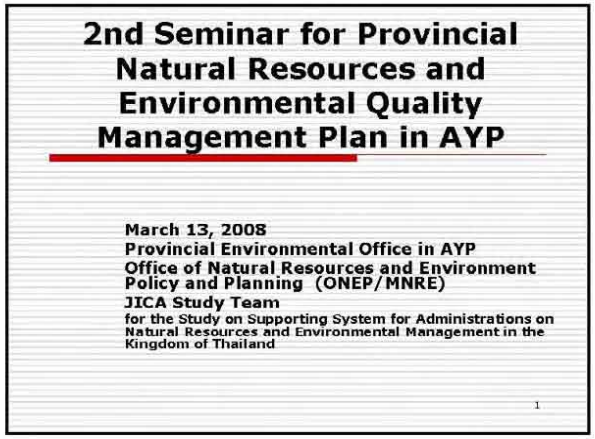
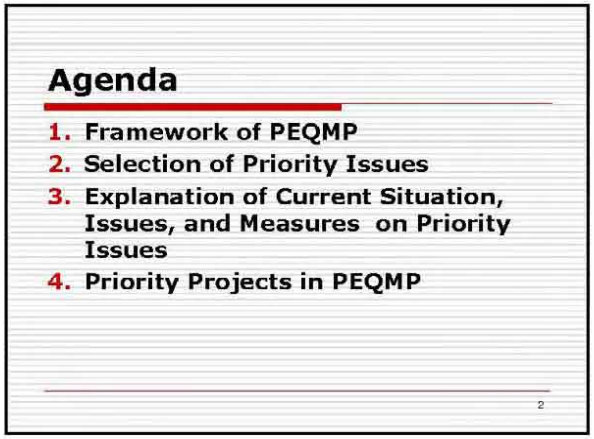
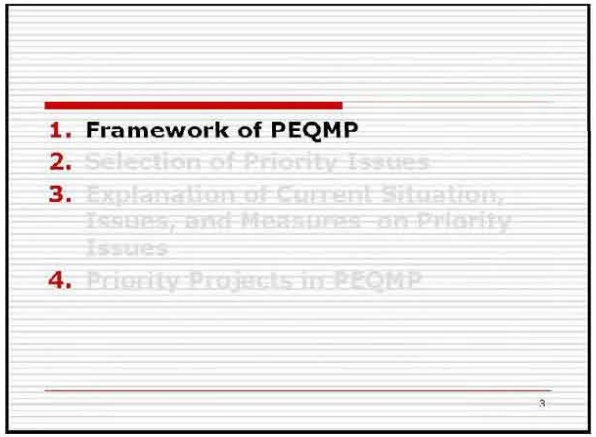
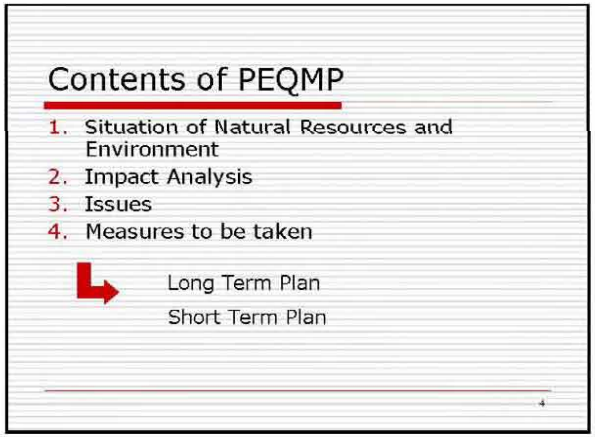
2.2 2nd seminar in AYP

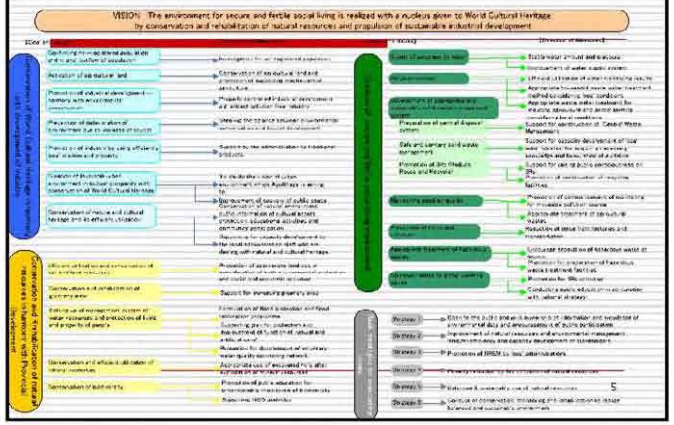








Long Term Plan: Vision, Goal, Strategy



Short Term Plan: Target Year 2011

- PEQMP formulation committee meeting
- Opinion Survey to residents, business entities, local administrations, NGOs
- Selection of Priority Issues
- Priority Projects on Priority Issues which should be implemented by 2011

6

1. Framework of PEQMP
2. **Selection of Priority Issues**
3. Explanation of Current Situation, Issues, and Measures on Priority Issues
4. Priority Projects in PEQMP

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Opinion Survey to the Stakeholders

Target Group

Target Group	Number
Local Administration	54 LA
Resident	226
Business Establishment	97
NGO	5 NGO

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Problems of NREM

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 Establishment	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

Note *1: Although the number of interviewees that selected "Global Warming Problem" as "4. Very serious" is slightly less than interviewees who selected "Water Quality Problem", number of interviewees who selected "Global Warming Problem" as "3. Somewhat serious" is much higher than those who indicated "Water Quality Problem".

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Reasons for Selecting Serious Problems

Most Serious Problem	Item	Reason
Water Resources Management	Flood	Loss of Agricultural Land and Property Isolation of Transportation
Solid Waste Management	Non-Sanitary Landfill	Occurrence of Environmental and Sanitary Problem

Second Serious Problem	Item	Reason
Solid Waste Management	Improper Disposal of Huge Amount of Waste Difficulty of Acquisition of Disposal Site	Occurrence of Serious Environmental Problem
Global Warming	Rise in Temperature	Health Problem Increase of Power Fee
Water Resources Management	Flood	Loss of Agricultural Land and Property Loss of Fertile Land

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Priority Examined in SWOT Analysis

- The PEQMP-KPI Formulation Committee was held at the AYP Conference Room on the 27th of June 2007 chaired by the Vice Governor
- SWOT Analysis was conducted with 20 relevant participants directed by a moderator from AY University

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Priority Issues on NREM in AYP discussed in SWOT Analysis Meeting

Priority	NRE Problems
1.	Solid Waste Management (SWM)
2.	Surface Water Resources and Flood Control
3.	Tourism places for art, culture and history
4.	Air Pollution and Noise
5.	Biodiversity
6.	Groundwater Resources
7.	Soil Resources and Land Use
8.	Urban Environment

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Examination of Priority

- Since natural resources and environmental management consists of many sectors, it is quite difficult to give priority to numerous projects in different sectors
- Furthermore, a huge amount of money has to be invested in each project for each sector.
- Therefore, sufficient survey, research and planning should be conducted in each sector fast.
- The priority among projects should be decided after the master plans of each sector with quantitative analysis is studied made and looked at thoroughly in comparison.

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Selection of Priority Issues

- Sector Improvement
  1. Improvement of Solid Waste Management
  2. Flood Prevention and Disaster Mitigation
  3. Supply of Safe and Quality Water
  4. Secure Water Quality in Public Water Body
- Strengthen Provincial NREM
  1. Strengthening Linkage between Central/Local Administration on NREM
  2. Supporting Plan for Improvement of Administration Capacity of Central/Local Government on NREM

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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 Projects in PEQMP

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3. **Explanation of Current Situation, Issues, and Measures on Priority Issues**
   1. Solid Waste
   2. Flood
   3. Water Quality

Waste Generation Amount and Collection Rate

Item	Tessaban		Orbortor		Total	
	Ton/ day	%	Ton/ day	%	Ton/ day	%
Waste Generation	252		297		549	
Waste Collection	229	91%	223	75%	452	82%
Uncollected Waste	23	9%	74	25%	97	18%

Data Source: RE:06 Nonthaburi, 2006

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Waste Generation Amount/ person /day

Item	Unit	Tessaban	Orbortor	Total
Waste Generation	(t/day)	252	297	549
Population in 2005	(Person)	253,316	493,603	746,919
Waste Generation Ratio	(kg/day/person)	0.995	0.602	0.735

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Physical Condition of Wastes

Waste Composition	Unit	Tessaban Tambon Sena	Tessaban Tambon Nakhon Luang	Tessaban Phra Nakhon Si Ayutthaya	Tessaban Tambon Tha Ruea	Analysis Result (Average)
Bulk Density	t/m³	0.24	0.20	0.24	0.22	0.22
Food waste	%	44.21	43.89	48.27	42.53	44.73
Paper	%	17.11	15.54	11.68	12.85	14.30
Plastic	%	11.05	10.22	15.91	16.15	13.33
Rubber/leather	%	0.14	0.00	0.00	1.18	0.33
Cloth	%	1.03	2.30	5.54	1.28	2.54
Wood/leave	%	13.90	16.00	12.54	9.90	13.09
Glass	%	3.99	3.80	2.75	4.48	3.76
Metal	%	3.28	1.94	1.35	5.21	2.95
Stone/ceramic	%	3.49	3.31	0.00	4.27	2.77
Other	%	1.80	3.00	1.96	2.15	2.23
Total	%	100.00	100.00	100.00	100.00	100.00

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Final Disposal Site in AYP

Name of LA	Operating organization	Tipping Fee (Baht/ton)	final disposal amount (ton/day)	Location of final disposal site	Disposal Method
[illegible]	[illegible]		140	Moo 8, Tambon Ban Pom, Amphur Mueang Ayutthaya	Open Dump
2. TAO Salalay	TES.T Tha Ruea	0	12	Moo 13, Tambon Salalay, Amphur Tha Ruea	Open Dump
3. TES.T Nakhon Luang	TES.T Nakhon Luang	0	20	Moo 3, Tambon Bang Rakam, Amphur Nakhon Luang	Semi-sanitary Landfill
4. TAO Mae La	TAO Mae La	0	4	Moo 2, Tambon Bang Rakam, Amphur Nakhon Luang	Semi-sanitary Landfill
5. TES.T Bang Sai	Individual Contractor	100	11	Moo 5, Tambon Bang Plee, Amphur Bang Sai	Semi-sanitary Landfill
6. TES.T Ratchakram	TES.T Ratchakram	0	8	Moo 2, Tambon Chang Wai, Amphur Bang Sai	Semi-sanitary Landfill
7. TES.T Ban Sang	TES.T Ban Sang	0	15	Moo 6, Tambon Ban Sang, Amphur Bang Pa-in	Open Dump
8. TES.T Bang Kra Ran	TES.T Bang Kra Ran	0	20	Moo 10, Tambon Bang Krasan, Amphur Bang Pa-in	Semi-sanitary Landfill
9. TES.T Chieng Rak Noi	Individual Contractor	100-200	74	Moo 11, Tambon Chieng Rak Noi, Amphur Bang Pa-in	Semi-sanitary Landfill
10. TES.T Phachi	TES.T Phachi	0	6	Moo 1, Tambon Phachi, Amphur Phachi	Open Dump
11. TES.T Lat Bua Luang	TES.T Lat Bua Luang	0	0.5	Moo 1, Tambon Lat Bua Luang, Amphur Lat Bua Luang	Semi-sanitary Landfill
12. TES.T Sam Mueang	TES.T Sam Mueang	0	20	Moo 4, Tambon Sam Mueang, Amphur Lat Bua Luang	Open Dump
13. TES.T Lam Ta Sao	TES.T Lam Ta Sao	0	15	Moo 5, Tambon Lam Ta Sao, Amphur Wang Noi	Open Dump
14. TES.T Sam Ko	TES.M Sena	0	147	Moo 5, Tambon Sam Ko, Amphur Sena	Semi-sanitary Landfill
15. TES.T Chao Jet	TES.T Chao Jet	0	5	Tambon Chao Sadej, Amphur Sena	Semi-sanitary Landfill
16. TES.T Bang Nom Ko	TES.T Bang Nom Ko	0	6	Moo 1, Tambon Bang Nom Ko, Amphur Sena	Semi-sanitary Landfill
17. TES.T Uthai	TES.T Uthai	0	8	Moo 12, Tambon Uthai, Amphur Uthai	Open Dump
18. TES.T Rong Chang	TES.T Rong Chang	0	3	Moo 6, Tambon Pitta Phin, Amphur Maharat	Open Dump
Total			286.2		


Nakhon Luang Disposal Site


Sena Disposal Site


Small Disposal Site
Bang san
Bang Kra San
Bang Nom
23


Small Disposal Site
Bang Pa In
Bang Sai
Lad Bua
24

Small Disposal Site

Lam Ta Sao | Rat Khram | Sam Mueang

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Location of Final Disposal Sites in AYP

Number of Complain regarding NREM

Year	Number of Complaints					Total Number
	Water	Air	Noise	Odor	Others	
2003	2	2	0	2	1	7
2004	5	6	2	1	0	14
2005	11	8	3	5	3	30
2006	14	15	4	8	1	42

Source: PCD/NP for KP in 2007

It is unclear as to what complaints are directly related to solid waste management although a number of complaints about odor are assumed to be related to waste, and such complaints are on the rise.

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Result of Opinion Survey on Solid Waste

	Not Serious	Not Very Serious	Some What Serious	Very Serious	Can't Choose	No Respon se	Total
LAs	17%	17%	24%	42%	%	0	100%
Reside nt	69%	10%	9%	11%	1%	0	100%
BE	68%	13%	10%	8%	0%	0%	100%

Source: JICA study in 2007

According to the interviews with local residents in the JICA study, 79% of those surveyed replied that problems with waste management are "Not serious at all" or "Not very serious". Among those who replied that problems are very serious, the reasons indicated were collection of waste and odor from the wastes.

However, according to the interview survey of the 54 local administrations, 66% of LAs replied that problems with waste management are "Some what serious" or "Very serious" and 43% pointed out SWM is the second most serious problems in their administrative areas.

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Impact: Future Waste Generation

year	Population			Generation Amount of Municipal Waste		
	Tessaban	Orbortor	Total	Tessaban	Orbortor	Total
				ton/day	ton/day	ton/day
2005	253,316	493,603	746,919	252.0	297.0	549.0
2006	253,561	494,408	747,969	252.3	297.6	549.9
2007	253,917	495,102	749,019	252.6	298.1	550.7
2008	254,273	495,796	750,069	253.0	298.5	551.5
2009	254,629	496,490	751,119	253.4	298.9	552.3
2010	254,985	497,184	752,169	253.7	299.3	553.0
2011	255,341	497,878	753,219	254.1	299.7	553.8

- The rate at which waste is generated does not increase. Therefore, the amount of generation is in proportion to the increase of population.
- The figures of 0.995kg/person/day for Tessaban and 0.602kg/person/day for Orbortor are used as the rate of generation.
- Proportion of population in Tessaban and Orbortor are 33.9% and 66.1% respectively and will not change from 2005 to 2011.

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Impact:

- **Future Generation:** Although forecasted generation amount of municipal waste is not much due to little increase rate of registered population, it may be more than the above forecast if it includes unregistered population and increase of tourist. Therefore municipal SWM will be more serious in future.
- **Unsanitary Conditions:** Almost all of disposal sites are open dumping operation. Consequently, the adverse impacts of the disposal site are very serious to surrounding environment, especially the sites located in the flood prone area as shown in the figure below.

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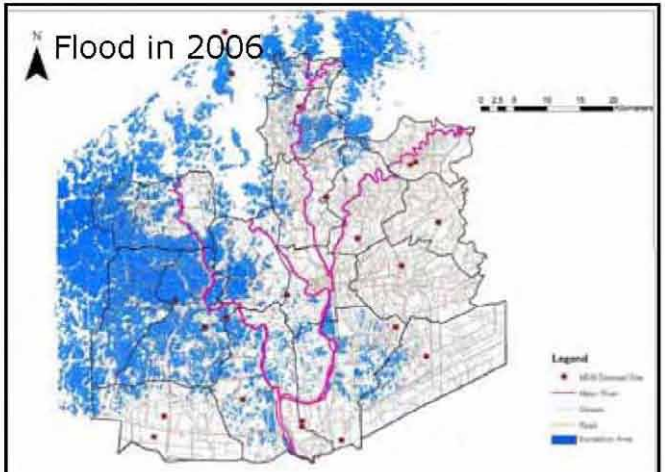
Flood in 2006



Issue: Waste Generation and Collection

National Target

	Unit	Tessaban Nakhon	Tessaban Mueang	Tessaban Tambon	Orbortor
Waste Generation Rate	Kg/person/day	0.8	0.6	0.6	0.4
Collection rate	%	95	95	95	90
Recycling Rate	%	30	30	30	30

Source: National Solid Waste Management Plan (Draft), PCD MNRE Jun 2003.

Actual

	Unit	Tessaban	Orbortor	Average
Waste Generation Rate	Kg/person/day	0.995	0.602	0.735
Collection rate	%	91	75	82
Recycling Rate	%	NA	NA	NA

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Issue: Final Disposal

- There are over 18 disposal sites for about 750,000 population of the province
- Almost all of disposal sites are open dumping operation.
- Five of the disposal sites have reached capacity and require the location of new disposal sites or to expand their capacities.
- The population, area and budget of each local administration are small.
- 写真

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Measures to be taken

- Reduction of waste generation
  - A 3R (Reduce, Reuse and Recycle) approach to waste should be promoted.
  - Environmental education to the public especially at schools is an important tool to reduce the amount of waste
  - Composting food waste, which makes up about half of the waste, and thermal recycling of plastic and paper shall be considered as an alternative to recycling

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Measures to be taken

- Final Disposal
  - The population, area and budget of each local administration are small, especially for Orbortor.
  - Furthermore, many local administrations operate their own disposal sites and the amount they dispose is just a few tons a day.
  - For this reason, it is difficult to hire heavy machinery and operate sanitary landfills.
  - Therefore clustering with local administrations will be required.

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Measures to be taken

- Implement Master Plan
  - According to the National Solid Waste Management Plan, a central waste disposal system was recommended
  - AYP Orborjor has hired a private consultant to formulate master plan for this system.
  - Under the master plan, two central waste centers are proposed to be constructed to receive all the wastes from whole province.
  - It is important to implement the master plan with public participation in order to obtain their cooperation, especially those residents living near the future central disposal sites.

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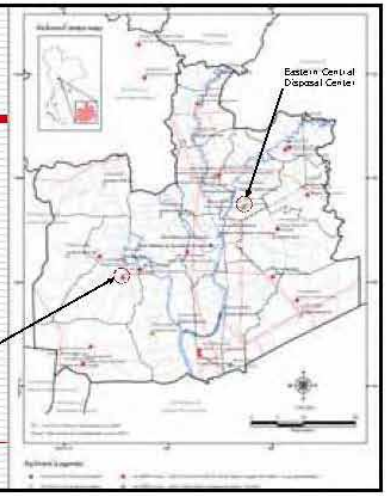
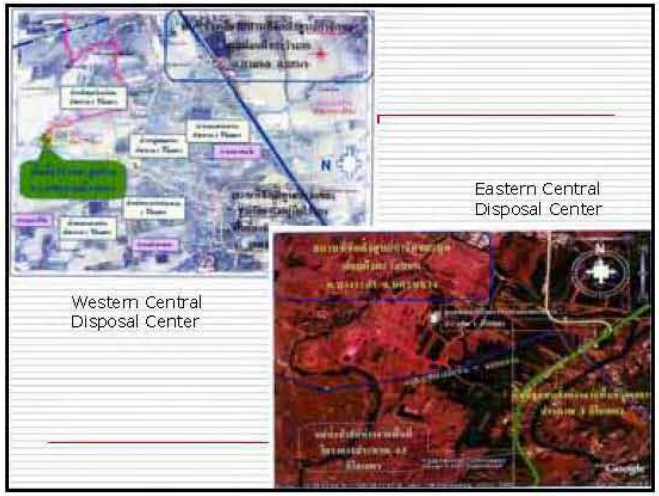
Location of Two Central Disposal Sites





Facilities of Central Disposal Center

Facilities	Symbol
Security Building	A
Weight Indicator Control Building	B
Material Storage and Maintenance Building	C
Waste Receiving and Sorting Building	D
Composting Building	E
Compost Screening Building	F
Odor Elimination Pond	G
Transformer Field	H
Housing Building	I
Office Building	J
Toilet	K
Parking Building	L
Wastewater Treatment Pond	M
Sanitary Landfill	N
Incinerator	O

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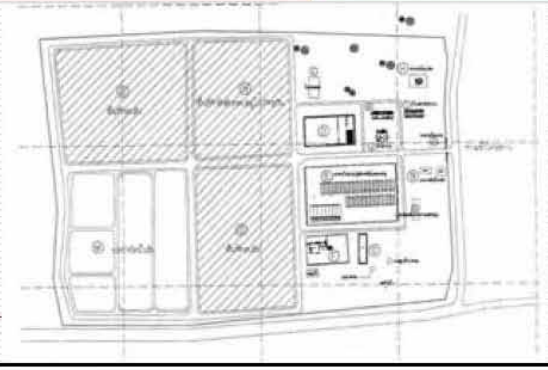
Western Disposal Center



Eastern Central Disposal Center

3. Explanation of Current Issue on Priority Issue

1. Solid Waste
2. Flood
3. Water Quality

AYP and Water Basin

Rainfall and Runoff

Rainfall

River basin	Range of rainfall (mm)	Average annual rainfall (mm)	Province	
			Low rainfall	High rainfall
The Chao Phraya River Basin	700-1,500	1,076	Lop Buri	Bangkok

Runoff

River basin	Catchment area (km²)	Average annual Runoff		Annual runoff (MCM)		Percentage of total runoff (%)	
		(MCM)	(mm)	Wet season	Dry season	Wet season	Dry season
The Chao Phraya River Basin	20,125	1,732	86	1,645	87	95	5

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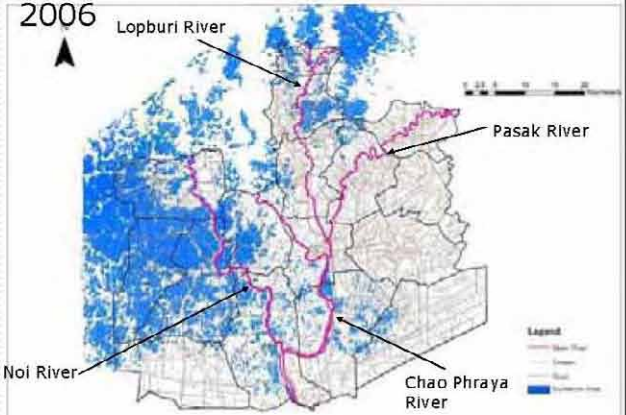
Main Rivers and Flooded Area in 2006



Result of Opinion Survey

Opinion Survey on Water Resources

	Not Serious	Not Very Serious	Some What Serious	Very Serious	Can't Choose	No Response	Total
LAs	7%	15%	24%	54%	0%	0	100%
Resident	31%	15%	15%	38%	1%	0	100%
BE	38%	14%	11%	34%	0%	0%	100%

According to the opinion survey, 53% of the residents, 78% of LAs and 45 % of the business establishments (BEs) considered that water resources are very serious or some what serious problems.

The LAs, residents and business entities, who reply it is very serious, specify the aspects and reasons as follows. Everybody specify that **flood** is the main aspects of the problem on water resources in AYP.

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Impact

AYP had considerable damage caused by flood as shown in the table below according to the Office of Disaster Prevention and Mitigation of MOI in AYP.

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

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Measures to be taken

- Comprehensive provincial flood prevention and mitigation plans should be formulated.
- Rehabilitation and improvement of natural and artificial canals in order to intake and discharge water efficiently

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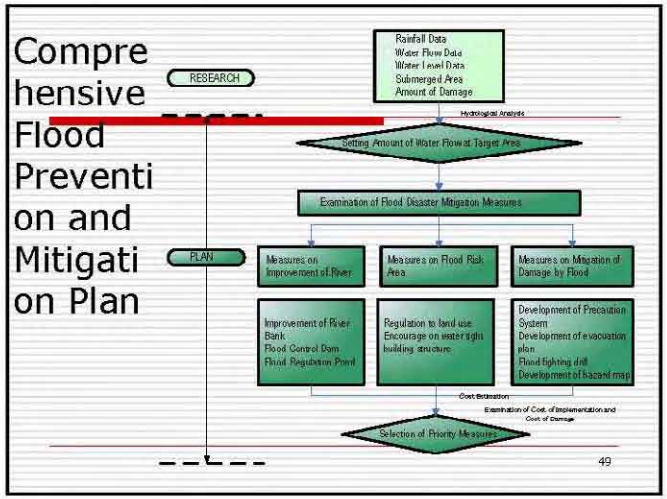

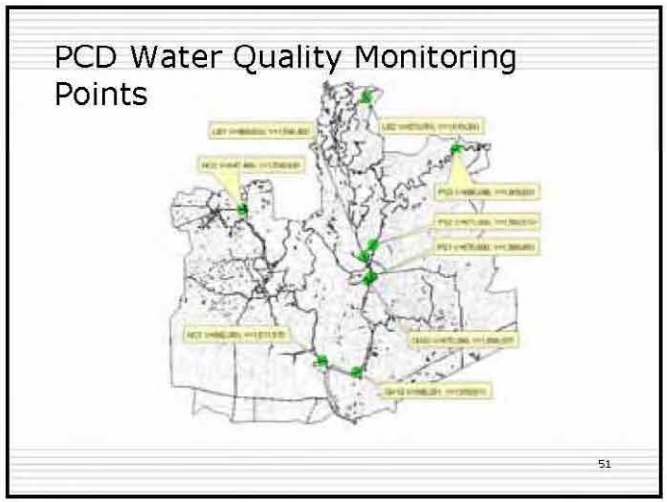

Definition of Class of Water Quality Standard

Classifications	Objectives / Conditions and Beneficial Usage
Class 1	Extra clean fresh surface water resources used for: (1) conservation not necessary 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: PCD Web page: http://www.pcd.go.th/info_serv/en_reg_std_water05.html#s3

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Summary of water quality class results (2006)

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	CH 18	Class4	Class3	Class3	Class3
phraya	CH 20	Class4	Class4	Class3	Class3

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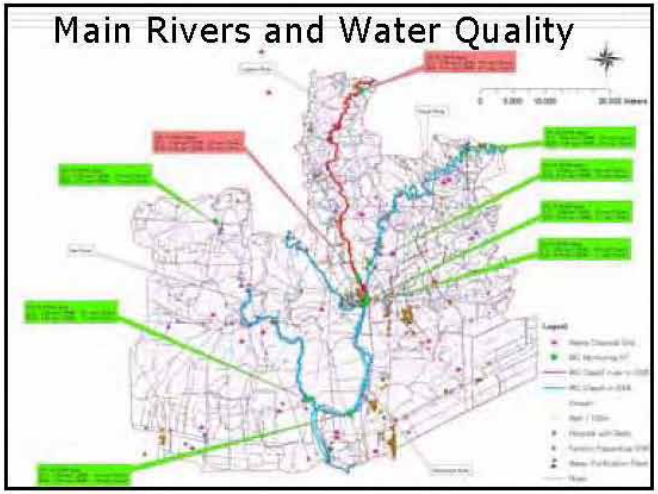
Main Rivers and Water Quality



Water Pollution Sources

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

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As for the problems on domestic waste water, it is very popular that a housing development project avoids waste water discharge standard by making number of houses developed less than 100, of which project does not require a central domestic waste water treatment facility

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