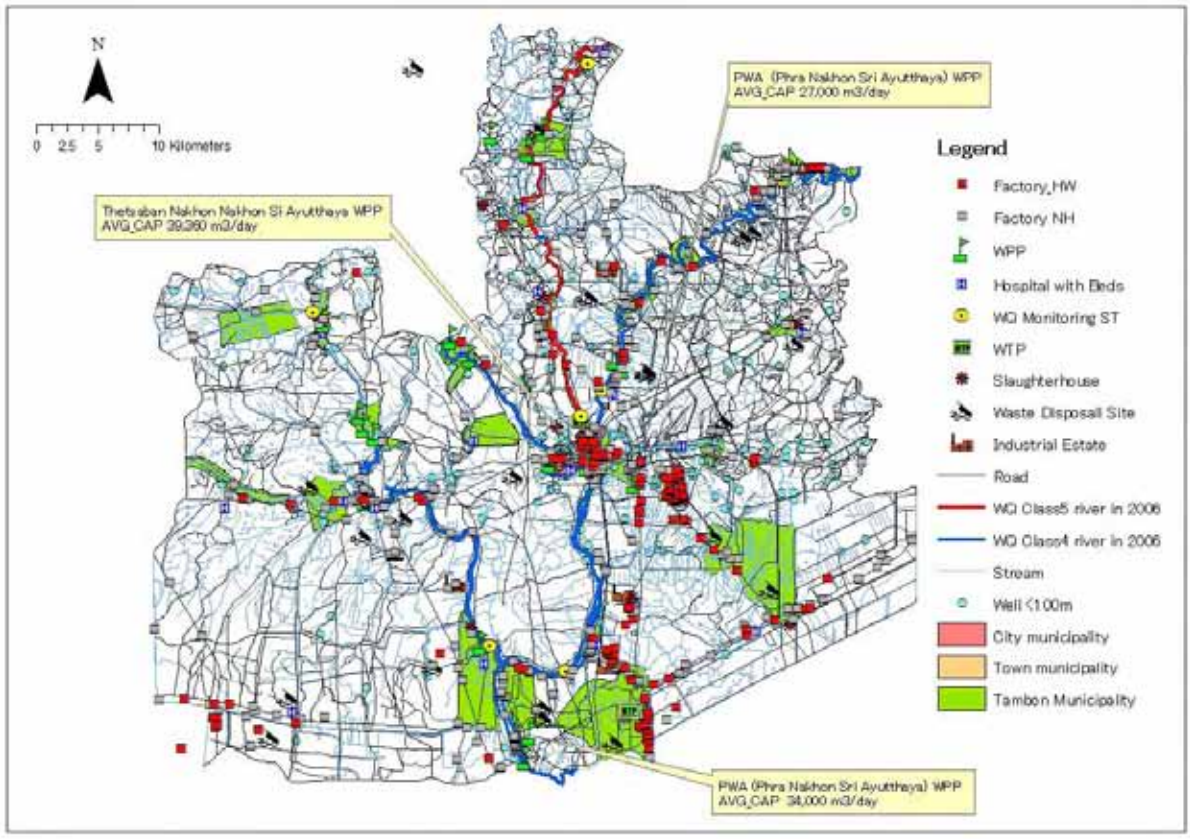


Figure 4-42: Location Map of Major Water Pollution Sources and Water Utilization Facilities in AYP

As shown in the figure above, there are three major water purification facilities in AYP where rivers are the water source, which means it would be difficult to change the sources to underground given the large amount of water intake. Therefore, priority should be given to the preservation of water quality upstream from these major purification facilities.

In order to formulate a water quality preservation plan, information will be required such as the amount of pollution load, location of discharge into public water bodies, amount of water inflow at the location, amount of river water flow from upstream (special consideration must be given to river water flow during the dry season due to the critical effect of pollutants). Nevertheless, there is no such information in the existing database.

The following figure shows an enlarged view of the map of Phra Nakhon Si Ayutthaya as a sample highlighting the relationship between a major water purification facility and various possible pollution sources.

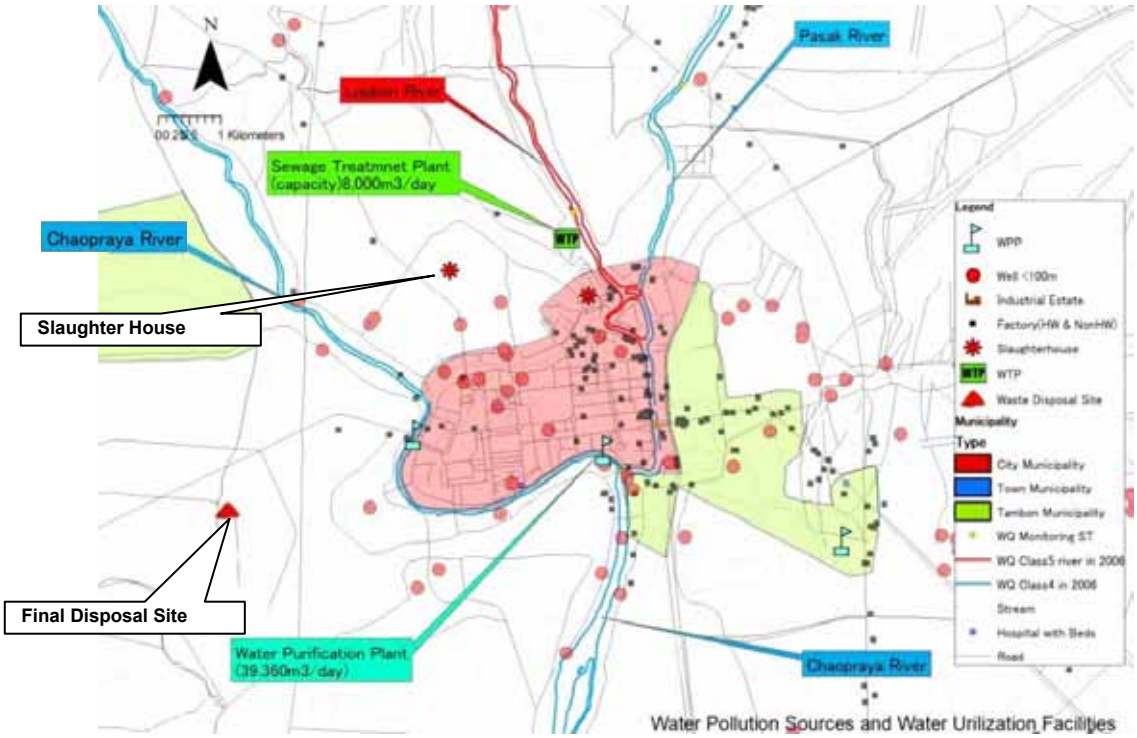


Figure 4-43: Location Map of Major Water Pollution Sources and Water Utilization Facilities in City of Ayutthaya

As shown in the figure, there are various possible pollution sources located upstream of this water purification facility, such as a waste water treatment plant, some slaughterhouses, a waste disposal site and so on. Furthermore, the residential area might be one of the pollution sources given the fact that the treatment of waste water from residential areas is not up to the required level.

Given these conditions, applying ad hoc countermeasures on individual pollution sources would require excessive amounts of money and time to achieve the final target of water quality preservation at public water bodies. In order to improve the water quality at public water bodies, to maintain quality of drinking water and to implement appropriate water quality management, it is important to investigate and plan at the provincial level instead of each Tessaban and Orbortor level. Then a plan for reduction of the pollution load at the provincial level shall be formulated.

It is impossible to formulate the plan outlined above without information such as the amount of pollution load, location of discharge into public water bodies, amount of water inflow at the location, amount of upstream river water flow, and so on.

Therefore, the program for water quality preservation in public water bodies shall be implemented.

This program consists of two priority projects. One is a survey of pollution sources, and the other is the formulation of a water quality preservation plan for public water bodies.

1. Pollution Source Survey

   Under this survey, first an investigation will be conducted of types of pollution sources, their locations, and the amount of pollution load generated and discharged. Then the ratio of pollution contributed by each pollution source will be examined. The results will be

utilized as basic information to formulate a water quality preservation plan for public water bodies.

2. Water Quality Preservation Plan for Public Water Bodies

A water quality preservation plan for public water bodies consists of a plan for the reduction of pollution load, confirmation of improvement effects, and maintenance of improved water quality.

The plan for reduction of pollution load is made up of the following:

- Set a water quality target at each monitoring point of public water bodies together with a target date for achievement,
- The amount of pollution load that must be reduced from each pollution source will be calculated in order to achieve the target, along with an examination of reduction methods for each type of pollution source,
- Priority to reduce pollution load will be determined based on the pollution contribution ratio and investment effect considering the above results,
- The plan to reduce pollution load will be formulated. Upon the formulation of the plan, activities for raising awareness among stakeholders in order to reduce the pollution load will be implemented.

Under the examination methods to confirm improvement of water quality, the water quality monitoring plan will be formulated in order to confirm whether or not the quality of water has been improved according to the plan.

Methods for revision of the plan will be examined and prepared in case the water quality goals are not reached.

These procedures are presented below.

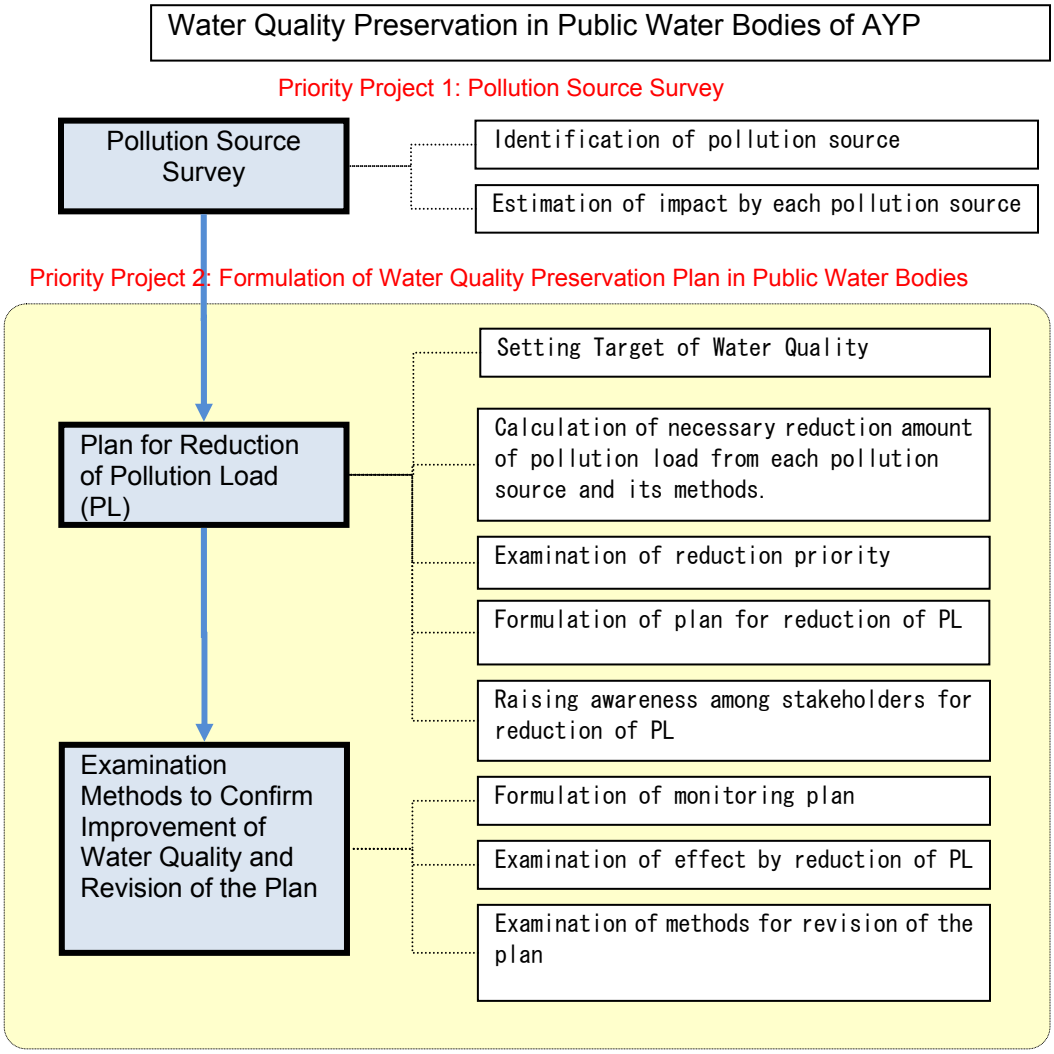


Figure 4-44: Relation between Program for Water Quality Preservation in Public Water Bodies in AYP and Priority Projects

Table 4-96: Project Design Matrix (PDM) for Program for Water Quality Preservation in Public Water Bodies of AYP

Program Name: Water Quality Preservation in Public Water Bodies in Ayutthaya Province (AYP)
Target Area: Ayutthaya Province
Target Group: Beneficiaries of public water bodies Ayutthaya Province (administration, Business Enterprises, and residents)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Preserve high water quality in public water bodies of AYP	Water quality monitoring results	Water quality monitoring study	AYP does not change its water quality management policy
Program Purpose Formulate an appropriate, province-wide water quality management plan in AYP	Contents of water quality management plan	Water quality management plan	
Outputs 1. Identification of pollution source and its contribution to the public water bodies 2. Formulation of water quality preservation plan in public water bodies	1. Contents of pollution source survey 2. Contents of water quality preservation plan	1. Pollution source survey report 2. Water quality preservation plan	
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Pollution source survey	PEO, REO	PCD, PAgO, PFO, PLO, PIO	3,000,000
2. Formulation of water quality preservation plan in public water bodies	PEO, REO	PCD, PAgO, PFO, PLO, PIO	3,500,000

PCD: Pollution Control Department/MNRE
PEO: Provincial Environment Office
REO Regional Environment Office
PIO: Provincial Industrial Office
PAgO: Provincial Agricultural Office
PFO: Provincial Fishery Office
PLO: Provincial Livestock Office

d. Program for safe and quality water supply

River water is utilized not only for water supply but also for agriculture, livestock, industry, transportation and maintenance water for the river bank and bed. Water of rivers in AYP is rich and it is believed that water demand in each sector can be fulfilled without any problem. But it must be examined whether safe and quality water will be supplied to each sector or not especially at dry season when the amount of water flow reduce significantly. Based on the conditions of water flow and quality at dry season, water distribution plan including priority of water supply to the sectors shall be formulated considering the future demand of water in each sector.

As for the domestic water supply, there are several water supply organizations such as Provincial Water Authority (PWA), City of Ayutthaya, and each local administration in different service areas. There is no comprehensive plan to control and manage water supply in order to supply safe and quality water after investigating individual water sources and water demands in whole province.

In fact there are several water purification plants along the Lopburi River (such as three plants in Tessaban Tambon Rong Chang) which changed their water source from the Lopburi River to underground water sources without knowing while picture of water supply in the Province. Since the scale of these plants was small (about 1,000 m^3/day capacity on average), changing the source was not difficult.

But in case the large water purification plant such as the plant in City of Ayutthaya, appropriate master plan on domestic water supply, considering water distribution to each sector in whole province, must be formulated first before changing any source or amount of water.

Accordingly, program for safe and quality water supply is proposed together with the program for water quality preservation in public water bodies. This program consists of two priority projects. One is the formulation of water distribution plan considering water quality and water sources and the other is the formulation of master plan on domestic water supply in whole province.

- Water Distribution Plan

  There are water demands such as agriculture, livestock, industry, tourism, drinking and so on. In case of river water, besides these water demands, maintenance water of the river and water demands for downstream area should be considered. Upon the consideration of water quality and amount of the water in each sector, water distribution plan will be formulated. This plan includes determination of the water shed of individual River, water balance within the water shed, individual water demand in each sector, and appropriate distribution plan according to the required quality in each sector.

- Master Plan on Domestic Water Supply

  At first, the investigation of current condition of water supply will be conducted. Then the future domestic water demand will be estimated. Master plan on domestic water supply will be formulated using these results in order to supply safe and quality water according to the water sources allocated under water distribution plan.

These procedures are presented below.

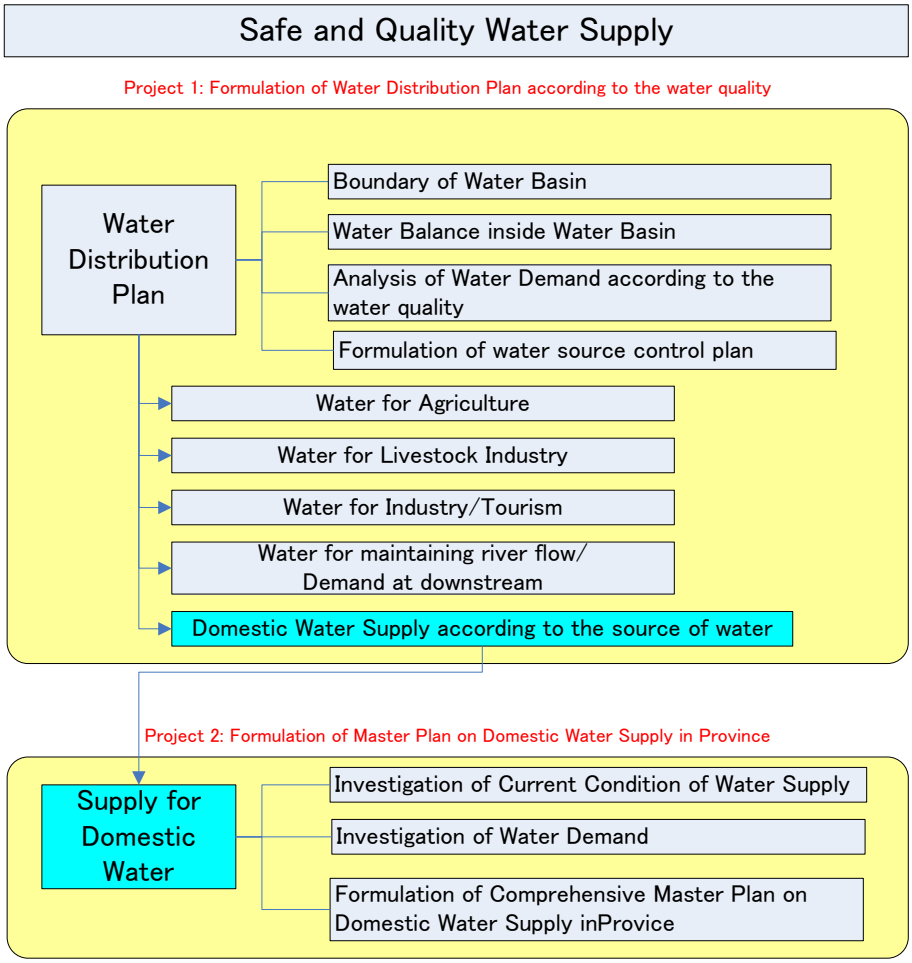


Figure 4-45: Relation between Program for Safe and Quality Water Supply and each Priority Project.

Table 4-97: Project Design Matrix (PDM) for Program for Safe and Quality Water Supply in AYP

Program Name: Safe and Quality Water Supply in Ayutthaya Province (AYP)
Target Area: Ayutthaya Province
Target Group: Residents of Ayutthaya Province

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Achieve the supply of good quality, safe-to-drink water for all AYP	Water quality, amount, and pressure data	Water quality analysis and interview survey	AYP does not change safe and quality water policy
Program Purpose Formulate a comprehensive, province-wide Master Plan for water supply	Contents of comprehensive water supply plan	Comprehensive water supply plan	
Outputs 1. Volume of water demand in each sector from each source is calculated and water resource distribution plan is formulated 2. Master plan on domestic water supply is formulated	1. Contents of water distribution plan 2. Contents of master plan on domestic water supply	1. Water distribution plan 2. Master plan on domestic water supply	
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Formulation of water distribution plan in Province	PA, Orborjor, Tessaban, Orbortor	PEO, PWA	2,000,000
2. Formulation of master plan on domestic water supply	PWA with other water supply organizations	PEO, PO	3,500,000

PWA: Provincial Water Authority
PEO: Provincial Environment Office
PHO: Provincial Public Health Office
PA: Provincial Administration
PO: Provincial Office of Provincial Administration

e. Program to Strengthen Linkage between Central, Provincial and Local Administrations in Ayutthaya Province (AYP)

Many tasks related to NREM have been decentralized and devolved onto Local Administrations (LAs; Orborjor, Tessaban, Orbortor), but the LAs put in charge of these tasks do not realistically have the capacity to execute these tasks. Therefore, for the time being, problem-solving in NREM will be difficult without the strong support of organizations in Central Administration and their agencies in the Province, and various PA (Changwat) offices. Thus the following program is proposed as a priority program:

Table 4-98: Project Design Matrix (PDM) for Program to Strengthen Linkage between Central, Provincial, and Local Administrations in AYP

Program Name: Program to Strengthen Linkage between Central, Provincial, and Local Administrations in Ayutthaya Province (AYP)
Target Area: Central Government and Ayutthaya Province
Target Group: MNRE in Central Administration, PA (Changwat) and LAs in Ayutthaya Province

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal NREM administrative capabilities of LAs in AYP are strengthened	Number of NREM projects started by government agencies in AYP, for example solid waste management or wastewater treatment	Interview survey with government agencies in AYP	The Governor (MOI official) supports such a program
Program Purpose Strengthen linkage for NREM between Central Administration organizations, the PA (Changwat) and LAs in AYP	NREM awareness increases among Provincial Administration and LA staff in AYP	Questionnaire survey to PA and LA	Central Government seriously promotes the decentralization of NREM
Outputs 1.1 NREM capacities of PEO, a NREM supporting team in PA (Changwat) and the Environmental Division in Orborjor increases 1.2 The link between REO 6 and regional offices still held by the five non-ex-MOSTE departments within MNRE shall be strengthened. 1.3 The existing NREM GIS Database of REO 6 is strengthened, and periodically updated and well maintained. The updated information on NREM is provided to PEOs and other administrative organizations under REO 6. 2.1 The linkages between central/ provincial/ and local administrations is strengthened. 2.2 Departments within MNRE grasp the current actual state of NREM in PAs and LAs 3.1 NREM awareness in preserving NRE, increases among administrative officers in LAs. 3.2 NREM awareness, and interest in preserving NRE, increases among residents	1.1 Number of training for PEO, a NREM supporting team in PA (Changwat) and the Environmental Division in Orborjor 1.2 Number of cooperation activities between REO 6 and 5 Regional Offices 1.3 Number of information on NREM provided to PEOs and other administrative organizations under REO 6. 2.1 Number of inquires to "PA/LA Central Support Center for NREM" 2.2 Number of inquiries dealt with by MNRE departments 3.1 Amount of budget for NREM and number of officers for it in LAs 3.2 Awareness and interest in preserving NRE among residents and number of complaints	1.1 Annual report of REO 6 1.2 Annual report of REO 6 and5 Regional Offices 1.3 Annual report of REO 6 and NREM GIS Database Center 2.1 Activity report of "PA/LA Central Support Center for NREM" 2.2 Annual report of various departments of MNRE 3.1 Budget and annual report of LAs 3.2 Interview survey to residents and annual report of PEO	OPS/MNRE actively supports the program
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Strengthening of the local NREM support capacities of REO 6	REO 6	OPS and ONEP of MNRE	5,600,000
2. Establishment of "PA/LA Central Support Center for NREM" in MNRE	ONEP/MNRE	OPS, DEQP, PCD, RFD, DNP, DMR, DMCR, DWR, DGR in MNRE	11,570,000

3. Promotion of awareness regarding NREM among administrator of LAs and resident and publication of environmental information	DEQP, PEO/AYP	ONEP PO Cable TV, local radio stations	3,480,000

REO: Regional Environmental Office

PEO: Provincial Environmental Office

PO: Provincial Office

All other agencies: departments within MNRE

f. Program to Strengthen NREM Capacities of LAs in Ayutthaya Province (AYP)

There are three kinds of Local Administrations (LAs); the Orborjor, which shares their sphere of governance (i.e. the province) with PA (Changwat); the Tessaban, in charge of cities and municipalities; and the Orbortor, in charge of villages. These are organizations given new power under the Constitution of 1997 and the Decentralization Act of 1999. Many types of authority that have previously belonged to the Central Government have already been handed over to LAs, but the LAs often do not possess enough administrative capacity, including NREM capacities, due to the rapid pace in which decentralization occurred. Thus the following program is proposed as a priority program:

Table 4-99: Project Design Matrix (PDM) for Program to Strengthen NREM capacities of LAs in AYP

Program Name: Program to Strengthen NREM Capacities of Local Administrations (LAs) in Ayutthaya Province (AYP)

Target Area: Ayutthaya Province

Target Group: LAs in Ayutthaya Province

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal NRE in AYP are properly managed	Level of satisfaction towards NRE among local residents	Questionnaire survey to local residents	Decentralization continues
Program Purpose NREM capacities of LAs in AYP are strengthened	Awareness among LA staff in AYP	Questionnaire survey to LA staff	Decentralization of NREM is promoted
Outputs 1.1 The Environmental Division in Orborjor is strengthened. 1.2 PA supports NREM of Orborjor 1.3 The Environmental Division of the Orborjor conducts NREM activities that are beyond the scope of Tessaban and Orbortor Orborjor, e.g. implementation of PEQMP Priority Programs 2. Opinions of local residents are reflected in PEQMP formulation and implementation, and NREM status is monitored by local residents 3. NREM information is used effectively by PA (Changwat), LAs, and local residents	1.1 Number of staff in the Environmental Division in Orborjor and budget of it 1.2 Establishment of a NREM supporting team in PA (Changwat) 1.3 Number of NREM projects at the provincial level started by LAs 2-1 Number of public notices 2-2 Number of resident opinions recorded 2-3 Appointment of local resident representative(s) to monitoring committee 3. Number of inquiries to Environmental Information Center	1.1 Annual report and budget of Orborjor 1.2 Annual report of PA 1.3 Budgets and annual reports of Orborjor, Tessaban, and Orbortor 2.1 Interviews with PEO and Amphoe 2.2 Interviews with PEO 2.3 Interviews with monitoring committee 3. Annual report of NREM Information Center, or Interviews with PEO	The understanding of DLA (MOI) and the Governor is obtained

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Individual Priority Projects (Numbers correspond to Output numbers)	**Responsible Agency**	**Supporting Agency**	**Input (Baht)**
1. Strengthening of NREM capacity of Orborjor in AYP	Orborjor of Ayutthaya and Provincial Office of AYP	MOI, PA (Changwat) of AYP and ONEP of MNRE	10,760,000
2. Construct ion of resident participatory system for NREM in AYP	Provincial Office and PEO of AYP	ONEP and Amphoe of AYP	1,000,000
3. Strengthening of the Environmental Information Center in PEO/AYP	PEO/AYP	OPS and ONEP of MNRE	1,900,000

DLA: Department of Local Administration, MOI

MOI: Ministry of Interior

PA: Provincial Administration

PO: Provincial Office

All other organizations: departments within MNRE

4.3.2 Implementation and Budget Plan of Priority Projects

In accordance with the PEQMP-KPI manual, the corresponding implementation and budget plan for each Priority Program/Project is shown in a single corresponding table below:

Table 4-100: Implementation and Budget Plan of Priority Projects in AYP

Program/Project	Budget (Baht)				Total Budget (Baht)	Implementation Schedule in Fiscal Year (Baht)				Responsible Agency
	Province	LA	DC	Other		2008	2009	2010	2011	
1. Program for Improvement of Solid Waste Management	**6,300,000**	**55,000,000**	**474,646,000**		**535,946,000**		**106,100,000**	**102,100,000**	**326,746,000**	
1-1 Construction of two Central Disposal Centers (CDCs)										
1-1-1 Land purchase for CDC		25,000,000			25,000,000		25,000,000			Orborjor
1-1-2 Site preparation for construction		4,000,000			4,000,000		4,000,000			Orborjor
1-1-3 Detail design of CDCs		25,000,000			25,000,000		25,000,000			Orborjor
1-1-4 Construction of CDCs			474,646,000		474,646,000		50,000,000	100,000,000	324,646,000	Orborjor
1-2 Development of School Recycling System	6,300,000				6,300,000		2,100,000	2,100,000	2,100,000	LA, PHO, School
2. Program for Flood Prevention and Disaster Mitigation (FP/DM)	**7,000,000**	**6,000,000**			**13,000,000**		**1,500,000**	**7,500,000**	**4,000,000**	
2-1 Formulation of FP/DM plan	7,000,000				7,000,000		1,500,000	5,500,000		ODPM
2-2 Formulation of action pan for renovation and maintenance of rivers and canals		3,000,000			3,000,000			1,000,000	2,000,000	LAs
2-3 Formulation of action plan for flood damage mitigation		3,000,000			3,000,000			1,000,000	2,000,000	LAs
3. Program for Water Quality Preservation in Public Water Bodies	**6,500,000**				**6,500,000**			**3,000,000**	**3,500,000**	
3-1 Pollution Source Survey	3,000,000				3,000,000			3,000,000		PEO, REO
3-2 Formulation of Water Quality Preservation Plan of Public Water Bodies	3,500,000				3,500,000				3,500,000	PEO, REO

Program/Project	Budget (Baht)				Total Budget (Baht)	Implementation Schedule in Fiscal Year (Baht)				Responsible Agency
	Province	LA	DC	Other		2008	2009	2010	2011	
4. Program for Safe and Quality Water Supply in AYP	**2,000,000**			**3,500,000**	**5,500,000**			**2,000,000**	**3,500,000**	
4-1 Formulation of Water Distribution Plan in Province	2,000,000				2,000,000			2,000,000		PA, LAs
4-2 Formulation of Master Plan on Domestic Water Supply				3,500,000	3,500,000				3,500,000	PWA and other water supply organizations
5. Program to Strengthen Linkage between Central, Provincial and Local Administrations in AYP	**3,480,000**			**17,170,000**	**20,650,000**		**13,170,000**	**9,250,000**	**26,050,000**	
5-1 Strengthening of the local NREM support capacities of REO6				5,600,000	5,600,000		180,000	2,710,000	2,710,000	REO
5-2 Establishment of "PA/LA Central Support Center for NREM" in MNRE				11,570,000	11,570,000		810,000	5,380,000	5,380,000	ONEP/MNRE
5-3 Promotion of awareness regarding NREM among administrators of LAs and resident and publication of environmental information in AYP	3,480,000				3,480,000		1,160,000	1,160,000	1,160,000	PEO,DEQP
6. Program to Strengthen NREM capacities of LAs	**6,680,000**	**6,980,000**			**13,660,000**		**300,000**	**6,680,000**	**6,680,000**	
6-1 Strengthening of NREM capacity of Orborjor in AYP	4,780,000	5,980,000			10,760,000			5,380,000	5,380,000	PO, Orbortor
6-2 Construction of resident participatory system for NREM		1,000,000			1,000,000			500,000	500,000	PO, PEO, LA

Program/Project	Budget (Baht)				Total Budget (Baht)	Implementation Schedule in Fiscal Year (Baht)				Responsible Agency
	Province	LA	DC	Other		2008	2009	2010	2011	
6-3 Strengthening of the Environmental Information Center in PEO/AYP	1,900,000				1,900,000		300,000	800,000	800,000	PEO

DC: Decentralization Committee Budget

The Amount in budget column is estimated only

4.4 Part 4: Details of Priority Projects

Details of priority projects are explained according to the following format:

Table 4-101: Format for Detailed Information of Priority Projects

1. Name of Program	
2. Name of Project	
3. Sector in NREM	
4. Responsible Agency	
5. Supporting Agency	
6. Monitoring and Evaluation Agency	
7. Background of the Project	(Note): Describe summary of issues, area in which issue occurs, causes and impacts.
8. Justification of the Project	(Note): Describe relationship to national, regional and provincial policy and strategy.
9. Objectives of the Project	(Note): Describe outcomes of project implementation.
10. Objectively Verifiable Indicators	(Note): Each indicator corresponds with an objective mentioned above in 9.
11. Main Components of the Project	(Note): Desscribe scope of the work.
12. Implementation Schedule	(Note): Describe time frame of the project with reference to the main components of the project.
13. Budgetary Plan	(Note): Prepare budgetary plan according to the time frame mentioned above in 12.
14. Benefit to be achieved	(Note): Describe the benefits of the project.

Table 4-102: Sector in NREM:

1. Social and Economic	2. Natural Resources Management	3. Social and Living Environment Management
SE.1.1. Population SE.1.2. Economy SE.1.3. Local Administration SE.1.4. NERM Administration SE.1.5. Others	SE.1.6. Land and Soil Resources SE.1.7. Forestry Resources SE.1.8. Wildlife Resources SE.1.9. Water Resources SE.1.10. Mineral Resources SE.1.11. Marine and Coastal Resources SE.1.12. Biodiversity	SE.1.13. Water Quality SE.1.14. Solid Waste SE.1.15. Air Quality SE.1.16. Noise/Vibration SE.1.17. Toxic and Hazardous Substances SE.1.18. Urban Environment SE.1.19. Natural and Cultural Assets SE.1.20. Global Warming

4.4.1 Program for Improvement of Solid Waste Management in AYP

According to the opinion survey among residents by the Study Team, 79 % of those surveyed replied that problems with waste management are "Not serious at all" or "Not very serious".

However, according to the opinion survey among 54 Local Administrations, 66% of LAs replied that problems with waste management are "Somewhat serious" or "Very serious" and 43% pointed out SWM is the second most serious problem in their administrative areas.

The above results suggest that sanitary conditions in residential areas are maintained by the proper collection and transportation of waste but the conditions at the disposal sites are bad, as the operation of disposal site fall under the LAs' responsibility.

The following is a flow chart indicating the relationship between each priority project and process of solid waste management.

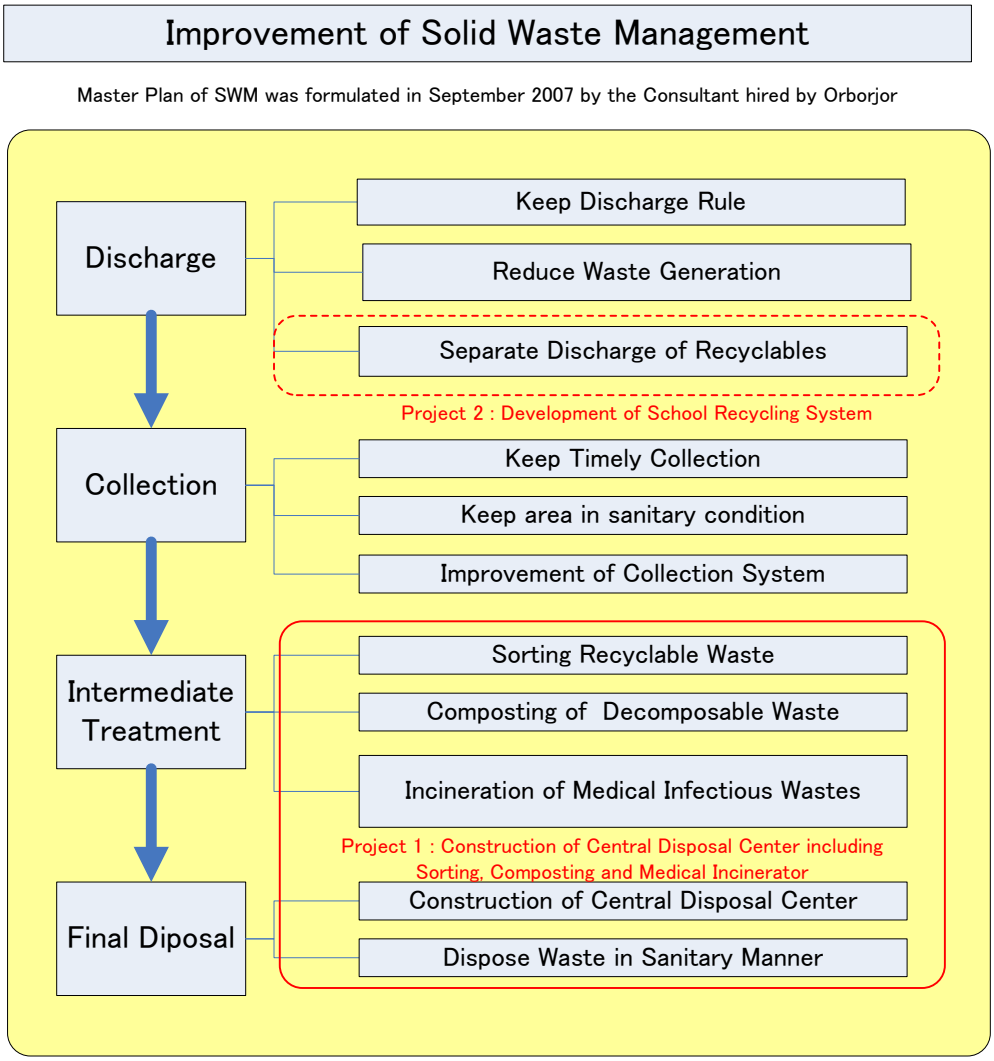


Figure 4-46: Relation between Process of SWM and each Priority Project

a. Project 1: Project for Construction of Two Central Disposal Centers (CDCs)

<table>
<tr><td>1. Name of Program</td><td>Improvement of Solid Waste Management (SWM) in AYP</td></tr>
<tr><td>2. Name of Project</td><td>Construction of Two Central Disposal Centers (CDCs)</td></tr>
<tr><td>3. Sector in NREM</td><td>Solid Waste</td></tr>
<tr><td>4. Responsible Agency</td><td>Orborjor in collaboration with all LAs in SKP</td></tr>
<tr><td>5. Supporting Agency</td><td>Provincial Committee (PC), Pollution Control Department in MNRE (PCD), Department of Local Administration (DOLA)</td></tr>
<tr><td>6. Monitoring and Evaluation Agency</td><td>PEO with all the stakeholders in AYP
Provincial Committee (PC)</td></tr>
<tr><td>7. Background of the Project</td><td>The current system of Municipal SWM mainly consists of a collection system and final disposal system. An important point is that there are over 18 disposal sites for about 750,000 residents in the province; an incredibly redundant situation. Almost all of disposal sites are open dump operations. Consequently, there are very serious adverse impacts to the surrounding environment by the disposal site, especially among disposal sites located in flood-prone areas.
In order to overcome this situation above and following the recommendation by PCD of MNRE, Orborjor of AYP hired a consultant to formulate a master plan on SWM.
According to the master plan, it is recommended to construct two central disposal centers, with sorting and composting plants and a incinerator for medical wastes in each.
Therefore, implementation of the master plan is the key issue for AYP to improve the SWM.</td></tr>
<tr><td>8. Justification of the Project</td><td>Relation with Upper Level Plan:
Strategy number 4 of Four-year Provincial Operation Plan, which is: “Clean city, good environment, and promote good health.”</td></tr>
<tr><td>9. Objectives of the Project</td><td>CDCs are constructed with suitable volume for sanitary landfilling with recycling facilities and an incinerator for medical wastes</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>Disposal capacity of two CDCs, recycling facility capacities, medical waste incineration facilities.</td></tr>
<tr><td>11. Main Components of the Project</td><td>• Land purchase for two CDCs
• Site preparation for construction
• Detailed design of CDCs
• Construction of CDCs</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Land Purchase</td><td>2009</td></tr><tr><td>Site Preparation</td><td>2009</td></tr><tr><td>Detailed Design</td><td>2009</td></tr><tr><td>Construction of CDCs</td><td>2010-2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget</th><th>Source</th></tr><tr><td>Land Purchase</td><td>25,000,000</td><td>LA</td></tr><tr><td>Site Preparation</td><td>4,000,000</td><td>LA</td></tr><tr><td>Detailed Design</td><td>25,000,000</td><td>LA</td></tr><tr><td>Construction of CDCs</td><td>474,646,000</td><td>Decentralization Committee</td></tr></table></td></tr>
<tr><td>14. Benefit of the Project</td><td>Beneficiary: Whole population in AYP</td></tr>
</table>

b. Project 2: Project for Development of School Recycling System

<table>
<tr><td>1. Name of Program</td><td>Improvement of Solid Waste Management (SWM) in AYP</td></tr>
<tr><td>2. Name of Project</td><td>Development of School Recycling System</td></tr>
<tr><td>3. Sector in NREM</td><td>Solid Waste</td></tr>
<tr><td>4. Responsible Agency</td><td>Orborjor, Tessaban, Orbortor, Public Health Office (PHO), Schools</td></tr>
<tr><td>5. Supporting Agency</td><td>Provincial Environment Office (PEO), Pollution Control Department in MNRE (PCD), Department of Environment Quality Promotion (DEQP), Educational Service Office (ESO)</td></tr>
<tr><td>6. Monitoring and Evaluation Agency</td><td>PEO with all the stakeholders in AYP</td></tr>
<tr><td>7. Background of the Project</td><td>In order to keep the city clean, appropriate SWM is one of the important factors.
Appropriate SWM can be achieved only upon the cooperation of all the stakeholders since there is a lot of interaction among them; therefore, raising awareness among stakeholders is very important.
Under this project, the focus is on students and their parents and the development of a school recycling system is the target.</td></tr>
<tr><td>8. Justification of the Project</td><td>Relation with Upper Level Plans:
The National EQMP has set a concept framework by stressing the creation of a peaceful society based on balanced development in economic, social, natural resources and environment.
Strategy number 4 of Four-year Provincial Operation Plan, which is: “Clean city, good environment, and promote good health.”</td></tr>
<tr><td>9. Objectives of the Project</td><td>To reduce waste generation by increasing public awareness about waste reduction, separation and recycling and encourage youths to operate waste banks.</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>Number of schools implementing waste banks and their recycling records.</td></tr>
<tr><td>11. Main Components of the Project</td><td>• Support establishment of waste banks in schools
• Training waste bank management at schools</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Establish waste banks in schools</td><td>2009-2011</td></tr><tr><td>Training waste bank management</td><td>2009-2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget</th><th>Source</th></tr><tr><td>Establish waste banks in schools</td><td>4,800,000</td><td>PA</td></tr><tr><td>Training waste bank management</td><td>1,500,000</td><td>PA</td></tr></table></td></tr>
<tr><td>14. Benefit of the Project</td><td>Beneficiary: Whole population in AYP</td></tr>
</table>

4.4.2 Program for Flood Prevention and Disaster Mitigation in AYP

In order to prevent damages caused by flood, there are three main measures to be considered:

1. Flood Control (River Improvement):
    - To control the amount of water flow in the river, by constructing dams or flood regulation ponds.
    - To control the flow of water so the water does not overflow, by construction and improvement of the riverbank.
2. Rainfall Control (Area Improvement)
    - To get rid of rainfall water from living area by development and improvement of canals and waterways.
    - To discharge water from low lying areas to nearby canals or rivers by construction of pumping stations.
    - Regulation of Land use
3. Measures for Flood Damage Mitigation
    - Development of Precaution System
    - Development of Evacuation Plan
    - Development of Flood Fighting Drill
    - Development of Hazard Map

Item 1 “Flood Control” will be taken care of by the Central Government or river basin committees. Thus, item 2 “Rainfall Control” and item 3 “Measures for Flood Damage Mitigation” falls under the responsibility of Provincial and Local Administrations.

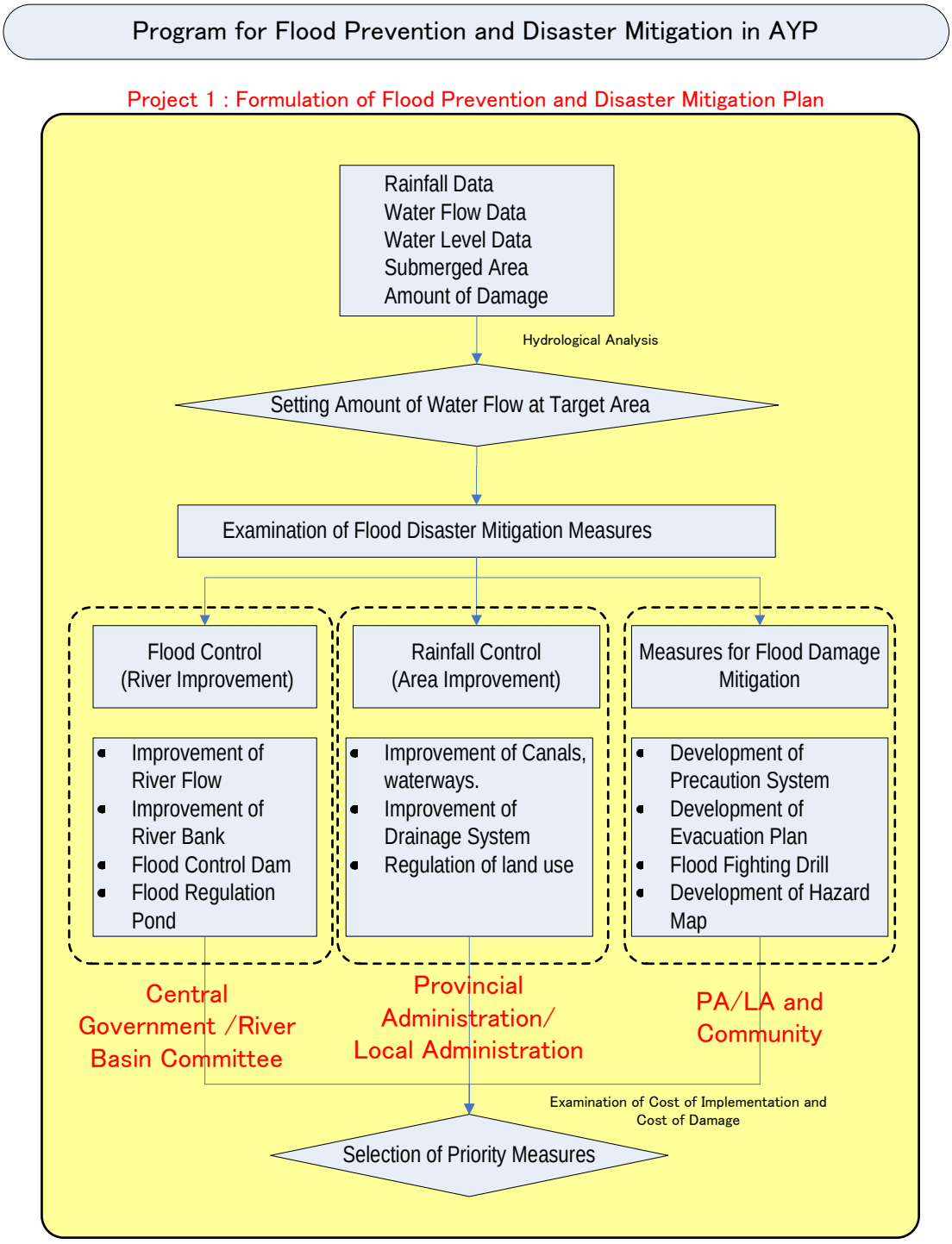


Figure 4-47: Flow of Formulation of Flood Prevention and Disaster Mitigation Plan

a. Project for Formulation of Flood Prevention and Disaster Mitigation Plan

1. Name of Program	Program for Flood Prevention and Disaster Mitigation in AYP
2. Name of Project	Project for Formulation of Flood Prevention (FP) and Disaster Mitigation (DM) Plan
3. Sector in NREM	Water Resources
4. Responsible Agency	Office of Disaster Prevention and Mitigation (ODPM)
5. Supporting Agency	Meteorological Station (MS), Irrigation Project Office (IPO), Public Works and City Planning Office (PWO), Provincial Agricultural Office (PAgO), Provincial Fishery Office (PFO), Provincial Livestock Office (PLO)
6. Monitoring and Evaluation Agency	PEO and other relevant stakeholders
7. Background of the Project	According to the opinion survey, LAs, residents and business enterprises replied that the most serious problem of NREM in AYP is water resources management, specifically the management of floods. In fact AYP had experienced considerable flood damage. For example number of affected people in 2006 was 378,891 with 70 deaths. However, there is no clear demarcation or allocation of specific roles and responsibilities in fighting floods among central government, Provincial Administration and Local Administrations. Therefore, a comprehensive master plan for FP/DM at the provincial level is needed for PA and LAs to take an action.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: “Conserve natural resources and environment and develop better conditions”
9. Objectives of the Project	• Formulation of Flood Prevention and Disaster Mitigation Plan, including cost benefit analysis.
10. Objectively Verifiable Indicators	• Flood Prevention and Disaster Mitigation Plans and their EIRR/FIRR (Economic/Financial Internal Rate of Return)
11. Main Components of the Project	• Study of hydrology in the area • Research and analyze the past damages and their costs • Examination of Flood Disaster Mitigation Measures • Selection of Priority Measures
12. Implementation Schedule	• Selection of the Consultant: December 2009 • Commencement: January 2010 • Completion: July 2010
13. Budgetary Plan	7 million Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

b. Formulation of Action Plan on Renovation and Maintenance of River and Canals

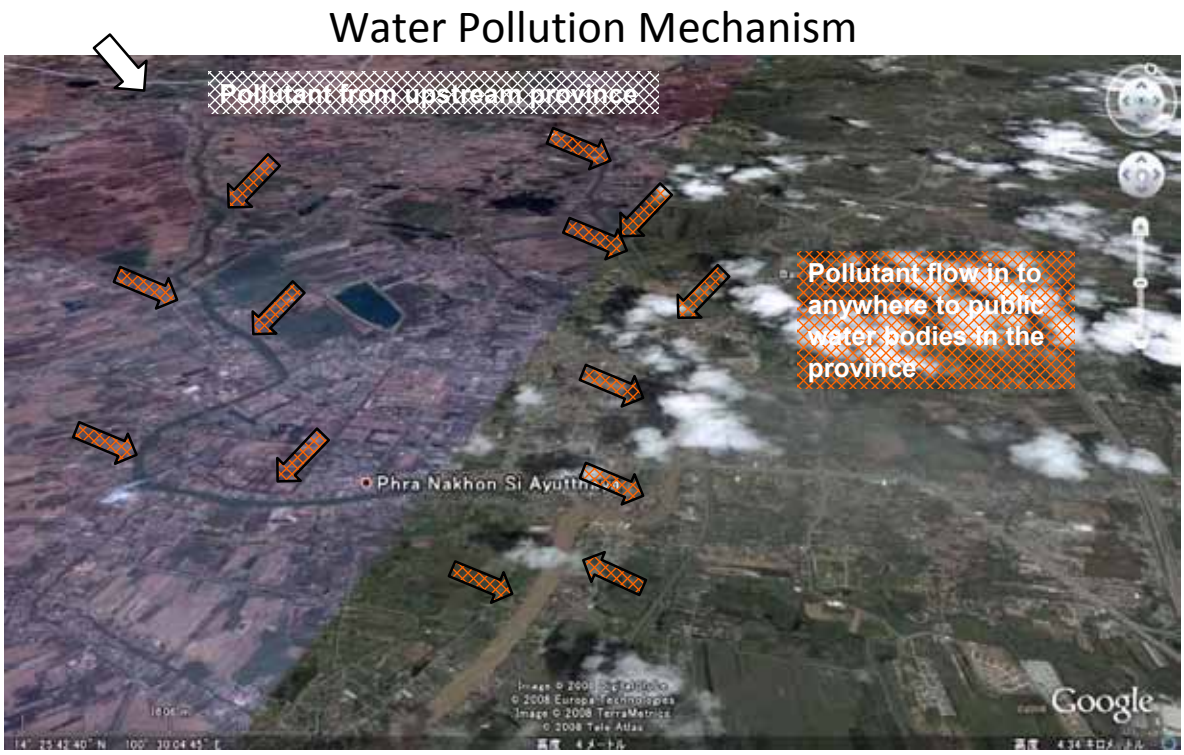
1. Name of Program	Program for Flood Prevention and Disaster Mitigation in AYP
2. Name of Project	Project for Formulation of Action Plan on Renovation and Maintenance of River and Canals
3. Sector in NREM	Water Resources
4. Responsible Agency	Orborjor in collaboration with Tessaban and Orbortor
5. Supporting Agency	Department of Local Administrations (DOLA), Royal Irrigation Department (RID). Public Works and City Planning Office (PWO)
6. Monitoring and Evaluation Agency	PEO and relevant stakeholders
7. Background of the Project	Upon the formulation of the master plan through the priority project above, the role of Provincial and Local Administrations for flood prevention and disaster mitigation at the province level will become clear. Basically, rainfall control and measures for flood damage mitigation will fall under the responsibility of Provincial and Local Administrations. An action plan on rainfall control will be formulated based on the master plan, and concrete measures to be taken by individual Provincial and Local Administrations will be outlined.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: “Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	River and canal function will be improved and maintained to reduce the effect of floods.
10. Objectively Verifiable Indicators	Management and responsibility structure of various river and canal sections
11. Main Components of the Project	• Action plan on improvement of canals and waterways • Action plan on improvement of drainage • Regulation of land use based on flood risk
12. Implementation Schedule	• Selection of the Consultant: December 2010 • Commencement: January 2011 • Completion: July 2011
13. Budgetary Plan	3 million Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

c. Formulation of Action Plan on Flood Damage Mitigation

1. Name of Program	Program for Flood Prevention and Disaster Mitigation in AYP
2. Name of Project	Project for Formulation of Action Plan on Flood Damage Mitigation
3. Sector in NREM	Water Resources
4. Responsible Agency	Orborjor in collaboration with Tessaban and Orbortor, NGOs, representatives of residents.
5. Supporting Agency	Department of Local Administrations (DOLA), Department of Environment Quality Promotion (DEQP), Department of Water Resources (DWR)
6. Monitoring and Evaluation Agency	PEO and relevant stakeholders
7. Background of the Project	Upon the formulation of the master plan through the priority project above, the role of Provincial and Local Administrations for flood prevention and disaster mitigation at the province level will become clear. Basically, rainfall control and measures for flood damage mitigation will fall under the responsibility of Provincial and Local Administrations. An action plan on flood damage mitigation will be formulated based on the master plan and concrete measures to be taken by individual Provincial and Local Administrations will be outlined.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: “Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	Measures for flood damage mitigation will be realized and risk of disaster will be reduced.
10. Objectively Verifiable Indicators	1. Number of precaution systems and its conditions 2. Contents of evacuation plan 3. Contents of action plan for fire fighting drill 4. Contents of hazard map
11. Main Components of the Project	• Development of precaution system • Development of evacuation plan • Action plan for flood fighting drill • Development of hazard map
12. Implementation Schedule	• Selection of the Consultant: December 2010 • Commencement: January 2011 • Completion: July 2011
13. Budgetary Plan	3 million Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

4.4.3 Program for Water Quality Preservation in Public Water Bodies of AYP

AYP is a water-rich province with a large number of rovers and canals. But at the same time, there are various pollution sources which affect water quality in public water bodies, as illustrated below.



To preserve the water quality of public water bodies, it is important to understand the situation surrounding each water pollution source and to reduce the pollution load from each source. Furthermore, even after such activities improve the water quality, it is important to maintain the improved conditions.

Project 1 investigates and identifies the sources of water pollution. Utilizing these results, Project 2 formulates the Public Water Body Water Quality Preservation Plan, which includes setting the amount of pollution load target reduction amounts, the method to do so, determining ways to inspect the effect of pollution load reduction, and monitoring water quality in public water bodies.

The following figure shows the position of each project in the effort to preserve water quality of public water bodies.

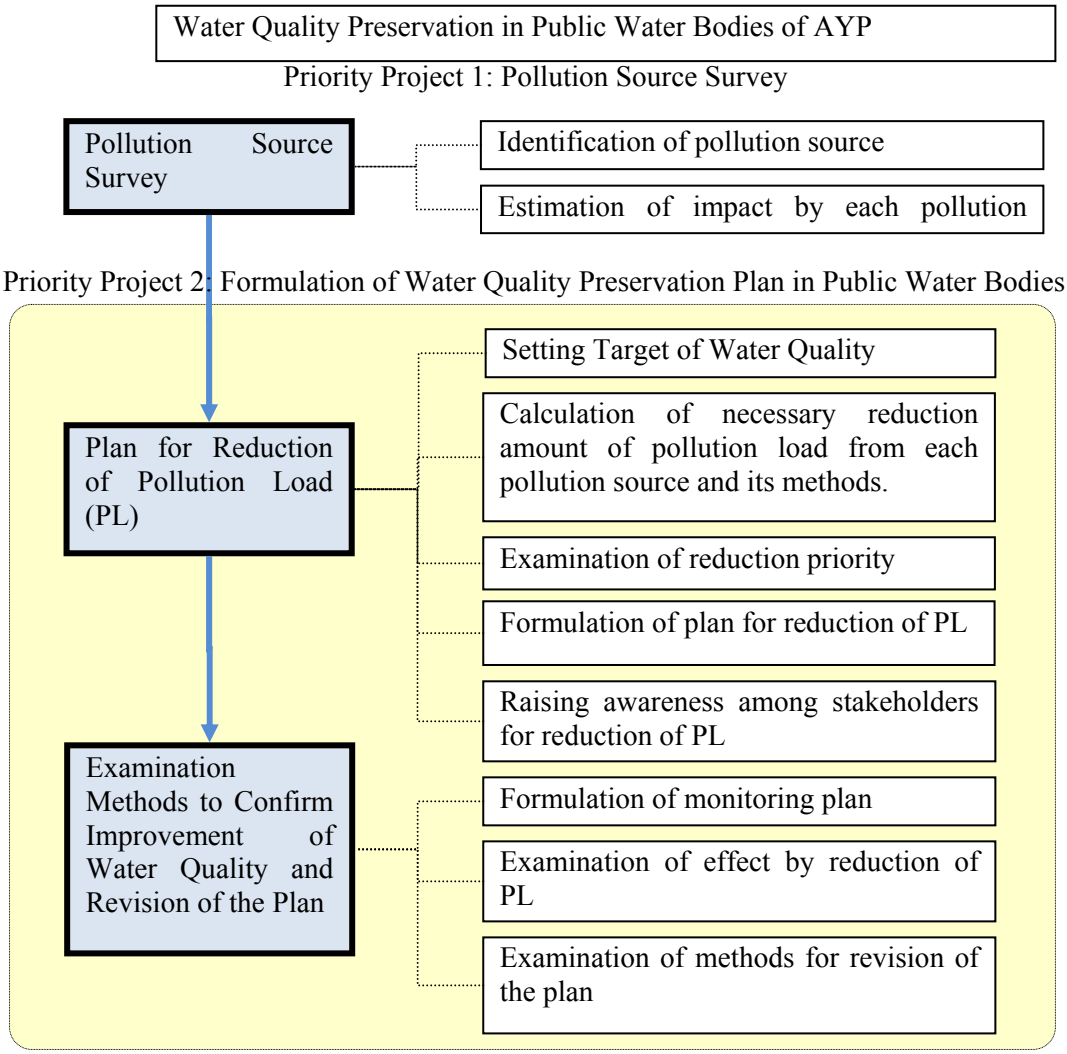
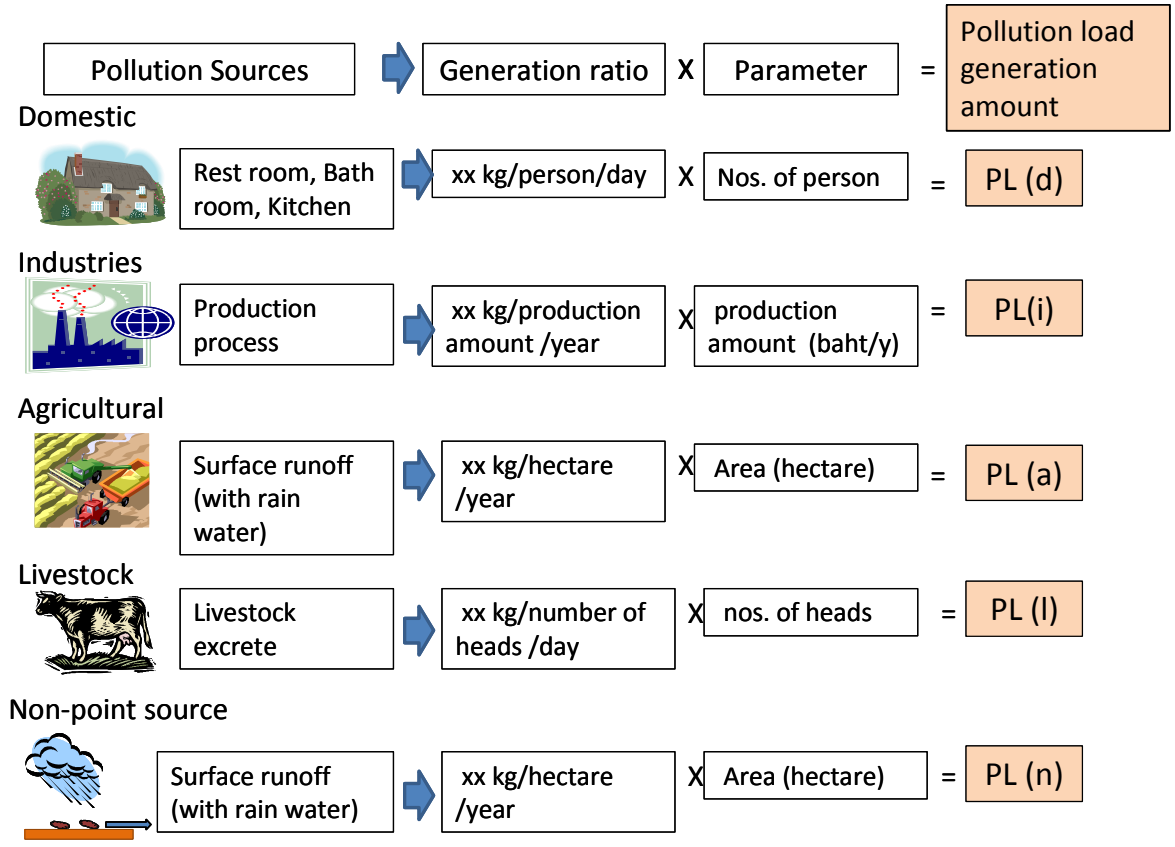


Figure 4-48: Relation between Water Quality Preservation in Public Water Bodies and each Project

Procedure of pollution source survey is explained according to the following steps.

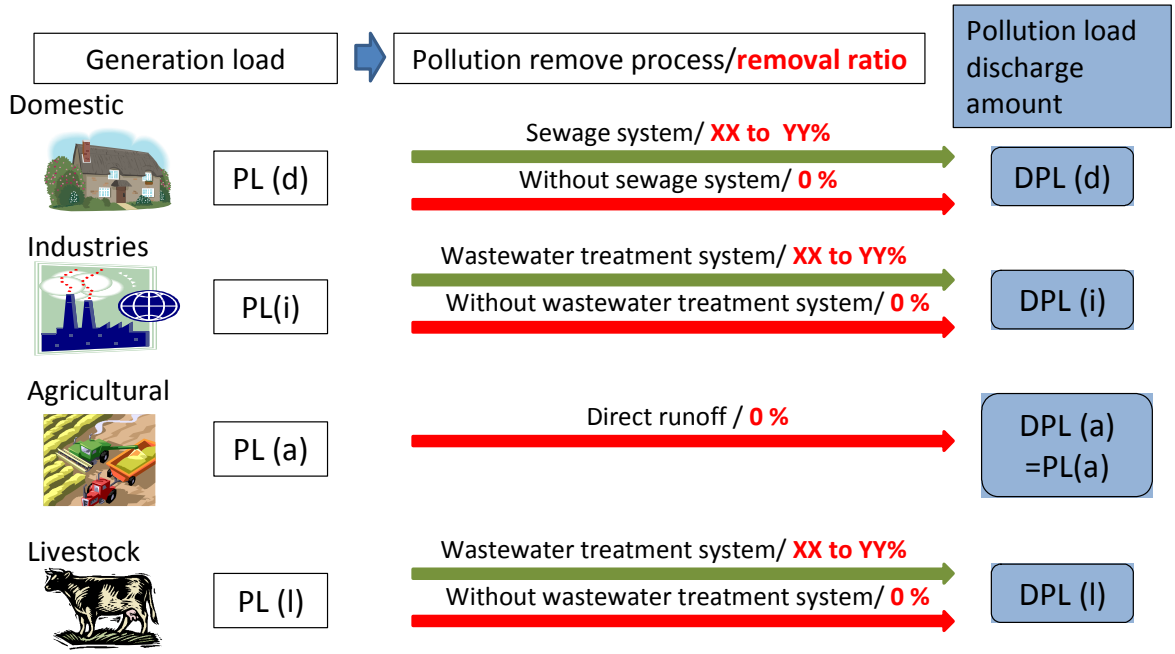
Step1: Identification of pollution sources and calculation of pollution load from each source.

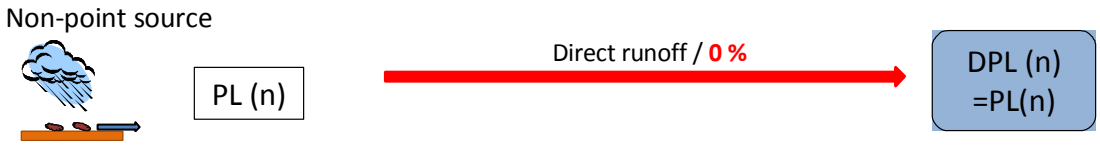
In AYP, pollution sources are categorized into 5 types: domestic, industry, agriculture, livestock and non-point sources. The generation amount of pollution load will be calculated as unit generation amount multiplied by number of each generation source, as follows.



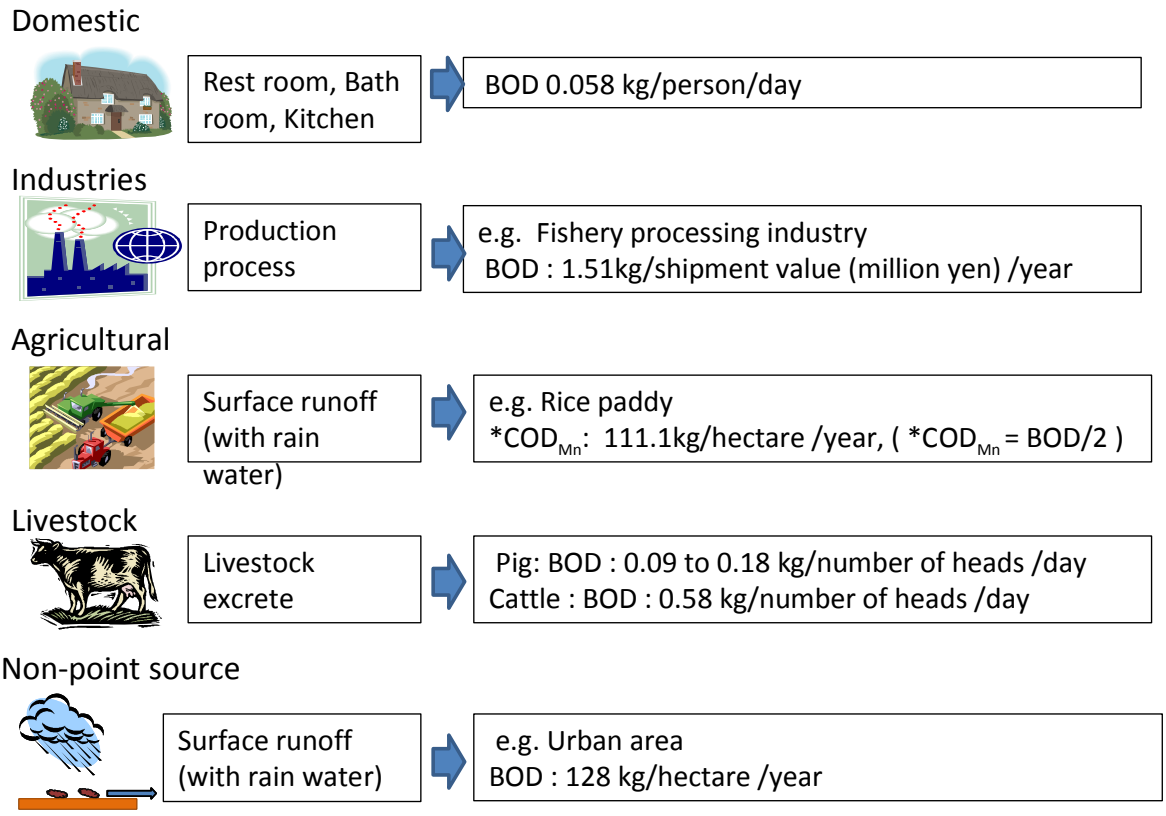
Step2: Calculation of discharge amount from each pollution sources

Upon the application of waste water treatment system, discharge amount of pollution load from each pollution source is calculated as follows.





A few examples of pollution generation ratio of each pollution source in Japan are presented as follows.



Pollutants from each pollution source will be removed by the waste treatment system and the percentage of pollutant removed is based on the discharge limit set by the relevant law. In Japan, 90 to 99 % of pollutant is removed through this waste water treatment process.

The relation between pollution load and concentration of pollutant is given below.

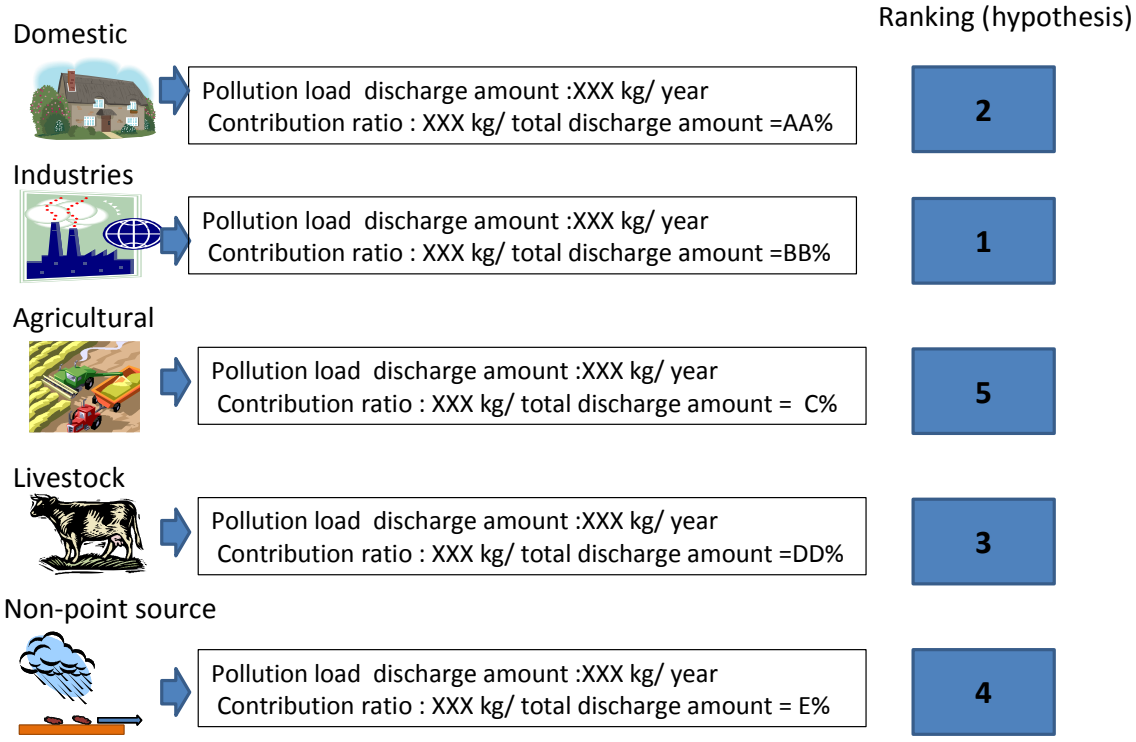
$$\text{Concentration of pollutant (mg/l)} = \frac{\text{Pollution load (kg)}}{\text{Water amount (m}^3\text{)}} \times 1{,}000$$

Example
- river water quality : annual BOD average value 1.5 (mg/l)
- water amount (river flow quantity):
  1,000 million cubic meter per year=2,739,726 m^3/day

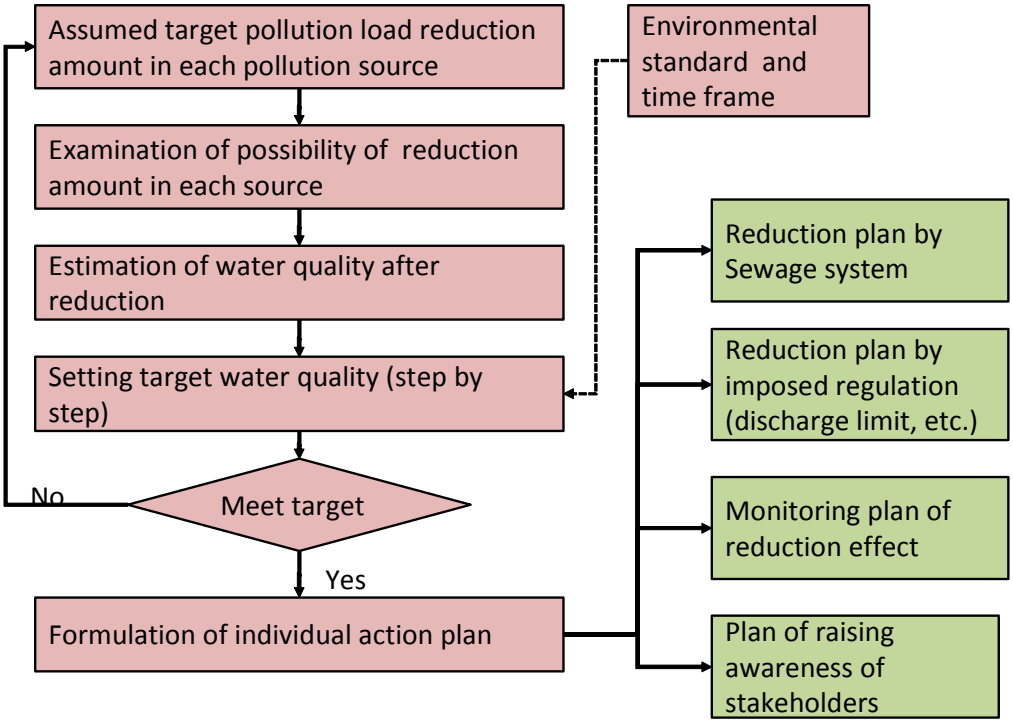
$$\text{BOD concentration 1.5 (mg/l)} = \frac{\text{4,110 (kg/day)}}{\text{2,739,726 (m}^3\text{/day)}} \times 1{,}000$$

Step3: Determination of pollution contribution ratio from each pollution sources

After calculation of discharged pollutant load from each pollution source, it will become clear which sectors discharge what amount as follows.



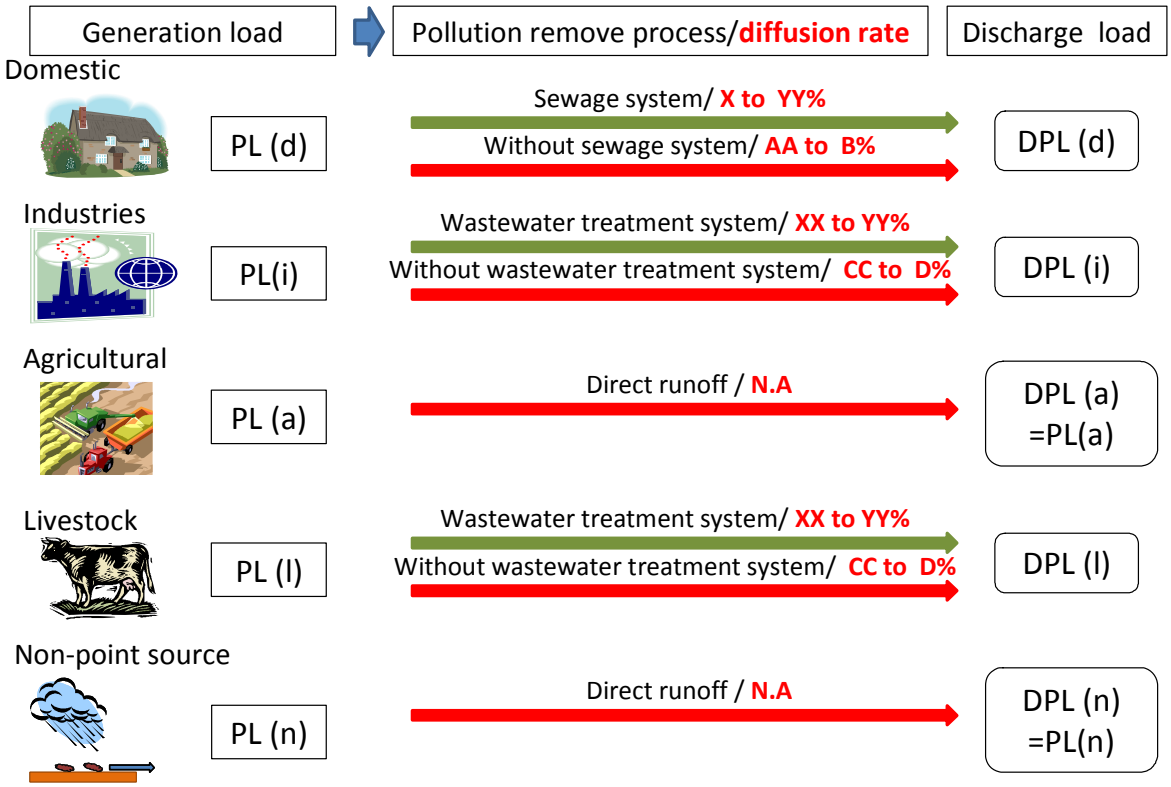
Based on the results shown above, methods to reduce the pollution load will be examined and the water quality preservation plan in public water bodies will be formulated. The Procedure of formulating water quality preservation plan is explained according to the following flow chart



At first, the target of water quality in public water bodies will be set considering the time frame. Then, the necessary reduction amount of pollutant from each sector will be calculated. These steps are illustrated as follows.

	Target1 : Class4 to class 3 (middle term)	Target2 : Class to class2 (long term)
Domestic	Pollution load Discharge amount :XXX kg/ year to XX kg/year	Pollution load Discharge amount :XX kg/ year to X kg/year
Industries	Pollution load Discharge amount :XXX kg/ year to XX kg/year	Pollution load Discharge amount :XX kg/ year to X kg/year
Agricultural	N.A	N.A
Livestock	Pollution load Discharge amount :XXX kg/ year to XX kg/year	Pollution load Discharge amount :XX kg/ year to X kg/year
Non-point source	N.A	N.A

Following these steps, the amounts of pollution load to be reduced from each pollution source will be fixed and individual action plans for reducing pollution load will be formulated.


Generation load
Pollution remove process/diffusion rate
Discharge load
Domestic
PL (d)
Sewage system/ X to YY%
Without sewage system/ AA to B%
DPL (d)
Industries
PL(i)
Wastewater treatment system/ XX to YY%
Without wastewater treatment system/ CC to D%
DPL (i)
Agricultural
PL (a)
Direct runoff / N.A
DPL (a) =PL(a)
Livestock
PL (l)
Wastewater treatment system/ XX to YY%
Without wastewater treatment system/ CC to D%
DPL (l)
Non-point source
PL (n)
Direct runoff / N.A
DPL (n) =PL(n)

a. Project 1: Pollution Source Survey

1. Name of Program	Program for Water Quality Preservation in Public Water Bodies of AYP
2. Name of Project	Pollution Source Survey
3. Sector in NREM	Water Quality
4. Responsible Agency	Provincial Environment Office (PEO), Regional Environment Office (REO)
5. Supporting Agency	Pollution Control Department (PCD), Provincial Agricultural Office (PAO), Provincial Fishery Office (PFO), Provincial Livestock Office (PLO), Provincial Industrial Office (PIO)
6. Monitoring and Evaluation Agency	Pollution Control Department (PCD)
7. Background of the Project	There are nine water quality monitoring stations in AYP: two in Noi, two in Chao Phraya, three in Pasak, and two in Lopburi River. According to the results of past monitoring data, the water quality of all four main rivers is changing towards the worse. Under the assumption that the same conditions (amount of pollutant, treatment, etc.) would continue in the future, water quality of all four major rivers will be worse compared with current situation. The water quality of all four major rivers in 2006 was Class 4 or Class 5, which meant that the water required a special water treatment process before use. In order to improve above situation, determination of pollution contribution from each pollution source to the public water bodies is required.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: "Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	Identification of pollution sources and their contribution to the public water bodies.
10. Objectively Verifiable Indicators	Contents of pollution source survey report.
11. Main Components of the Project	• Generation and discharge of pollution load from each pollution source • Incoming pollution load from upstream province • Pollution load at target point of the River • Pollution contribution from each pollution source
12. Implementation Schedule	• Selection of the Consultant: December 2009 • Commencement: January 2010 • Completion: December 2010
13. Budgetary Plan	3,000,000 Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

b. Project 2: Formulation of Water Quality Preservation Plan in Public Water Bodies

1. Name of Program	Program for Water Quality Preservation in Public Water Bodies of AYP
2. Name of Project	Formulation of Water Quality Preservation Plan in Public Water Bodies
3. Sector in NREM	Water Quality
4. Responsible Agency	Provincial Environment Office (PEO), Regional Environment Office (REO),
5. Supporting Agency	Pollution Control Department (PCD), Provincial Agricultural Office

	(PAO), Provincial Fishery Office (PFO), Provincial Livestock Office (PLO), Provincial Industrial Office (PIO),
6. Monitoring and Evaluation Agency	Pollution Control Department (PCD)
7. Background of the Project	There are nine water quality monitoring stations in AYP: two in Noi, two in Chao Phraya, three in Pasak, and two in Lopburi River. According to the results of past monitoring data, the water quality of all four main rivers is changing towards the worse. Under the assumption that the same conditions (amount of pollutant, treatment, etc.) would continue in the future, water quality of all four major rivers will be worse compared with current situation. The water quality of all four major rivers in 2006 was Class 4 or Class 5, which meant that the water required a special water treatment process before use. In order to improve above situation, a water quality preservation plan for public water bodies shall be formulated.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: “Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	Formulation of water quality preservation plan in public water bodies
10. Objectively Verifiable Indicators	Contents of water quality preservation plan in public water bodies.
11. Main Components of the Project	• Reduction of pollution load from each pollution source. • Determining possibility of reduction of pollution load from each pollution source • Estimated water quality in the river and target quality • Formulation of water quality preservation plan - Reduction plan by development of wastewater treatment - Reduction plan by regulations imposed upon industrial wastewater discharge - Monitoring plan of reduction effect - Plan for raising awareness among stakeholders
12. Implementation Schedule	• Selection of the Consultant: December 2010 • Commencement: January 2011 • Completion: December 2011
13. Budgetary Plan	3,500,000 Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

4.4.4 Program for Safe and Quality Water Supply in Ayutthaya Province (AYP)

The supply of domestic water involves two elements; the appropriation of water sources based on the analysis of water demand for various activities, and the formulation of a domestic water supply plan suitable for those water sources. The following figure shows the location of water purification plants with source of water sources.

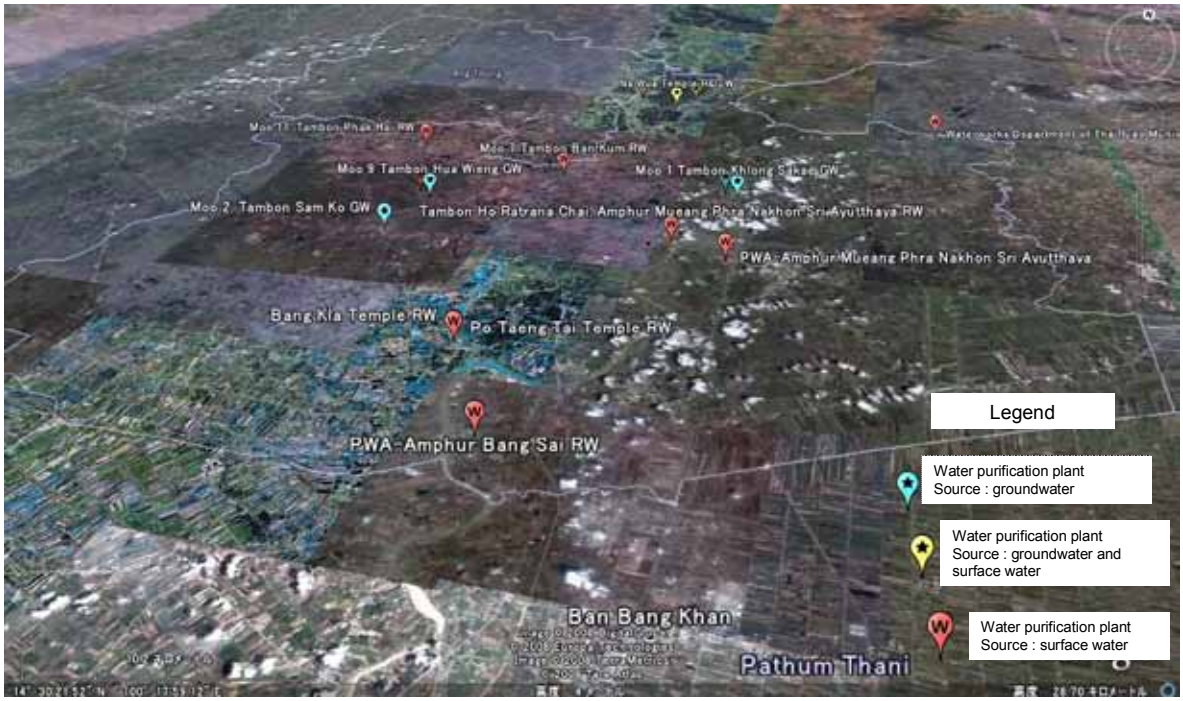


Figure 4-49: Location of Water Purfication Plants with water source in AYP

In Project 1, a master plan for water distribution based on the source of water, which is surface water and ground water, with due consideration to water quality is formulated, while paying attention to upper level plans[16], for the overall management of water sources within the province.

In Project 2, the water sources allocated for domestic water supply in Project 1 will be incorporated into a province-wide domestic water supply plan.

The following figure illustrates these two elements for a safe and quality water supply and relaions between them.

[16] e.g. : Integrated Plan for Water Resources Management in the Chao Phraya, Sakae Krang and The Chin River Basins, Department Water Resources, 2006

The supply of domestic water involves two elements;

- the appropriation of water sources based on the analysis of water demand for various activities,
- the formulation of a domestic water supply plan suitable for those water sources.

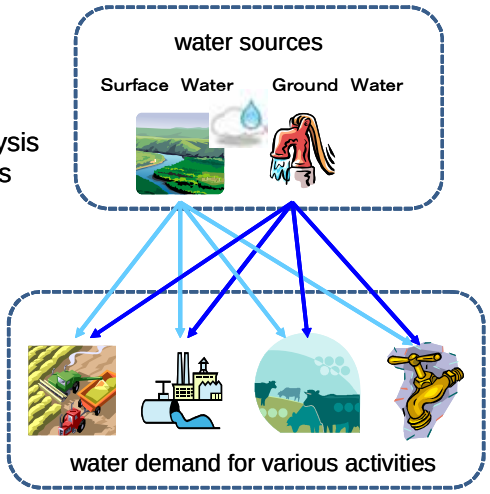


Figure 4-50: Water Distribution Plan considering water quality and amount of wach water source

The following figure shows how each project places within the priority program to provide safe and quality water supply.

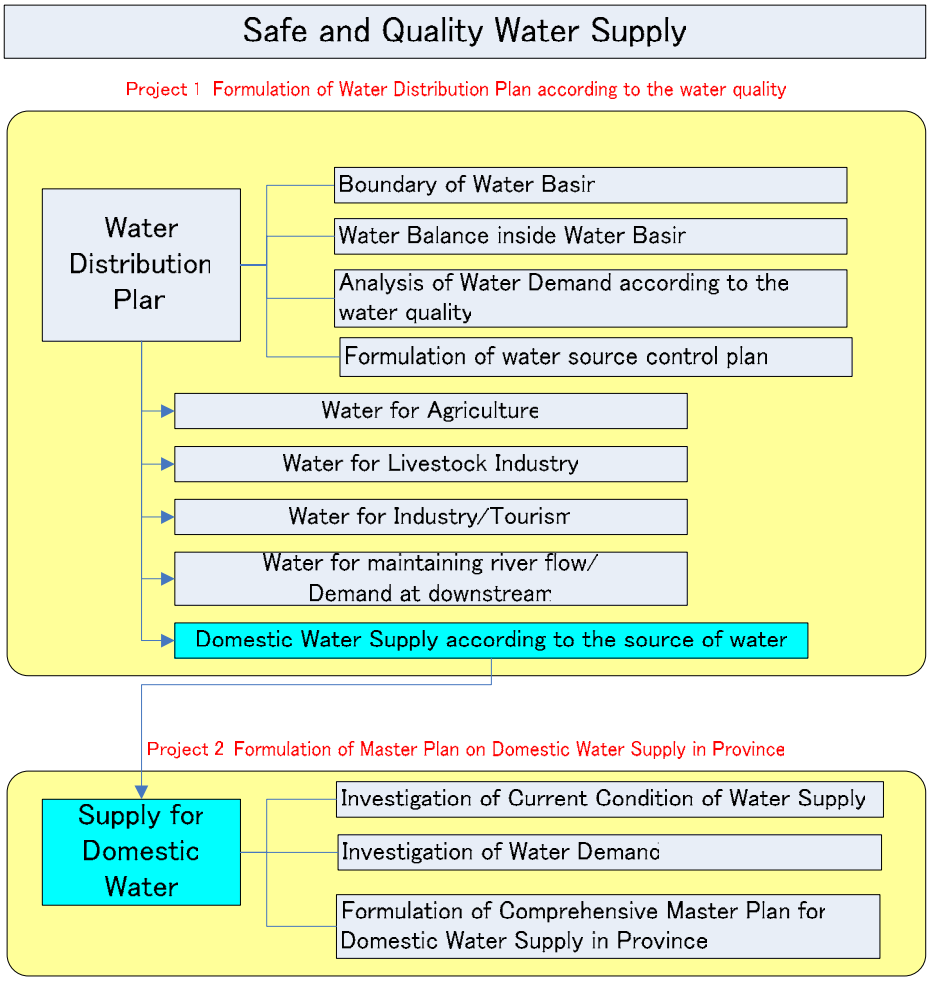


Figure 4-51: Relation between Safe and Quality Water Supply and Each Project

Prior to the formulation of the water distribution plan, the water balance, water demand and supply within the province shall be investigated. Then, considering the water quality and amount in each source, the water distribution plan will be formulated. The formulation process is presented as follows.

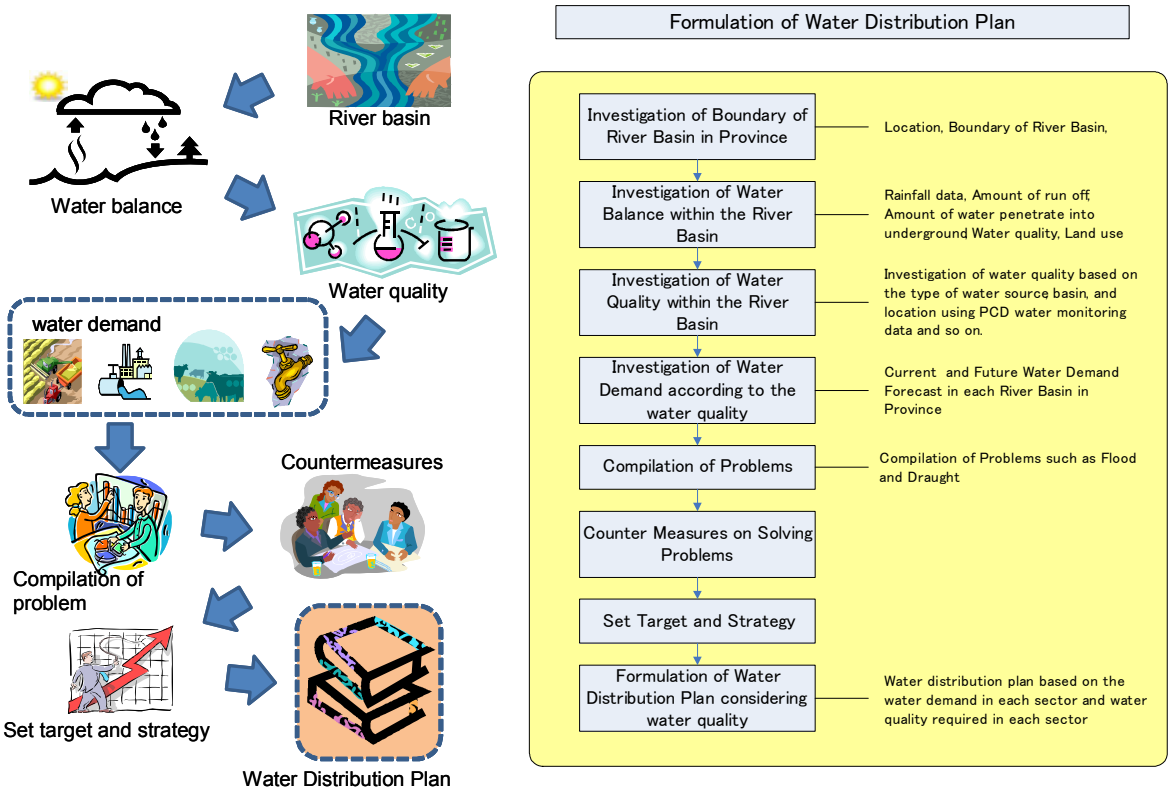


Figure 4-52: Process of Formulation of Water Distribution Plan

After formulation of the water distribution plan, domestic water supply will be highlighted. Firstly, the current conditions of water supply will be investigated. Then, future water demand will be forecast. Finally, a comprehensive water supply plan will be formulated. These procedures are illustrated as follows.

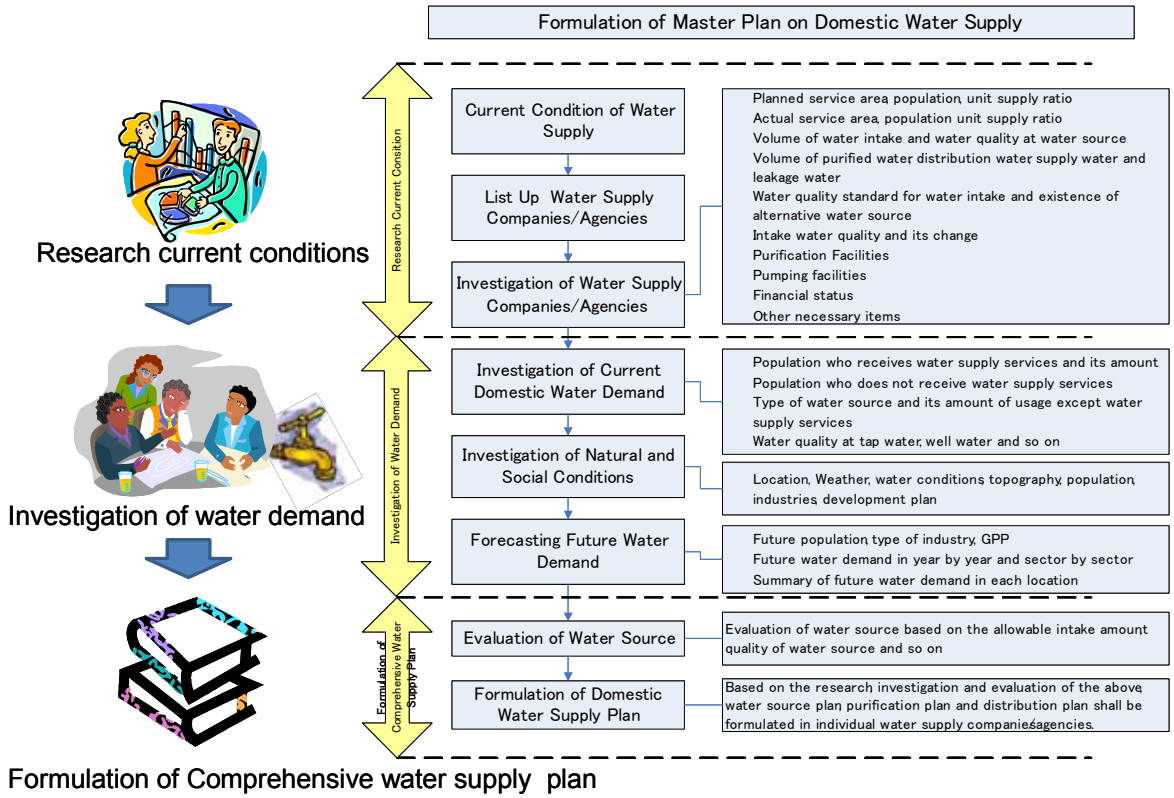


Figure 4-53: Procedure for Formulation of Master Plan on Domestic Water Supply

Project details of each priority project are shown below according to the format set in the PEQMP manual.

a. Project 1: Formulation of Water Distribution Plan in Province

1. Name of Program	Program for Safe and Quality Water Supply in Ayutthaya Province (AYP)
2. Name of Project	Formulation of Water Distribution Plan in Province
3. Sector in NREM	Water Quality
4. Responsible Agency	Provincial Administration under Department of Water Resources
5. Supporting Agency	Provincial Waterworks Authority (PWA), Provincial Environment Office (PEO), Provincial Office (PO)
6. Monitoring and Evaluation Agency	PWA, PEO with all the stakeholders in SKP
7. Background of the Project	Water pollution of public water bodies seriously affects human health if sufficiently clean water cannot be delivered through water utilization facilities such as water purification plants and wells. If water pollution becomes serious, it raises the cost of purification or makes the water unsuitable for consumption and use. Furthermore, water demand of AYP, especially around the City of Ayutthaya, is considerably high due to economic and tourism growth. Upon consideration of the above situation, the volume of water demand in each sector shall be calculated and water resource distribution plan shall be formulated in order to realize the safe and quality water supply in AYP

8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: "Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	Volume of water demand in each sector from each source is calculated and a water resource distribution plan is formulated
10. Objectively Verifiable Indicators	Contents of Water Distribution Plan
11. Main Components of the Project	• Investigation for boundary of river basin • Water Balance in each river basin. • Investigation of water quality within each river basin. • Current and future water demand from each source • Analysis of water demand in province • Compilation of problems • Countermeasures on solving problems • Target setting and strategy • Formulation of water distribution plan from each source
12. Implementation Schedule	• Selection of the Consultant: December 2009 • Commencement: January 2010 • Completion: July 2010
13. Budgetary Plan	2,000,000 Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

b. Project 2: Formulation of Master Plan on Domestic Water Supply

1. Name of Program	Program for Safe and Quality Water Supply in Ayutthaya Province (AYP)
2. Name of Project	Formulation of Master Plan for Domestic Water Supply
3. Sector in NREM	Water Quality
4. Responsible Agency	Provincial Waterworks Authority (PWA) and other water supply companies/agencies
5. Supporting Agency	Provincial Environment Office (PEO), Provincial Office (PO)
6. Monitoring and Evaluation Agency	PWA, PEO with all the stakeholders in SKP
7. Background of the Project	Water pollution of public water bodies seriously affects human health if sufficiently clean water cannot be delivered by water utilization facilities such as water purification plants and wells. If water pollution becomes serious, either the cost of purification rises or the water remains unsuitable for consumption and use. Furthermore, water demand of AYP, especially around the City of Ayutthaya, is considerably high due to economic and tourism growth. Upon the consideration of the above situation, formulation of master plan for domestic water supply shall be formulated.
8. Justification of the Project	Relation with Upper Level Plans: Strategy number 5 of Three-year Provincial Development Plan, which is: "Conserve natural resources and environment and develop better conditions
9. Objectives of the Project	Supply of safe and quality domestic water supply in the province
10. Objectively Verifiable Indicators	Contents of Master Plan for Domestic Water Supply
11. Main Components of the Project	• Research of current conditions of domestic water supply - Identification of domestic water supply companies/agencies - Investigation of contents of domestic water supply

	• Investigation of domestic water demand - Demand for domestic water - Natural and social conditions - Future domestic water demand • Formulation of comprehensive domestic water supply plan - Assessment of water source - Formulation of comprehensive domestic water supply plan
12. Implementation Schedule	• Selection of the Consultant: December 2010 • Commencement: January 2011 • Completion: July 2011
13. Budgetary Plan	3,500,000 Baht
14. Benefit of the Project	Beneficiary: Whole population in AYP

4.4.5 Program to Strengthen Linkage between Central, Provincial and Local Administrations in AYP

a. Strengthening of the Local NREM Support Capacities of REO 6

1. Name of Program	Program to Strengthen Linkage between Central, Provincial and Local Administrations in AYP
2. Name of Project	Strengthening of the local NREM support capacities of REO 6
3. Sector in NREM	NREM Management
4. Responsible Agency	REO 6
5. Supporting Agency	OPS and ONEP of MNRE
6. Monitoring and Evaluation Agency	PEOs under REO 6
7. Background of the Project	At present REO 6 supports NREM being conducted by Provincial and Local Administrations within its region but it is not enough due to insufficient capacity of REO 6 and very weak capacity of LAs. Therefore, it is necessary to strengthen the local NREM support capacities of REO 6 to provide technical assistance and information for the improvement of NREM among PA (Changwat) and LAs within its region, or in other words, so that REO functions as a 'PA/LA Regional Support Center for NREM'. Specifically, the REO's capacity to provide training/ information and conduct public relations activities through its GIS Database Center should be strengthened.
8. Justification of the Project	Relation with Upper Level Plans: • Decentralization of NREM is the national policy. • In all aspects, LAs do not have enough capability to conduct proper NREM in their administrative areas and they require strong technical assistances from REO.
9. Objectives of the Project	Objectives are: • To raise NREM capacities of PEO, a NREM supporting team in PA (Changwat) and the Environmental Division in Orborjor • To strengthen the link between REO 6 and regional offices still held by the five non-ex-MOSTE departments within MNRE • To strengthen the existing NREM GIS Database of REO 6 • To periodically update and maintain the existing NREM GIS Database of REO 6 well. • To provide updated information on NREM to PEOs and other administrative organizations under REO 6.
10. Objectively Verifiable Indicators	• Number of training for PEO, a NREM supporting team in PA (Changwat) and the Environmental Division in Orborjor.

<table>
<tr><td></td><td>• Number of cooperation activities between REO 6 and 5 Regional Offices of non-ex-MOSTE departments.
• Number of information provided to PEO and other administrative organizations within its region.</td></tr>
<tr><td>11. Main Components of the Project</td><td>• The NREM GIS Database Center in REO 6 is strengthened by upgrading and adding PCs, GIS software, X-Y plotters, color printers, etc. to provide information on NREM in the province to PEO and other administrative organizations under REO 6.
• The NREM GIS Database is updated periodically with the information provided by PEO, the PA and LA Support Center for NREM in MNRE and other agencies under REO 6.</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Strengthening of Database</td><td>2009</td></tr><tr><td>Provision of updated information on NREM</td><td>2010-2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget (baht)</th></tr><tr><td>Strengthening of Database</td><td>180,000</td></tr><tr><td>Provision of updated information on NREM</td><td>5,420,000</td></tr></table></td></tr>
<tr><td>14. Beneficiary of the Project</td><td>Whole population in Region 6</td></tr>
</table>

b. Establishment of "PA/LA Central Support Center for NREM" in MNRE

1. Name of Program	Program to Strengthen Linkage between Central, Provincial and Local Administrations in AYP
2. Name of Project	Establishment of "PA/LA Central Support Center for NREM" in MNRE
3. Sector in NREM	NREM Management
4. Responsible Agency	ONEP/MNRE
5. Supporting Agency	OPS, DEQP, PCD, RFD, DNP, DMR, DMCR, DWR, DGR in MNRE
6. Monitoring and Evaluation Agency	REO and PEO
7. Background of the Project	Tasks related to NREM have been comprehensively decentralized and devolved onto Local Administrations (LAs), but the LAs put in charge of these tasks do not realistically have the capacity to execute these tasks. Therefore, for the time being, problem-solving in NREM will be difficult without the strong support of Central Government Organizations and Provincial Administrations (PAs). On the other hand PAs do not have sufficient capability to support LAs due to a lack of technical knowledge on proper NREM. Furthermore, although REO supports NREM being conducted by Provincial and Local Administrations, it could not support some part of NREM due to lack of expertise and resources. Therefore it requires assistance from departments of MNRE. It is, therefore, necessary to establish a support center in MNRE to support both LAs and PAs for proper NREM.
8. Justification of the Project	Relation with Upper Level Plans: • Decentralization of NREM is the national policy. • In all aspects, LAs do not have enough capability to conduct proper NREM in their administrative areas and they require strong technical assistances from MNRE.
9. Objectives of the Project	Objectives are as follows: • The linkages between central/ provincial/ and local

<table>
<tr><td></td><td>administrations is strengthened.
• Departments within MNRE grasp the current actual state of NREM in PAs and LAs</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>• Number of inquires to “PA/LA Central Support Center for NREM”
• Number of inquiries dealt with by MNRE departments</td></tr>
<tr><td>11. Main Components of the Project</td><td>• The Support Center is established in ONEP/MNRE with several staffs and facilities.
• The Support Center is a focal point of inquires from PA and LA on NREM.
• The Support Center requests PA and LA assistance to all departments of MNRE when necessary.
• All departments of MNRE assist PAs and LAs by providing the latest scientific theories and technical information, technical instruction, sector-based training, dispatch of and instruction by experts, assistance for formulating plans in their various responsible fields.
• .</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Establishment of the Center</td><td>2009</td></tr><tr><td>Support of PA and LA on NREM</td><td>2010-2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget (Baht)</th></tr><tr><td>Establishment of the Center</td><td>810,000</td></tr><tr><td>Support of PA and LA on NREM</td><td>10,760,000</td></tr></table></td></tr>
<tr><td>14. Beneficiary of the Project</td><td>Whole population in Thailand</td></tr>
</table>

c. Promotion of Awareness regarding NREM among Administrators of LAs/ Resident and Publication of Environmental Information in AYP

1. Name of Program	Program to Strengthen Linkage between Central, Provincial and Local Administrations in AYP
2. Name of Project	Promotion of awareness regarding NREM among administrators of LAs/ resident and publication of environmental information in AYP
3. Sector in NREM	NREM Management
4. Responsible Agency	DEQP of MNRE and PEO/AYP
5. Supporting Agency	ONEP of MNRE, PO/AYP, Cable TV and Local Radio Stations
6. Monitoring and Evaluation Agency	REO 6
7. Background of the Project	For LAs to properly execute the NREM responsibilities devolved onto them, especially solid waste management and wastewater treatment, the LAs and especially the Orborjor must be led to assign the necessary staff and budget to NREM. At the same time, the NREM responsibilities of LAs are closely related to the life of residents and their efforts will not be sustainable without the residents’ cooperation. To overcome the above issues, the awareness regarding NREM shall be raised among LAs and residents.
8. Justification of the Project	Relation with Upper Level Plans: • Decentralization of NREM is the national policy. • In all aspects, LAs do not have enough capability to conduct proper NREM in their administrative areas and they require strong technical assistances from REO.
9. Objectives of the	Objective is:

<table>
<tr><td>Project</td><td>• To raise NREM awareness in preserving NRE among administrative officers in LAs and residents.</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>• Amount of budget for NREM and number of officers for it in LAs
• Awareness and interest in preserving NRE among residents
• Number of complaints to PEO/AYP</td></tr>
<tr><td>11. Main Components of the Project</td><td>• Organize educational events and seminars.
• Actively use, upgrade, and localize existing teaching aids and TV programs for environmental awareness education, created mainly by DEQP/MNRE.
• Publish the results of PEQMP monitoring and other information on NREM in bulletins and/or through cable TV, radio stations, and websites.</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Education event and seminar</td><td>2009 - 2011</td></tr><tr><td>Upgrade and localize existing teaching aids and TV programs</td><td>2009 - 2011</td></tr><tr><td>Publication of PEQMP monitoring and other information on NREM</td><td>2009 - 2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td>Annual budget<table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Education event and seminar</td><td>1,500,000</td></tr><tr><td>Upgrade and localize existing teaching aids and TV programs</td><td>990,000</td></tr><tr><td>Publication of PEQMP monitoring and other information on NREM</td><td>990,000</td></tr></table></td></tr>
<tr><td>14. Beneficiary of the Project</td><td>Beneficiary: Whole population in AYP</td></tr>
</table>

4.4.6 Program to Strengthen NREM Capacities of LAs in Ayutthaya Province (AYP)

a. Strengthening of NREM Capacity of Orborjor in AYP

1. Name of Program	Program to Strengthen NREM Capacities of LAs in AYP
2. Name of Project	Strengthening of NREM Capacity of Orborjor in AYP
3. Sector in NREM	NREM Management
4. Responsible Agency	Orborjor of Ayutthaya and Provincial Office of AYP
5. Supporting Agency	MOI, PA (Changwat) of AYP and ONEP of MNRE
6. Monitoring and Evaluation Agency	REO 6 and PEO/AYP
7. Background of the Project	Tasks related to NREM have been comprehensively decentralized and devolved onto Local Administrations (LAs) including Orborjor, but the LAs put in charge of these tasks do not realistically have the capacity to execute these tasks. A province-wide viewpoint is a requirement for finding a solution to pollution control problems; thus the Orborjor plays an especially important role in this sector. The Orborjor of AYP already has an Environmental and City Planning Section in the Engineering Division, but their 4 staff members are also in charge of city planning. Although the MNRE has instructed LAs to commit 8% of the total budget to environment in the National EQMP, the environmental budget of AYP Orborjor for FY2006 was only 0.2% of its budget[17].

[17] Source: Opinion survey among LAs

<table>
<tr><td></td><td>Though NREM is clearly written as one of the main responsibilities of Orborjor, it is doubtful that it is successfully functioning as an environmental administration unit.
Consequently, many projects related to the environment at the provincial level, i.e. beyond the scope of Tessaban and Orbortor have not been implemented. It is, therefore, necessary to strengthen NREM Capacity of AYP Orborjor.</td></tr>
<tr><td>8. Justification of the Project</td><td>Relation with Upper Level Plans:
• Decentralization of NREM is the national policy.
• MNRE has instructed LAs including Orborjor to commit 8% of the total budget to environment in the National EQMP
• The Orborjor of AYP does not have enough capability to conduct proper NREM in its administrative area and it requires strong technical support from PA (Changwat) offices.</td></tr>
<tr><td>9. Objectives of the Project</td><td>Objectives are as follows:
• The Environmental Division in Orborjor is strengthened.
• The PA supports NREM of Orborjor.
• The Environmental Division of the Orborjor conducts NREM activities that are beyond the scope of Tessaban and Orbortor Orborjor, e.g. implementation of PEQMP Priority Programs such as Improvement of Solid Waste Management.</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>• Number of staff in the Environmental Division of the Orborjor and budget of it
• Establishment of a NREM supporting team in PA (Changwat)
• Number of NREM projects at the provincial level started by LAs</td></tr>
<tr><td>11. Main Components of the Project</td><td>• A NREM supporting team, of which members are recruited from staff of various PA (Changwat) offices with cooperation from PA (Changwat), is created and the team supports the Environmental and City Planning Section of AYP Orborjor on NREM.
• The Environmental and City Planning Section of AYP Orborjor is strengthened by increasing its number of staff and budget.
• The Environmental and City Planning Section of AYP Orborjor promote NREM activities that are beyond the scope of Tessaban and Orbortor, i.e. implementation of the priority programs like “Program for Improvement of Solid Waste Management in AYP”, etc.</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Creation of and support by the NREM supporting team</td><td>2009</td></tr><tr><td>Strengthening of the Environmental and City Planning Section of AYP Orborjor</td><td>2010 - 2011</td></tr><tr><td>Promotion of NREM activities</td><td>2010 - 2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget (Baht)</th></tr><tr><td>Creation of and support by the NREM supporting team</td><td>4,780000</td></tr><tr><td>Strengthening of the Environmental and City Planning Section of AYP Orborjor (annual operation cost)</td><td>1,990,000</td></tr><tr><td>Promotion of NREM activities (annual operation cost)</td><td>1,000,000</td></tr></table></td></tr>
<tr><td>14. Beneficiary of the Project</td><td>Beneficiary: Whole population in AYP</td></tr>
</table>

b. Construction of Resident Participatory System for NREM in AYP

<table>
<tr><td>1. Name of Program</td><td>Program to Strengthen NREM Capacities of LAs in AYP</td></tr>
<tr><td>2. Name of Project</td><td>Construction of Resident Participatory System for NREM in AYP</td></tr>
<tr><td>3. Sector in NREM</td><td>NREM Management</td></tr>
<tr><td>4. Responsible Agency</td><td>Provincial Office and PEO of AYP</td></tr>
<tr><td>5. Supporting Agency</td><td>ONEP and Amphoe of AYP</td></tr>
<tr><td>6. Monitoring and Evaluation Agency</td><td>REO 6</td></tr>
<tr><td>7. Background of the Project</td><td>The main executors of the PEQMP would be individuals and organizations who directly impact their natural resources and environment during the course of their everyday activities. Therefore, the participation at the stage of plan formulation, understanding of plan contents, and building of a system of cooperation for the execution/implementation of the plan by all interest-bearing parties, i.e. stakeholders, is a necessary precondition for a successful and realistic plan.
In the wide-ranging and widely-affecting field of natural resources and environmental management (NREM), NREM cannot move forward without public/stakeholder participation. It is, therefore, necessary to construct a resident participatory system for NREM in AYP.</td></tr>
<tr><td>8. Justification of the Project</td><td>Relation with Upper Level Plans:
• The Regulation of the Office of Prime Minister on Public Consultation by Public Hearing (B.E. 2548) stipulates that stakeholder opinion should be reflected in plan formulation.
• MNRE has instructed maximum public participation for PEQMP formulation and implementatyion in the National EQMP.</td></tr>
<tr><td>9. Objectives of the Project</td><td>Objectives are as follows:
• Opinions of local residents are reflected in PEQMP formulation and implementation, and NREM status is monitored by local residents</td></tr>
<tr><td>10. Objectively Verifiable Indicators</td><td>• Number of public notices on PEQMP
• Number of resident opinions recorded on PEQMP and NREM
• Appointment of local resident representative(s) to monitoring committee for PEQMP and NREM</td></tr>
<tr><td>11. Main Components of the Project</td><td>• The draft PEQMP formulated by the Formulation Committee is posted and made available to the public in branch government offices (for example, Amphoe offices) for 45 days, the same way zoning regulation changes are handled. At the same time, the posting period of the draft PEQMP is publicized through cable TV, radio stations, and websites, with the purpose of attracting opinions from as wide a range of local residents as possible, in order to reflect such opinions on the plan itself.
• The Monitoring Committee includes environmental experts, representatives of NGOs, and representatives of local residents, so that various stakeholders can jointly monitor the implementation of NREM.</td></tr>
<tr><td>12. Implementation Schedule</td><td><table><tr><th>Component</th><th>Implementation</th></tr><tr><td>Public notification of the draft PEQMP</td><td>2009</td></tr><tr><td>Operation of the Monitoring Committee</td><td>2010-2011</td></tr></table></td></tr>
<tr><td>13. Budgetary Plan</td><td><table><tr><th>Component</th><th>Budget (Baht)</th></tr></table></td></tr>
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	Public notification of the draft PEQMP (annual operation cost)	330,000	
	Operation of the Monitoring Committee (annual operation cost)	170,000	
14. Justification of the Project	Beneficiary: Whole population in AYP		

c. Strengthening of the Environmental Information Center in PEO/AYP

1. Name of Program	Program to Strengthen NREM Capacities of LAs in AYP
2. Name of Project	Strengthening of the Environmental Information Center in PEO/AYP
3. Sector in NREM	NREM Management
4. Responsible Agency	PEO/AYP
5. Supporting Agency	OPS and ONEP of MNRE
6. Monitoring and Evaluation Agency	REO 6
7. Background of the Project	Many comments that "the information on current NREM is hardly at hand and it shall be provided by the public sector" were voiced in the stakeholder opinion survey and at seminars. In AYP, an Environmental Information Center has been established within the PEO and responds to inquiries by local residents and companies, but such inquiries are handled non- systematically. The Environmental Information Center in PEO shall be strengthened to provide NREM information supply services; that the information provided is on paper and in PDF file format; and that the information should come from databases maintained and updated by the REO 6.
8. Justification of the Project	Relation with Upper Level Plans: • The Regulation of the Office of Prime Minister on Public Consultation by Public Hearing (B.E. 2548) stipulates that stakeholder opinion should be reflected in plan formulation. • MNRE has instructed maximum public participation for PEQMP formulation and implementation in the National EQMP.
9. Objectives of the Project	Objectives are: • To provide NREM information to local residents, LAs, developers and organizations in general in AYP. • To collect NREM information from local residents, LAs, developers and organizations in general in AYP.
10. Objectively Verifiable Indicators	• Amount of information provided to local residents, LAs, developers and organizations in general in AYP. • Amount of information collected from local residents, LAs, developers and organizations in general in AYP.
11. Main Components of the Project	• The Environmental Information Center in PEO/AYP is strengthened by upgrading and adding PCs, copy machine, color printer and so on, to provide information on NREM in the province to local residents, LAs, developers and organizations in general. • The Environmental Information Center in PEO/AYP collects information on NREM in the province from local residents, LAs, developers and organizations in general. Then they send the information to the NREM GIS Database Center in REO 6.
12. Implementation Schedule	Component: Strengthening of the Center — Implementation: 2009 Component: Provision and collection of the information on NREM — Implementation: 2010-2011
13. Budgetary Plan	

	Component	Implementation
	Strengthening of the Center	300,000
	Provision and collection of the information on NREM (annual cost)	800,000
14. Benefit of the Project	Beneficiary: Whole population in AYP	