

Impact

- Future generation amount may increase in case unregistered population and tourist will increase.
- If neighboring provinces refuse to accept disposal of wastes from SKP, many wastes will heap in the urban area.
- It happens in many cities in the world including Tokyo, Japan.

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Issues: Waste Generation and Collection

National Target

Unit	Tessaban Nakorn	Tessaban Mueang	Tessaban Tambon	Orbantor
Waste Generation Rate	0.8	0.6	0.6	0.4
Collection Rate	95 %	95 %	95 %	90 %
Recycling Rate	30 %	30 %	30 %	30 %

Actual

Item	Tessaban	Orbantor	Total
Waste Generation Rate	0.956	0.5	0.601
Collection Rate	93 %	81 %	95.3 %
Recycling Rate	NA	NA	NA

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Issues: Final Disposal

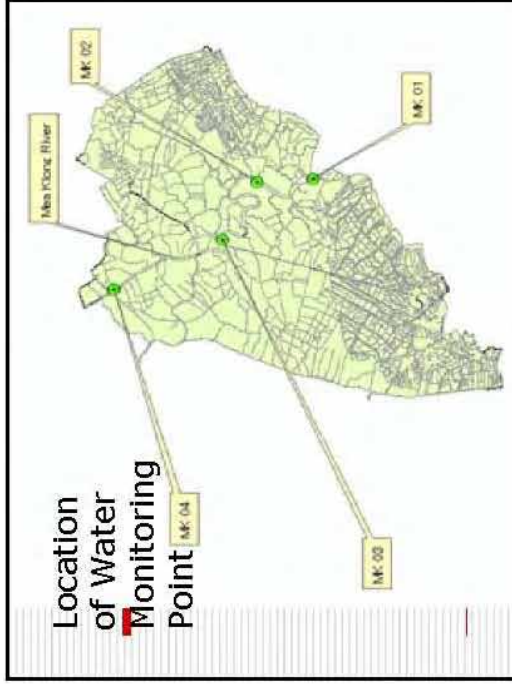
- There is no final disposal site within the Province.
- There is no control for disposal operation which is carried out outside the Province by the private company

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Measures

- Reduction of Waste Generation
 - Promotion of 3Rs, Education, Composting
- Improvement of Collection Rate
 - Investigation of rate for self disposal.
- Selection of site for Final Disposal
 - Selection procedure shall be open to the public

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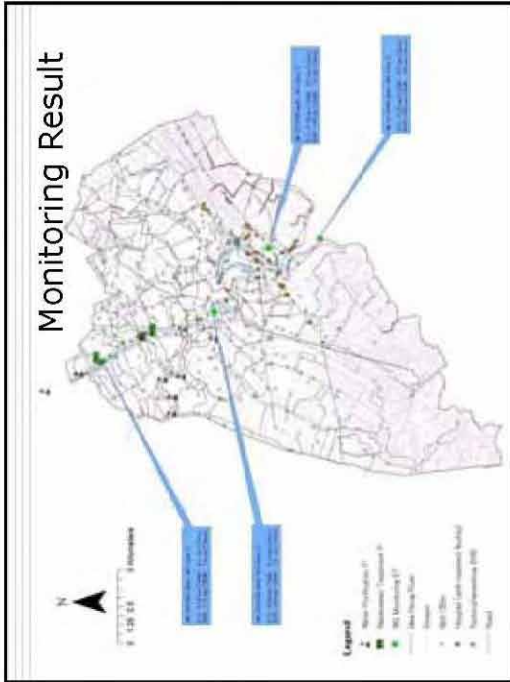


Classifications	Objectives / Conditions and Beneficial Usage
Class 1	Extra clean fresh surface water resources used for: (1) consumption not necessarily pass through water treatment process require only ordinary process for pathogenic destruction (2) ecosystem conservation where basic organisms can breed naturally
Class 2	Very clean fresh surface water resources used for: (1) consumption which requires ordinary water treatment process before use (2) aquatic organism of conservation (3) fisheries (4) recreation
Class 3	Medium clean fresh surface water resources used for: (1) consumption, but passing through an ordinary treatment process before using (2) agriculture
Class 4	Fairly clean fresh surface water resources used for: (1) consumption, but requires special water treatment process before using (2) industry
Class 5	The sources which are not classification in class 1-4 and used for navigation

Source: KCC (1986), (1991), (1992), (1993), (1994), (1995), (1996), (1997), (1998), (1999), (2000), (2001), (2002), (2003), (2004), (2005), (2006)

Summary of water quality class results (2006) for Mea Klong River

Point	DO P20	BOD P80	TCB P80	FCB P80
MK-01	Class3	Class2	Class3	Class3
MK-02	Class3	Class2	Class2	Class3
MK-03	Class3	Class4	Class2	Class3
MK-04	Class3	Class3	Class3	Class3



Heavy Metals

□ 11 kinds of heavy metals were analyzed. Results confirmed that they were all below the environmental standards, with the exception of Cd at MK.02 in 1999 (0.065mg/l, environmental standard: 0.005 mg/l) and As at MK.01 in 2002 (0.01mg/l, environmental standard: 0.01 mg/l)

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Coastal Sea Water Quality

□ PCD has examined the coastal sea water quality in 2006 in 3 stations of Samut Songkhram at the point at 500 meters far from coastal line.

Examination Stations (coastal area)	Results of Examination			
	DO (mg/l)		TCB (MPN/100 ml)	
	Summer	Rainy Season	Summer	Rainy Season
1. West of Mouth of Mao Klong River	5.1	4.7	1,600	5,400
2. Mouth of Mae Klong River	5.3	4.8	3,500	3,500
3. East of Mouth of Mae Klong River	6.4	6.5	5,400	3,500

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Coastal Sea Water Standard

Parameter	Unit	Methods for Examination	Standard					
			Class s1	Class s2	Class s3	Class ss4	Class ss5	Class ss6
11 DO	mg/l	1) Azide Modification Method 2) Membrane Electrode Method 3) Winkler Method	Not less than 4	Not less than 6	Not less than 4	Not less than 4		
12 Total Coliform Bacteria	MPN/100 ml	Multiple Tube Fermentation Technique	Not more than 1000					

Class	Description
1	Natural resources conservation
2	Coastal conservation
3	Water for Coastal farms
4	For recreation (water contact spot, such as swimming)
5	Nearby industrial estate, airport, port
6	Nearby populated area

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Findings

- In terms of DO all results show the coastal sea water quality of SKP is Class1 or Class3 - 6. Since the Class2 of DO is set for coral conservation, results of DO measurement satisfy the environmental standards. Because coastal area of SKP does not have coral reef.
- In terms of TCB (total coliform bacteria) all results over 1,000(MNP/100ml). It means the coastal sea water quality of SKP does not satisfy the environmental standards. This fact indicates that huge amount of feces/urine of human beings and animals are discharged into this coastal area without treatment.

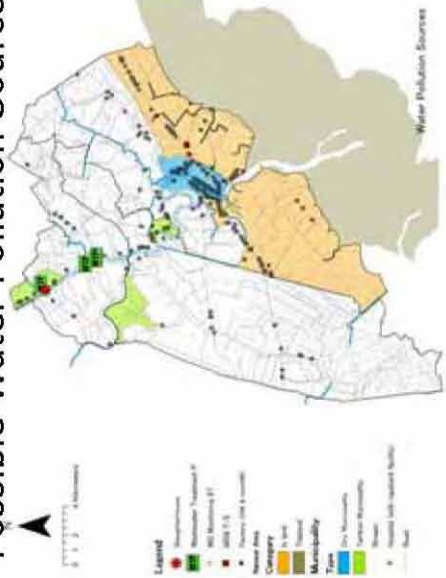
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Water Pollution Source

- As for domestic waste water, densely populated area like urban area
- Regarding industrial waste water which is high concentration, factories, slaughterhouses, livestock barns, etc.
- Leachate from final solid waste disposal sites

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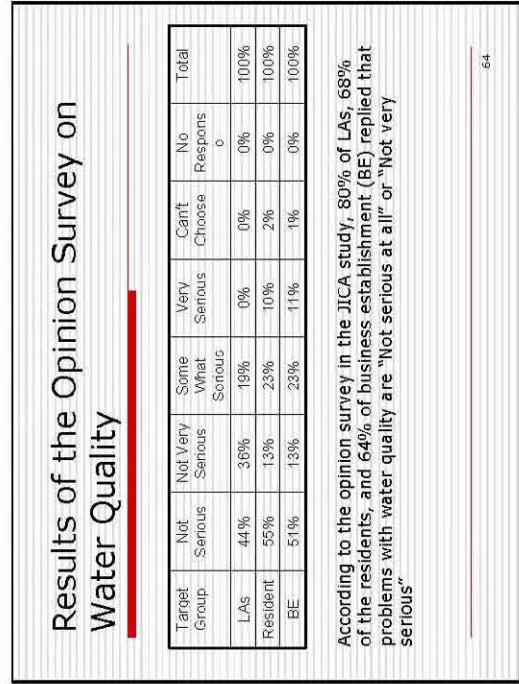
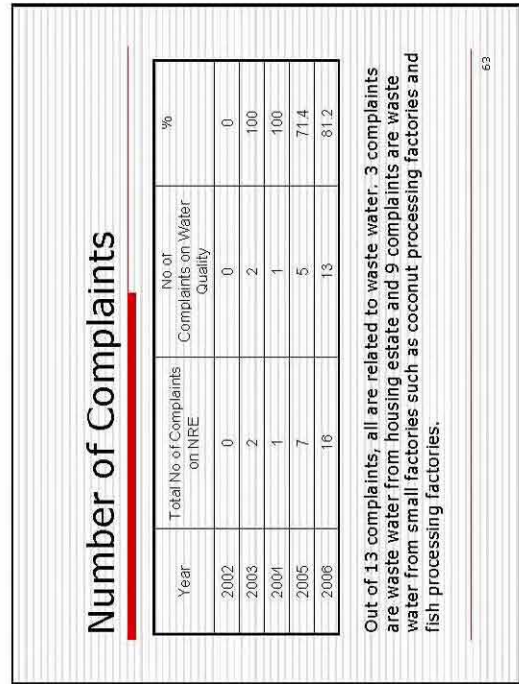
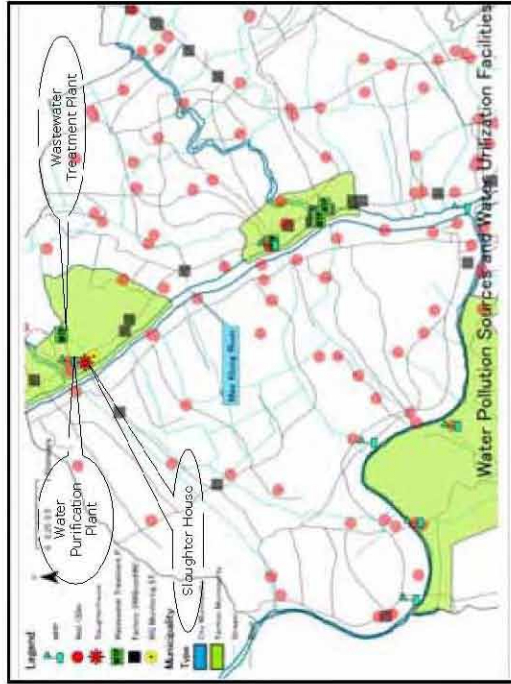
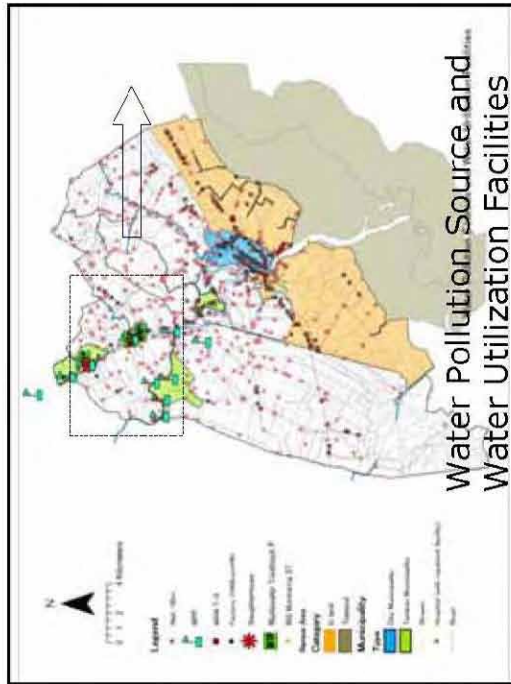
Possible Water Pollution Source



Water Utilization Facilities

- River water and underground water are utilized as sources of potable, irrigation and industry water.
- The following figure shows interrelation between Water Pollution Sources above mentioned and Water Utilization Facilities.

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What aspects and reasons why water quality is very serious

Target Group	What aspects	Reasons why very serious
LA	Waste water from neighboring province Factory discharged waste water to the Mae Klong River.	Lost of marine species Lost of marine species.
Resident	Dump garbage into canals Waste water Low quality of ground water Dump garbage into canals Waste water	Caused water pollution Caused damage to aqua culture Groundwater can not be used Caused water pollution Caused damage to aqua culture
BE	Low quality of ground water	Groundwater can not be useff

Issues

- Water pollution of public water bodies seriously affects to human health through water utilization facilities.
 - If water pollution becomes serious, it raises cost of purification or it makes the water unsuitable for water supply
- Priority Program
- Provision of safe and qualified water supply
 - Preservation of water quality of public water bodies

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Measures

- As for the provision of safe and qualified water supply, the following measures needs to be taken:
 - Study on current water supply system
 - Study on current water demand and supply and future water demand and supply
 - Formulation of an integrate water supply plan
 - Improvement of water supply system in accordance with the integrate water supply plan

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Measures

- As for preservation of water quality of public water bodies, it requires the following measures according to the pollution sources:
 - Appropriate treatment of domestic waste water
 - Appropriate treatment of factory waste water, agricultural and livestock wastewater, etc.
 - Prevent water bodies from illegal dumping of solid waste

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Short Term: By year 2011

- Effective use of water quality monitoring results (information disclosure and monitor/grasp understanding of water bodies)
- Study on current waste water management system
- Formulation of an integrate waste water management plan
- Support people to use septic tank for principal treatment of wastewater
- LA should control housing development project and building construction in accordance with Housing Estate and Building Effluent Standards for wastewater treatment from housing estate and buildings respectively.
- Control business enterprises not to discharge wastewater to public water bodies without treatment
- Raise awareness of residents for preventing illegal dumping in the canal

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Long Term (as vision, goals)

- Improvement of waste water management system in accordance with the integrate waste water management plan

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1. Framework of PEQMP

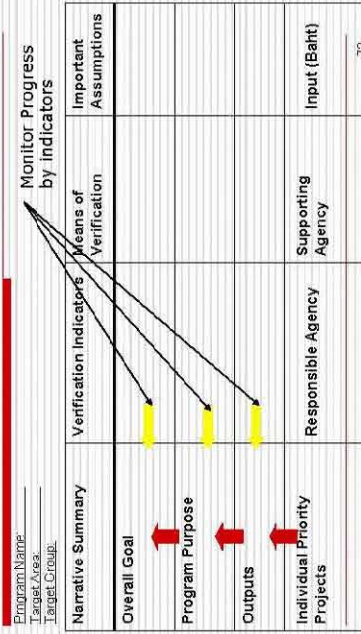
2. Selection of Priority Issues

3. Explanation of Current Situation, Issues, and Measures on Priority Issues

4. Priority Program in PEQMP

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Structure of PDM



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Individual Priority Projects

- Output**
 - Output will be realized through the Implementation of Individual Priority Projects
- Individual Priority Projects**
 - Study the decline in catch amounts and grasp the trends of decline by species/type, use as baseline data to suggest countermeasures
 - Formulate a conservation and rehabilitation plan based on study results
 - Conserve natural habitats for fish, i.e. coastal mangrove forests, and increase safe habitats through afforestation
 - Control illegal fishing practices and disseminate sustainable fishing practices
 - Educate fishermen in the importance of conservation and recovery of aquatic resources and increase their awareness⁷

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Individual Priority Projects, Responsible Agency, Supporting Agency, and Input

Individual Priority Projects	Responsible Agency	Supporting Agency
1. Study the decline in catch amounts and grasp the trends of decline by species/type, use as baseline data to suggest countermeasures	PFO	PEO, MFDS7, FFKU,MSRDC
2. Formulate a conservation and rehabilitation plan based on study results	PFO	PEO, MFDS7, FFKU,MSRDC
3. Conserve natural habitats for fish, i.e. coastal mangrove forests, and increase safe habitats through afforestation	MFDS7, PEO	IAs
4. Control illegal fishing practices and disseminate sustainable fishing practices	PFO, IAs	PEO
5. Educate fishermen in the importance of conservation and recovery of aquatic resources and increase their awareness	PEO, IAs, MFDS	PO

Monitoring Progress of Work

Outputs	Verification Indicator
1. The decline of aquatic resources is demonstrated through concrete numbers	1. Fishery statistics by species/type and location
2. A conservation and rehabilitation plan suited to SKP is formulated	2. Detailed plan for conservation and rehabilitation
3. Habitats for fish are established through afforestation of mangrove forests	3. Afforestation area statistics and total area statistics of mangrove forest
4. A sustainable form of fishing is established	4. Number of warnings and arrests over illegal fishing practices
5. Fishermen become increasingly aware of sustainable resource use	5. Number of workshops and other educational events, number of participants of the same

Progress of the work will be monitored by verification indicators.

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Program for Samut Songkhram Province (SKP) Appropriate and Sustainable Solid Waste Management

- Overall Goal**
 - The establishment of a structure for sustainable waste management that is appropriate to the environment of SKP, which is abundant in natural resources
 - Program Purpose**
 - Waste generation is reduced in SKP, and generated waste is hygienically finally disposed within SKP
- Overall goal will be realized through a achievement of Program Objectives

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Program Objective and Output

Program Objective will be realized through the achievement of Outputs

- Program Purpose
- Outputs
 - A final disposal site is constructed for solid waste in SKP
 - Waste generation amount declines
 - Separate discharge and collection of waste is implemented in an increasing number of LAs
 - The number of schools implementing school composting increases, and waste generation volume declines
 - Awareness among administration staff related to waste management increases

R1

Output and Individual Priority Program

Output will be realized through the Implementation of Individual Priority Projects

- Output
- Individual Priority Projects
 - Construction of solid waste final disposal site
 - Conduct education and outreach to residents, in order to satisfy the waste generation target volume indicated in the National MP
 - Promote separate collection among LAs by organizing a competition between LAs and initiating a campaign program
 - Spread school composting to schools that do not currently implement such a program
 - Conduct training seminars for administration staff, on appropriate and environmentally friendly waste management

R2

Individual Priority Project, Responsible Agency, Supporting Agency, and Input

Individual Priority Projects	Responsible Agency	Supporting Agency
1. Construction of solid waste final disposal site	Orbongor	PC, PCD
2. Conduct education and outreach to residents, in order to satisfy the waste generation target volume indicated in the National MP	LAs	PCO, PLAO School
3. Promote separate collection among LAs by organizing a competition between LAs and initiating a campaign program	LAs	PEO, REO, DEQP
4. Spread school composting to schools that do not currently implement such a program	School	PEO, REO, LAs
5. Conduct training seminars for administration staff, on appropriate and environmentally friendly waste management	PEO	PEO, REO, DEQP

R3

Monitoring Progress of Work

Output	Verification Indicator	Assumption
1. A final disposal site is constructed for solid waste in SKP	1. Capacity of new disposal site	Stakeholders agree to construct a final disposal site in SKP
2. Waste generation volume declines	2. Waste generation volume per capita	
3. Separate discharge and collection of waste is implemented in an increasing number of LAs	3. Volume of separate discharge and collection, number of LAs	
4. The number of schools implementing school composting increases, and waste generation volume declines	4. Number of schools which implemented school composting	
5. Awareness among administration staff related to waste management increases	5. Number of seminars for administration staff	

Progress of the work will be monitored by verification indicators.⁸⁴

Monitoring Progress of Work

Output	Verification Indicator
1. Current condition of water supply will be grasped	1. Water supply area, distribution system, purification system
2. Current and future water demand will be grasped	2. Current and future water demand in each area
3. Comprehensive water supply plan will be formulated	3. Feasibility of comprehensive water supply plan

Progress of the work will be monitored by verification indicators.

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Program for Water Quality Preservation in Public Water Bodies of SKP

- Overall Goal
 - To secure the quality of water body considering local conditions

Overall goal will be realized through achievement of Program Objectives

- Program Purpose
 - Formulation of Water quality management plan considering local conditions (water quality environment, population density, industry, business activities, etc)

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Program Objective and Output

- Program Purpose
 - Program Objective will be realized through the achievement of Output
- Output
 - Control system will be developed
 - Current conditions will be investigated and target for reduction of discharge amount of pollutant will be set.
 - Formulation of discharge water management plan
 - Saline water management plan will be formulated

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Individual Priority Projects

- Output
 - Output will be realized through the Implementation of Individual Priority Projects
- Individual Priority Projects
 - Development of control system using monitoring results
 - Investigation of current conditions and set a target
 - Formulation of discharge water management plan
 - Formulation of saline water management plan

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Individual Priority Projects, Responsible Agency, Supporting Agency, and Input

Individual Priority Projects	Responsible Agency	Supporting Agency
1. Development of control system using monitoring results	PEO, REO	PCD
2. Investigation of current conditions and set a target	PCD, RID, DIW, DOA	PIO, PEO
3. Formulation of discharge water management plan	RID, DIW, DOA, PCD	PIO, PEO
4. Formulation of saline water management plan	PCD, Orborjor, Tessaban, Orborjor	PIO, PEO

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Monitoring Progress of Work

Output	Verification Indicator
1. Control system will be developed.	1. Number of warning or action taken based on the monitoring results
2. Current conditions will be investigated and target for reduction of discharge amount of pollutant will be set.	2. Target for reduction of pollutant in each sector
3. Formulation of discharge water management plan	3. Feasibility of discharge water management plan
4. Saline water management plan will be formulated	4. Feasibility of saline water management plan

Progress of the work will be monitored by verification indicators. 94

Program to Strengthen Linkage between Central Government Agencies and LAs Samut Songkhram Province(SKP)

- Overall Goal
 - NREM administrative capabilities of LAs in SKP are strengthened

Overall goal will be realized through achievement of Program Objectives

- Program Purpose
 - Strengthen linkage for NREM between central government agencies and LAs

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Program Objective and Output

- Program Purpose
 - Program Objective will be realized through the achievement of Output
- Outputs
 - Proficiency of LA staff in NREM increases
 - Divisions within MNRE grasp the current actual state of NREM in LAs
 - The NREM Information Center becomes an increasingly important function/aspect of the PEO
 - A sustainable development plan with due consideration of NREM is proposed; it is approved and a budget is allocated by the central government,
 - NREM awareness, and interest in preserving NRE, increases among residents

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Individual Priority Projects

- Outputs**
 - Output will be realized through the Implementation of Individual Priority Projects
- Individual Priority Projects**
 - Establish a LA Support Center for NREM in ONEP; the Support Center requests LA assistance to various divisions of MNRE when necessary
 - The nine divisions of MNRE assist LAs through technical instruction, training services, assistance by experts, provision of information in their various responsible fields
 - Establish an NREM GIS Database Center in REO; the Database Center provides updated data to PEO
 - Training or assignment of NREM advisor to the Governor
 - Promote resident environmental awareness and publicize environmental information

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Individual Priority Projects, Responsible Agency, Supporting Agency, and Input

Individual Priority Projects	Responsible Agency	Supporting Agency
1. Establish a LA Support Center for NREM in ONEP; the Support Center requests LA assistance to various divisions of MNRE when necessary	ONEP	OPS
2. The nine divisions of MNRE assist LAs through technical instruction, training services, assistance by experts, provision of information in their various responsible fields	ONEP, DEQP, PCD, PFD, DNP, DMR, DMCR, DWR, DGR	OPS
3. Establish an NREM GIS Database Center in REO; the Database Center provides updated data to PEO	REO	ONEP, OPS
4. Training or assignment of NREM advisor to the Governor	PFO	PO, Orborjor
5. Promote resident environmental awareness and publicize environmental information	ONEP, RE-O, PEO	DEQP, PO, Cable TV, local radio stations

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Monitoring Progress of Work

Output	Verification Indicator
1. Proficiency of LA staff in NREM increases	1. Number of inquiries to the LA Support Center for NREM; number of LAs
2. Divisions within MNRE grasp the current actual state of NREM in LAs	2. Number of inquiries dealt with by MNRE divisions
3. The NREM Information Center becomes an increasingly important function/aspect of the PEO	3. Number of inquiries to the NREM Information Center
4. A sustainable development plan with due consideration of NREM is proposed; it is approved and a budget is allocated by the central government	4. Number of proposals; number of approvals
5. NREM awareness, and interest in preserving NRE, increases among residents	5. Education event/seminar numbers; number of complaints

Progress of the work will be monitored by verification indicators.

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Program to Strengthen NREM capacities of Local Administrations (LAs) in Samut Songkhram Province (SKP)

- Overall Goal**
 - NRE in SKP are properly managed
 - Program Purpose**
 - NREM capacities of LAs in SKP are strengthened
- Overall goal will be realized through achievement of Program Objectives

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Program Objective and Output

Program Purpose

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Program Objective will be realized through the achievement of Output

Outputs

- NREM projects such as solid waste management and wastewater treatment are moved forward
- Opinions of local residents are reflected in NREM plan formulation and implementation, and NREM status is monitored by local residents
- NREM information is used effectively by PA, LAs, and local residents

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Individual Priority Projects

Outputs

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Output will be realized through the Implementation of Individual Priority Projects

Individual Priority Projects

- Create a NREM team from PA staff with cooperation from PA; strengthen the Environmental and City Planning Section of Orborjor by joining the Team to this section; promote NREM activities that are beyond the scope of Tessaban and Orborjor
- Construct a resident participatory system for NREM, including schemes for public notification and resident inclusion in the monitoring committee
- Improve the NREM Information Center in PEO; use the NREM GIS database maintained by the REO and offer information supply services in NREM-Information-Center

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Individual Priority Projects, Responsible Agency, Supporting Agency, and Input

Individual Priority Projects	Responsible Agency	Supporting Agency
1. Create a NREM team from PA staff with cooperation from PA; strengthen the Environmental and City Planning Section of Orborjor by joining the Team to this section; promote NREM activities that are beyond the scope of Tessaban and Orborjor	TCO Orborjor	MCI PA CINEP
2. Consult with a resident participatory system for NREM, including schemes for public notification and resident inclusion in the monitoring committee	PO PEO	ONIEP Amphoe
3. Improve the NREM Information Center in PEO; use the NREM GIS database maintained by the REO and offer information supply services in NREM Information Center	PEO	REO DEQP OPS

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Monitoring Progress of Work

Output	Verification Indicator	Assumption
1. NREM projects such as solid waste management and wastewater treatment are moved forward	1. Number of NREM projects started by LAs	The understanding of DLA (MOI) and the Governor is obtained
2. Opinions of local residents are reflected in NREM plan formulation and implementation, and NREM status is monitored by local residents	2-1 Number of public notices received 2-2 Number of resident opinions 2-3 Appointment of local resident representative(s) to monitoring committee	
3. NREM information is used effectively by PA, LAs, and local residents	3. Number of inquiries to NREM Information Center	

Progress of the work will be monitored by verification indicators.
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