

Solid Waste:

Current Situation

- There is no final disposal site in the province so set up a transfer station and transport outside the province from there
- Waste is not sorted or collected separately
- Large portion of collection and final disposal is commissioned to the private sector
- No intermediate treatment facility for recycling

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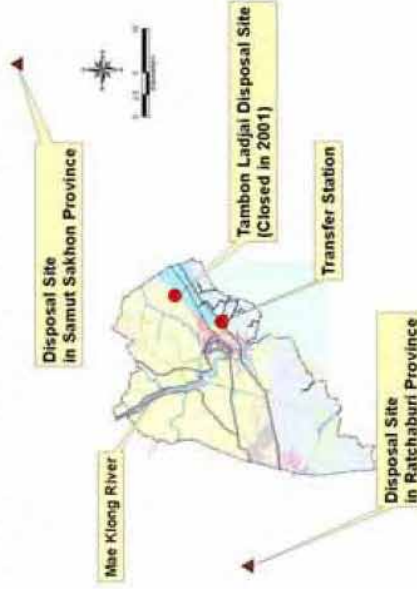
Solid Waste:

Issues

- No final disposal sites in the province.
- Even though Environmental Funds were used to make a final disposal site, it can't be used due to local opposition.
- A private collection truck is commissioned but taken to neighboring Ratchaburi Province and Samut Sakhon Province for disposal.
- No cover soil, no leachate treatment facility at disposal site, Open Dumping conditions at Ratchaburi Disposal Site
- 4 local administrations (11%) reported instances of illegal dumping

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Location of Solid Waste Management Facilities



Solid Waste: Measures

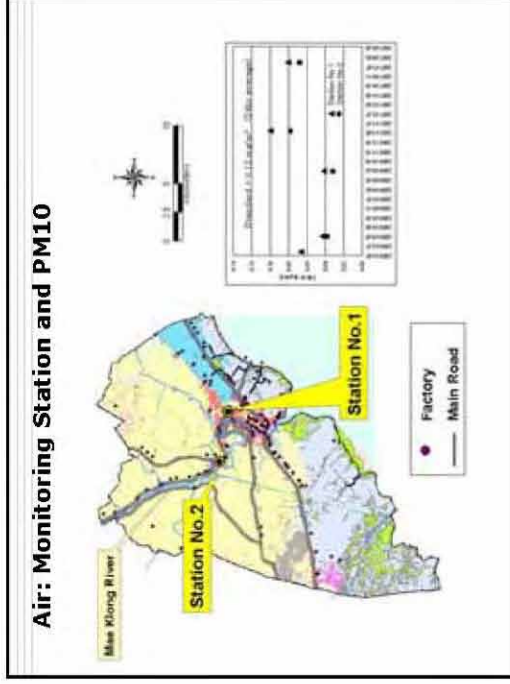
- According to the National SWM MP
 - Advocate restricting solid waste generation to 0.8kg/person/day or less from households in the Tassabani
 - The target ratio of non-collected household waste in Tassabani is 5% or less,
 - The target ratio of non-collected household waste in Orbator is 10% or less
- Give guidance for waste to be separated when put out and collected, thus reducing the volume for final disposal. (98% of local people indicated in an opinion poll that they would comply with a system to separate waste into 3 types)
- Provision a recycle center in the province
- To avoid discord with neighboring province in the future, it is necessary to discuss among stakeholders whether waste disposal should be constructed within the province or not

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Air Quality: Current Situations

- There is no station that regularly monitors air quality in this province.
- There are regular measurements of major roadways at 2 locations for particulate matter (PM-10 [24 hr average])
- The results for both points have been below environmental standard
- According to the questionnaire done by the Study Team, there are no problems with air quality or bad odors.

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Air Quality: Measures (1)

- The only item regularly measured is PM-10, so there is no other data for air quality items.
- Movable air monitoring unit shall be used to monitor air quality established by environmental standards items - carbon monoxide, nitrogen dioxide, sulphur dioxide, dust (PM-10), ozone, lead and VOCs
- Air quality has less priority in terms of environment management in SKP

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Air Quality: Measures (2)

- Use the policy put forth in "Air and Noise Quality Management in Thailand Master Plan 2007-2016 (Draft)".
- Raise the consciousness of the people in the province with campaigns to educate about pollution prevention and air quality in order to avoid occurrence of air pollution in future.

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Noise and Vibration

- No station takes measurements regularly for noise and vibration in the province.
- Measurements are taken regularly of major roads at 2 locations (at the same locations of air quality.)
- The results are satisfies the Community Noise Standard
- In general the sources of noise and vibration are factory crushing machines, large vehicles or building construction.
- However, responses to the opinion survey did not indicate any problems except for noise complaints about boat outboard motors used for viewing fireflies.

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Noise and Vibration

Current Situations

Noise SKP	No of Complaints	Total No of Complaints
2002	0	0
2003	0	2
2004	0	1
2005	0	7
2006	2	16

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Noise and Vibrations: Issues

- There is a problem with noise from outboard motors on boats used for firefly viewing.

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Noise and Vibrations: Measures

- The province will cooperate with the national and REO government offices to set up standards on place and time and come up with measures to prevent problems before they happen.
- Promote the use of low-noise emitting outboard motors for boat firefly viewing and provide support through subsidies and such as necessary.
- Concerning noise, use the policy put forth in "Air and Noise Quality Management in Thailand Master Plan 2007-2016 (Draft)".

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Hazardous and Toxic Waste

- Current Situations
 - There is no facility to properly treat and disposal household hazardous waste (dry cell batteries, fluorescent bulbs.) in SKP.
 - There is no special disposal site for medical infectious waste.
 - In response to the opinion survey, problems were indicated concerning the mixed discharge of medical infectious waste and general wastes.
 - The main source of hazardous substances is items from the workshop, which constitutes approx. 50% of this type of waste (REO 8 Report).

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Hazardous and Toxic Waste

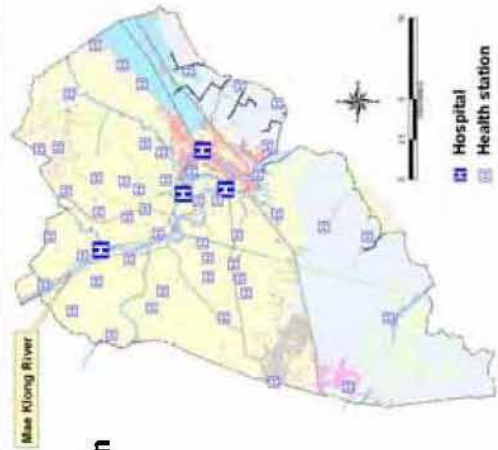
- Current Situations-2
 - Medical infectious waste in 2005 in the province was calculated as follows.

	Unit generated	bed/place	Amount discharged
Hospital	0.26 kg/bed/day	540 bed	140 kg/day
Health Station	0.28 kg/place/day	50 place	14 kg/day
		Total	154/kg/day

Note: Unit generated from REO8

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Hospital and Health Station



Hazardous and Toxic Waste: Current Situations

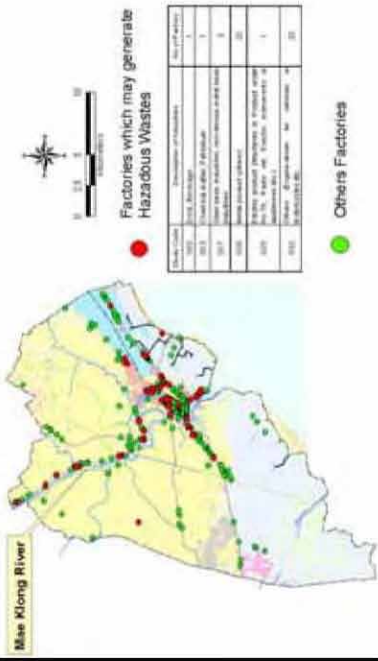
- There are 319 factories according to the DIW
- The amount of Industrial wastes in 2005 are estimated as follows.

	Amphoe	Non-HIW	HIW	Total
1	Mueang	35.0	2.2	37.2
2	Bang Khonthi	5.0	0.1	5.1
3	Amphawa	20.8	1.0	21.8
	Generation Amount	60.8	3.3	64.1
	Recycling Rate (%)	86.5	33.3	-
	Recycled Amount	52.6	1.1	53.7
	Treated or Disposed Amount	8.2	2.2	10.4

Note: HIW is the amount applied from "The Study on Hazardous Waste Management in Bangkok Metropolitan Area and its Vicinity in the Kingdom of Thailand (JICA 2005)".

Unit: ton/day

Factories which may produce hazardous wastes



Hazardous and Toxic Waste: Issues

- Toxic and hazardous substances are not separated
- Hazardous substances (such as explosives, inflammables, combustibles, toxic substances, corrosive materials, etc.) from households and medical centers are not properly treated or disposed.
- The amount of toxic and hazardous wastes from factories are estimated as little. But it is not clear how they are treated.

Hazardous and Toxic Waste: Measures

- Proper treatment for hazardous wastes has the priority to deal with industrial wastes.
- As for domestic hazardous waste, disposal system of it (collection, treatment and final disposal) shall be determined at first. After that separate collection of domestic hazardous waste will be introduced with intensive education activities.
- As for medical infectious waste/hazardous waste, proper disposal of them shall be promoted by giving intensive education activities to generation sources.
- Investigation on industrial wastes especially for hazardous wastes shall be carried out with cooperation from Provincial DIW.

Urban Environment (e.g. amenities): Current Situations

- Population density: 468 persons/km² (provincial average)
- Land use
 - Residential & Commercial: 4.8%
 - Agricultural field: 2.3%
 - Mix Plantation : 51.5%
 - Shrimp/Prawn farm, Salt field, etc: 30.2%
 - Mangrove forest 6.3%
 - Others: 4.9%
- Provincial road conditions are not very good
- Lack of trees along avenue
- Lack of neighborhood parks

Urban Environment (e.g. amenities): Issues

- Do people realize the rich environment of the Province?
- Are the environmental resources fully exploited?
- Eagerness for the joint efforts of government and private sectors to conserve and improve urban environment
- Revival of canals
- Improvement of the provincial roads
- Full utilization of Rama II Park and Queen Sirikit Park
- Development of neighborhood parks within built-up areas

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Urban Environment (e.g. amenities): Measures

- To recognize and to publicize the fact that good urban environments significantly contribute not only to population growth but also economic and cultural prosperity, and to make a policy for it.
- To set plan and allocate a budget for development of provincial water and road transportation network
- Government and private sectors make a joint effort to create urban amenities, e.g. planting trees along roads, neighborhood parks, etc.
- To investigate the situation of the billboards in the city area which violate the regulations.

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Natural and Cultural Assets: Current Situations

- Natural Heritage**
- Don Hoi Lot
- Mae Klong river
- Canals of 300
- Mangrove and its livings in the habitat etc.

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Natural and Cultural Assets: Current Situations

Cultural Heritage

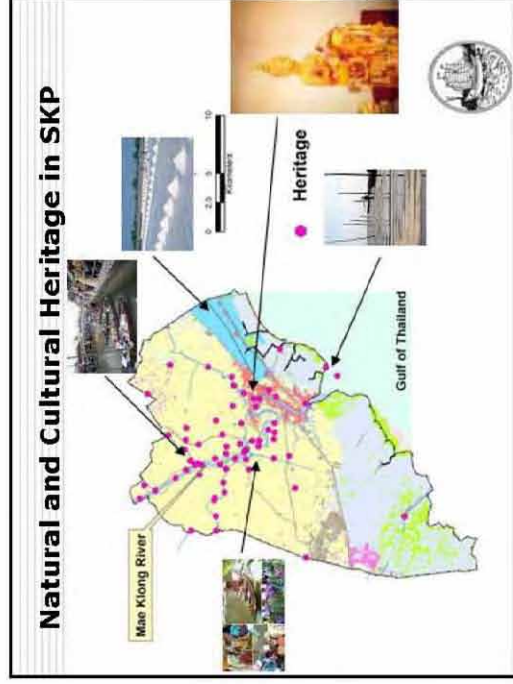
- Temples of more than 100
- A village which maintain a traditional life stile based on a situation of a river affected by wax and wane of the moon (Thaka Floating Market)
- Mae Klong railway station
- The agglomeration of Amphawa community
- Puppet play

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Natural and Cultural Assets: Current Conditions

- Samut Songkhram owes its present growth to the fertile low land on the river mouth of Mae Klong with numerous canals. Coconut and its product of sugar are particularly well known. But, in recent years coconut is gradually replaced by more profitable orchard, which is changing the traditional scenery of Samut Songkhram.
- On the other hand projects of mangrove forestation are actively conducted by local people and private organizations.

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Natural and Cultural Assets: Issues

- Natural and cultural assets are not sufficiently maintained.
- Are natural and cultural assets fully utilized?

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Natural and Cultural Assets: Measures

- Public education as well as administrative support and budget allocation for the conservation of natural and cultural assets
- To conduct publicity campaign for natural and cultural heritage in Samut Songkhram in order to activate tourism, which increases tourism income which are used for their preservation

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Global Warming

- Current Situations
- "The National Strategy on Climate Change (NSOCC)" reported that amount of greenhouse gas (GHG) emission in Thailand increased 20% from 1997 to 2003. Especially the increase of GHG from "Waste" is very significant
- The emission amount from waste in 2003 increased about 36 times more than it in 1997
- Rate of waste shared in total GHG emission becomes 7.8% in 2003 while it in 1997 is only 0.3%.

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Global Warming

- Current Situations in Samut Songkram Province
- According to the results of Opinion Survey, local people and business establishments concern about the "Global Warming/Climate Change".
The reasons of the answer are "cause of health problems", "adverse impacts on agriculture" and "decrease of marine species".
- On the contrary, LA and NGO replied it is less serious than the other aspects.
- Afforestation especially mangrove is actively conducted in the Province.

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Global Warming

- Issues
- The NSOCC reported that the SKP is one of the most vulnerable provinces in Thailand to the rise of sea level by climate change. It is not, however, conducting sufficient countermeasures.
- According to the transition of land use survey done by the Team, mangrove forest rate recovered up to 6.5% in 2007 compared to it in 1997, 5.6%. It does not, however, recovered up to 8.3% the rate in 1988.
- Although GHG emission from waste is significant, final disposal sites are operated in open dumping which emits methane gas and 3Rs (Reduce, Reuse and Recycle) activities are hardly conducting.

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Global Warming: Measures

- Implement countermeasures which are set up in "The National Strategy on Climate Change (NSOCC)", especially the following aspects:
- Further recover of the mangrove forest by afforestation
 - Conduct sanitary landfill operation and utilize the landfill gas, and promote 3Rs by public relation and education
 - Develop sea-level monitoring system

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3. Results of Opinion Survey to Stakeholders: Number of Samples

1. Local Administration (LA)

Model Province	Orbortor	Tessaban	Orbortor	Total
AYP	1	34	19 (124)	54 (159)
SKP	1	6	30	36

Number in parenthesis shows total number of Orbortor and local administration in AYP as of August 2007.

2. NGO: 5 NGOs

3. Resident and Business Establishment

Model Province	Resident	Business	Total
AYP	226	97	323
SKP	64	47	111
Total	290	144	434

Content and Results:

Three kinds of questionnaires were prepared for local administration, NGO and resident/business establishment, and interview was conducted directly to interviewee.

1. The current situation of natural resources and environmental management in local administration
2. Income and expenditure of resident and business establishment
3. Priority of natural resources and environmental management
4. Enforcement of environmental law and regulation
5. Role of governmental organization for environment improvement
6. Activity against global warming
7. Willingness of cooperation for natural resources and environmental management improvement
8. Suggestions for Formulation of PEQMP

Current Situation of NREM in LA (1)

1. Area, Population and Staffs of LA

The size of Tessaban and Orbortor in SKP appears to be very small in every aspect.

LA	Nos	Area (km ²)	Average Area in Japan (km ²)	Average Population	Average Population in Japan	Average No. of LA Staffs
Orbortor	1	416.7	8,039.0	195,068	2,718,467	132
Tessaban	5	12.0	207.6	8,610	70,202	84
Orbortor	30	13.2		5,062		17

2. Financial Issues on NREM of LA

Orbortor seems to do few natural resources and environmental management in SKP.

LA	Nos	A. Average Budget of LA in 2007 (1,000 Baht)	B. Average Budget for NREM in 2007 (1,000 Baht)	Share of Budget for NREM (B/A x 100)
Orbortor	1	191,703	160	0.1 %
Tessaban	5	64,578	2,899	4.5 %
Orbortor	30	12,450	1,180	9.5 %

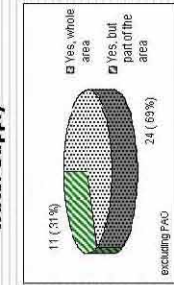
Current Situation of NREM in LA (2)

3. Water Supply

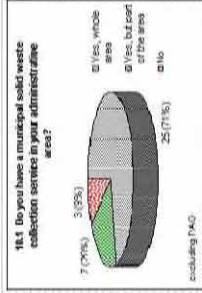
69% of LA have water supply in their whole administrative area and 31% have part of their area.

4. Sewerage System
Only two LAs (6%) have sewerage system in part of their administrative area.
5. Solid Waste Management (SWM)
91% of LAs have SWM collection service in their administrative area; 74% in whole area and 20% in part of area.

Water Supply

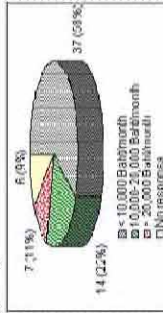


SWM



Income and expenditure of resident (RE) and business establishment (BE)

1. Income of a Household:
Majority (58%) is less than
10,000 Baht/month.



2. Average Utility Fees Paid

Fee	Resident (Baht/month)	Business Establishment (Baht/month)
Water	188	296
Electricity	659	1,653
Sewerage	0	0
Waste Collection	15	15

Priority Issues of NREM (1)

1. Problems to be concerned by the target group

Target Group	The Most Serious Problems	The Second Most Serious Problems
LA	Natural Resources and Environment Degradation	Economic Stagnation
Resident	Natural Resources and Environment Degradation	Economic Stagnation
BE	Natural Resources and Environment Degradation	Economic Stagnation
NGO	<ul style="list-style-type: none"> Natural Resources and Environment Degradation Local people were neither informed nor understood the development projects in SKP 	Economic Stagnation

The opinion survey also asks the target groups about measures to solve the above problems. There are a large numbers of measures answered. Those are presented in the sheets of detail answers.

Priority Issues of NREM (2)

2. NREM Problems

Target Group	The Most Serious Problems	The Second Most Serious Problems
LA	Fishery/Marine and coastal resources	Solid waste
Resident	Fishery/Marine and coastal resources	Global warming/climate change
BE	Fishery/Marine and coastal resources	Global warming/climate change
NGO	Fishery/Marine and coastal resources	<ul style="list-style-type: none"> Water quality Solid waste

All group replied the most serious problem in natural resources and environment (NRE) is the "Fishery/Marine and coastal resources". The reasons of the answer are "Marine resources decrease drastically and fisherman gain less profit than past", "Lost of Razor Clam", etc.

Priority Issues of NREM (3)

3. Comparison of Economic Development and Environmental Conservation

Target Group	Economic Development	Environment Conservation	Both	Others
LA	14	28	52	6
Resident	11	47	42	0
BE	19	34	47	0
NGO	0	20	80	0

The table indicates that "Environmental Conservation" is important the same as "Economic Development".

Priority Issues of NREM (4)

4. Main Pollutant Source

Target Group	Air Pollution	Water Pollution	Solid Waste	Noise Pollution
LA	No Problem (56%)	Factories (28%)	Household (88%)	No Problem (47%)
Resident	Automobile (32%)	No Problem (35%)	Household (40%)	Road Transportation (41%)
BE	Automobile (43%)	Factories (37%)	Household (49%)	Road Transportation (43%)
NGO	No Problem (80%)	Factories & Household (80%)	Household (100%)	Water Transportation (20%)

Enforcement of Environmental law and regulation

1. Degree of Observation of Environmental Regulations (Unit:%)

Target Group	Yes observed	Somewhat observed	Seldom observed	Do not know
LA	34	33	33	0
Resident	6	39	40	15
BE	6	23	44	27
NGO	0	40	60	0

2. Measures for Observation of Regulation

- Tightens control and increases penalty
- Industries should be raised awareness to take pollution control measures more seriously
- People should be raised awareness to pay more attention to environmental issues

Role of the Government for Improvement of Environment (1)

1. Prioritized Measures to be taken by the Central Government

Group	Most Prioritized Measure	Second Most Prioritized Measure
LA	<ul style="list-style-type: none"> • To construct more waste water treatment facilities and solid waste treatment & disposal facilities 	<ul style="list-style-type: none"> • To promote participation of local people
NGO	<ul style="list-style-type: none"> • To promote environment education 	<ul style="list-style-type: none"> • To promote participation of local people • To open more information and data

2. Prioritized Measures to be taken by the Provincial Administration

Group	Most Prioritized Measure	Second Most Prioritized Measure
LA	<ul style="list-style-type: none"> • To construct more waste water treatment facilities and solid waste treatment & disposal facilities 	<ul style="list-style-type: none"> • To promote participation of local people
NGO	<ul style="list-style-type: none"> • To promote participation of local people 	<ul style="list-style-type: none"> • To promote environment education • To help industries improve pollution control capabilities

Role of the Government for Improvement of Environment (2)

3. Prioritized Measures to be taken by the Government

Target Group	Most Prioritized Measure	Second Most Prioritized Measure
Resident	<ul style="list-style-type: none"> • To promote environment education 	<ul style="list-style-type: none"> • To promote participation of local people
BE	<ul style="list-style-type: none"> • To promote environment education 	<ul style="list-style-type: none"> • To open more information and data • To promote participation of local people

The results indicates as follows:

1. LAs expect the central and provincial governments to support them.
2. NGO, Resident and Business Establishment expect the government to promote environmental education and participation of people.

Efforts for Confronting Global Warming (1)

1. Efforts for Confronting Global Warming in LA

- About 58% of LA make efforts to confront global warming issues at present while only one NGO (20%) does.
- The largest number of activities made by LA is "Education of residents about environmental conservation, water and energy save, 3Rs, etc", followed by "Save energy such as raising temperature of air conditioners, use bicycles in stead of cars" and "Promote 3Rs (waste reduction, reuse and recycling)".
- One NGO does "Save energy such as raising temperature of air conditioners" and "Forestation".

Efforts for Confronting Global Warming (2)

2. Cooperation of Residents for Preservation of Environment

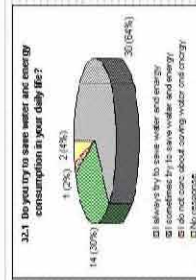
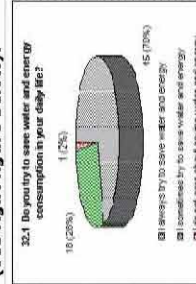
Target Group	Yes, very much (%)	Yes, some extent (%)	No or No Response (%)
LA	36	58	6
NGO	40	60	0

- According to LA the most popular activity done by resident is "Cleaning public area such as road, park, drain, etc." (26 LAs of 36 replied), followed by "Forestation" (16 LAs of 36) and "Cleaning their surrounding area" (15 LAs of 36).
- According to NGO the most popular activity done by resident is "Cleaning their surrounding area", "Forestation" and "Organize local meetings to share experiences and information" (2 NGOs of 5 replied).

Efforts for Confronting Global Warming (3)

3. Save of Water and Energy Consumption

70% of resident replied "Always try to save them" (see left figure below) while 64% of business establishment replied so (see right figure below).



As for the reason to save water and energy consumption, the largest reply of resident is "Both economic and environmental concern" (59%) while it of business establishment is "Economic reason" (45%).

Willingness to Cooperate for the Improvement of NREM (1): Fee Increase for improved service

1. Water

Group	Accept (%)	Not Accept (%)	No Comments (%)
Resident	45	35	20
BE	31	52	17

2. Sewerage

Group	Accept (%)	Not Accept (%)	No Comments (%)
Resident	38	18	44
BE	26	30	44

3. Solid Waste Collection

Group	Accept (%)	Not Accept (%)	No Comments (%)
Resident	43	19	38
BE	45	39	16

Willingness to Cooperate for the Improvement of NREM (2)

- 4. Cooperation to Reduce Environmental Problems in Community**
100% of resident and 98% of business establishment expressed they are willing to cooperate to reduce environmental problems in their community.
- 5. Cooperation to Separate Waste Collection**
98% of resident and 91% of business establishment expressed they are willing to cooperate with a separate waste collection system introduced by the local administration.

6. Participation of Meeting for Formulation of PEQMP

Group	Participate without Conditions (%)	Participate with Conditions (%)	Others (%)
Resident	37	42	21
BE	40	32	28

Suggestions for Formulation of PEQMP (1)

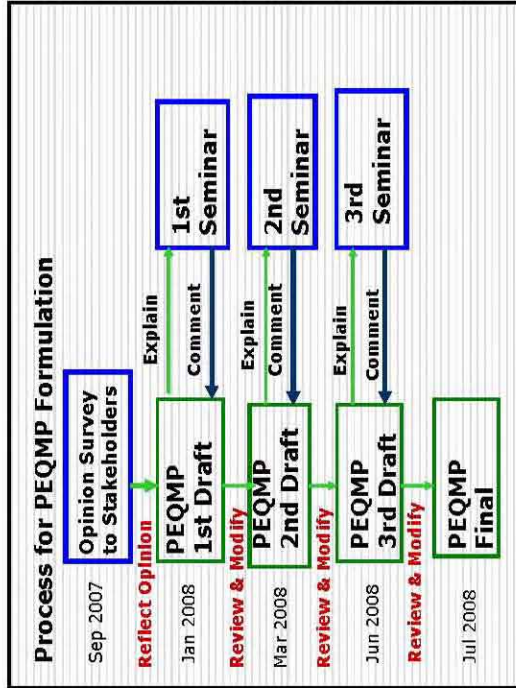
Group	Largest Nos. of Suggestion
LA	<ul style="list-style-type: none"> The province should construct high technology incinerator for municipal solid waste and infectious solid waste disposal or establish the integrated solid waste management system in the province.
Resident	<ul style="list-style-type: none"> All related organizations should work together to improve the environment Implementation of the PEQMP should be concrete. All information gathering from questionnaire survey should be used to support the project.

Suggestions for Formulation of PEQMP (2)

Group	Largest Nos. of Suggestion
BE	<ul style="list-style-type: none"> The government should tighten its control on wastewater pollution and solve wastewater problems caused by neighboring provinces. Implementation of the PEQMP should be concrete. All information gathering from questionnaire survey should be used to support the project.
NGO	<ul style="list-style-type: none"> To create plan should start with the concept of public participation and design proper indicators for evaluation the achievement of the plan. The implementing indicators should design for each area due to the differences of problems. The province should promote tourism that create revenue to the community and conform to people's way of life

4. How to reflect Public Opinion to PEQMP?

- Natural Resources and Environment (NRE) is assets for all citizens in SKP. PEQMP is a plan to preserve NRE, i.e. protect your assets.
- PEQMP shall be formulated by opening opportunity to all stakeholders for taking part in formulation and cooperation in implementation in future.
- Opinion survey to stakeholders was conducted and results was reflected the 1st draft PEQMP.
- Three seminars will be held to receive opinions and comments on PEQMP from stakeholders. => See next screen



5. Provincial Environmental Quality Management Plan (PEQMP)

- Priority of Plans and Projects
- Vision and Goals
- PEQMP (1st Draft)

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Priority of Plans and Projects (1)

- Since natural resources and environmental management consists of many sectors, it is quite difficult to give priority to numerous projects in different sectors.
- Furthermore, huge amount of money has to be invested on each project for each sector.
- Therefore, sufficient survey, research and planning should be conducted on each sector and the propriety of each project in each sector should be examined to implement the project effectively.
- The priority among projects should be decided after master plan of each sector is studied and compared thoroughly with each other.
- In SKP, however, master plan of every item has not been prepared completely.
- Therefore, we proposes following procedure of priority examination.

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Priority of Plans and Projects (2)

- First priority should be given to formulation of master plan of each sector of natural resources and environment (NRE).
- The priority for formulation of master plan for each sector can be decided as follows on the result of opinion survey to the stakeholders and priority examination conducted during SWOT analysis.
 1. Conservation and rehabilitation of marine/coastal/ fishery resources
 2. Establishment of proper solid waste management system
 3. Tackling of global warming
 4. Preservation of water quality
 5. Conservation of soil/land resources
- No matter how survey, research and planning on each urgent projects are listed to be implemented, Master plan for each priority project should be formulated urgently to implement the projects effectively.

Vision and Goals

- **Vision**
 1. The environment for favorable society and life living in symbiosis with fertile natural resources is realized with a nucleus given to rich water environment, and social and economic development is attained in harmony with the environment.
- **Goals**
 1. Conservation of rich water environment is harmonized with social and economic development.
 2. Provincial development is harmonized with conservation of fertile natural resources.
 3. Conservation of fertile social and living environment is in symbiosis with rich natural environment.

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PEQMP (1st Draft)

- The figure of environment to be achieved, vision, goal and issues, and direction of measures for NREM in SKP are arranged and shown in the Figure of next screen. The detailed measures will be prepared in the Interim Report in March 2008 by reflecting comments and requests for stakeholders of the PEQMP, especially those on priority of the sector or projects.

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Vision, Goal and Issues, and Direction of Measures for NREM

