

DATA BOOK 4

PEQMP Seminars

This Data Book contains the presentation materials and replies by ONEP to questions and recommendations voiced by stakeholders at the PEQMP Seminars.

1 Background

1.1 Background to the Study

In accordance with the request of the Thai Government to the Government of Japan, “the Study on Supporting System for Local Administrations on Natural Resources and Environmental Management in the Kingdom of Thailand” (the Study) has been underway since June 2007. The Study aims to strengthen capacities of central, provincial, and local administrations through the formulation of the Provincial Environmental Quality Management Plan (PEQMP) for two model provinces, Phra Nakhon Si Ayutthaya Province (AYP) and Samut Songkhram Province (SKP).

1.2 Background to PEQMP Seminars

The implementation of PEQMP will be dependent on individuals and organizations who affect the natural resources and environment, i.e. the Provincial residents and organizations within the Province including factories, business enterprises, services, government offices, schools, fishery unions, etc. Therefore, the planning and implementation of a realistic plan would necessarily require the participation of as many stakeholders as possible in the plan formulation stage, in order that they are aware of the contents of the plan, and will be more willing to cooperate in its implementation. The PEQMP Seminars was a method of public participation; their purpose was to explain the contents of PEQMP in each Model Province to as many stakeholders as possible, get their opinions, and reflect such opinions onto the next draft of the PEQMP.

In this Study, the Study Team first conducted an opinion survey among stakeholders; then formulated the PEQMP (1st draft) based on the results of the survey; then conducted the 1st PEQMP Seminar and asked for stakeholder opinions; then the opinions and requests voiced at the 1st PEQMP Seminar was worked into the PEQMP (2nd draft); then the process was repeated to the 3rd PEQMP Seminar before finalizing the PEQMP.

The 1st PEQMP Seminar, held in AYP (late December 2007) and SKP (mid-January, 2008), discussed the PEQMP 1st draft, the main contents of which were the current situation and issues of NREM in each Model Province. The 2nd PEQMP Seminar was conducted in both Model Provinces in early March 2008, and discussed the PEQMP 2nd draft, which consisted of a revised 1st draft -- revised in reflection of the PEQMP-KPI Evaluation Committee’s evaluations as well as the opinions/ requests from stakeholders voiced at the 1st PEQMP Seminar – and additionally, Provincial-level Priority Programs determined through discussion with Thai counterparts of this Study.


The 3rd Seminar was held in July 2008 in both Model Province and discussed the PEQMP 3rd draft, which consisted of a revised 2nd draft – revised in reflection of the opinion/ requests from stakeholders voiced at the 2nd PEQMP Seminar for finalization of the PEQMP.

1.3 Methodology

Questions and recommendations were collected from participants in written form. Replies were provided at the Seminar where possible, and at a later date for those which required further consideration. Sample instruction sheets and question/recommendation forms distributed at the 1st PEQMP Seminar in AYP is shown below:

Instruction

For Formulation of PEQMP for Phra Nakhon Si Ayutthaya Province For Questions Paper and Opinions/Suggestions Paper

By  The Study on Supporting System for Local Administrations on Natural Resources and Environmental Management in the Kingdom of Thailand

Participants will receive 1. "Questions" paper, and, 2. "Opinions/Suggestions" paper.
Please follow the instruction below.

1 2

"Questions"

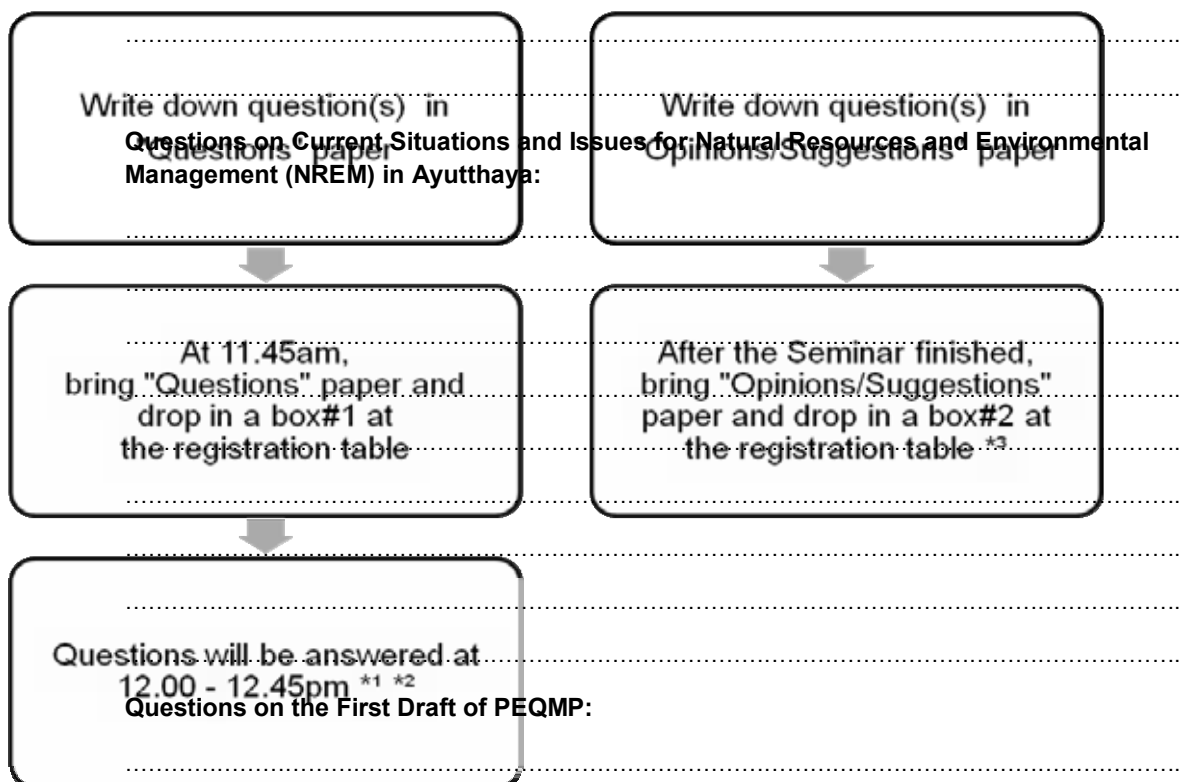
Name

"Questions" paper

Position Section

"Opinions/Suggestions" paper

Way of Communication (Mailing Address, Telephone, Fax, Email Address etc)



***Remark:** 1. Spontaneous questions are allowed during "question answering" sessions.

2. Due to limited time, AYP PEO will try to deliver the answer to unanswered questions via your convenient method as you specified.

3. You can also send further opinions/suggestions to, until January 10th, 2008: Fax Number:

Email:

2 Presentation Materials

2.1 1st seminar in AYP

**1st Seminar for Provincial
Natural Resources and
Environmental Quality
Management Plan in AYP**

December 27, 2007
Provincial Environmental Office in AYP
Office of Natural Resources and Environment
Policy and Planning (ONEP/MNRE)
JICA Study Team
for the Study on Supporting System for Administrations on
Natural Resources and Environmental Management in the
Kingdom of Thailand

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**1. Water Quality Analysis at Discharge
Point of 4 Major Industrial Estates**

This analysis was carried out for the samples
collected on 28 August 2007 under the study.

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Agenda

1. Water Analysis at Discharge Point at 4 major Industrial Estate
2. Development of Land Use Map
3. Current Situations, Issues, Measures for Natural Resources and Environmental Management in AYP
4. Result of Opinion Survey to Stakeholders
5. How to reflect Public Opinion to Provincial EQMP
6. Provincial EQMP

2

Sampling Point

No1:Bangpa-In
No2:Hi Tech
No3:Saharatanakorn
No4:Rojana



The map displays the study area with four sampling points marked: No.1 (Bangpa-In), No.2 (Hi Tech), No.3 (Saharatanakorn), and No.4 (Rojana). It also shows major roads, industrial estates, and geographical features. A legend in the bottom right corner provides details on the symbols used on the map.



Result-1 => All data are complied with industrial effluent standard.

Parameter	Unit	Sampling Point				Industrial Effluent Standards*
		1	2	3	4	
Air Temperature	* C	30	30	31	30	-
Water Temperature	* C	20.4	20.9	24.2	20.4	<40
pH	-	7.98	7.60	8.40	7.73	5.5 to 9.0
Dissolved Oxygen	mg/l	0.5	2.45	7.7	5.3	-
Biochemical Oxygen Demand	mg/l	13.0	16.50	12.5	8.8	<20
Suspended Solids	mg/l	2	12.0	2	2	<50
Total Solids	mg/l	1,128	590	2,244	758	<3,000
Total Dissolved Solids	mg/l	1,126	578	2,242	756	<3,000
Sulfide	U/L	U/L	U/L	U/L	U/L	-
Total Kjeldahl Nitrogen	mg/l	2.24	12.6	14.84	6.72	<100
Oil & Grease	mg/l	<0.1	<0.1	<0.1	<0.1	<5.0

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Result-2: => All data are complied with industrial effluent standard.

Parameter	Unit	Sampling Point				Industrial Effluent Standards*
		1	2	3	4	
Total Coliform Bacteria	MPN/100 ml	8,000	1,700	30,000	240,000	-
Fecal Coliform Bacteria	MPN/100 ml	1,400	500	1,100	34,000	-
Lead	mg/l	0.017	0.048	0.018	0.043	<0.2
Cadmium	mg/l	<0.001	<0.001	0.004	0.005	<0.03
Chromium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.75 (Cr+3)
Mercury	mg/l	0.003	<0.001	0.001	0.003	<0.035
Nickel	mg/l	<0.001	<0.001	0.002	<0.001	<1.0
Copper	mg/l	0.041	0.031	0.039	0.045	<?n
Zinc	mg/l	0.122	0.061	0.063	0.141	<5.0
Manganese	mg/l	0.156	0.004	0.024	0.076	<5.0

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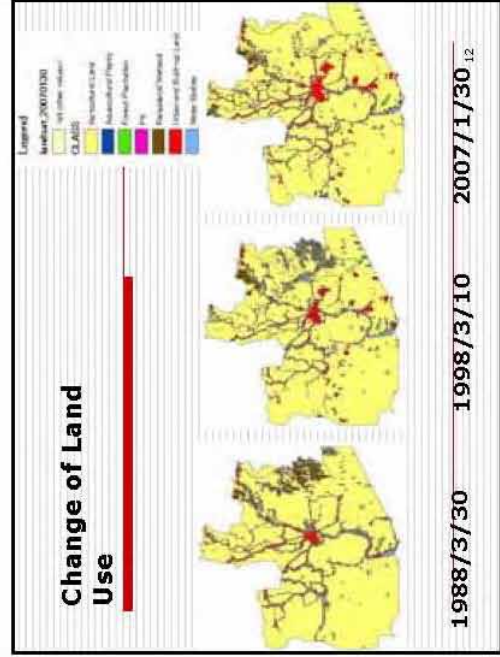
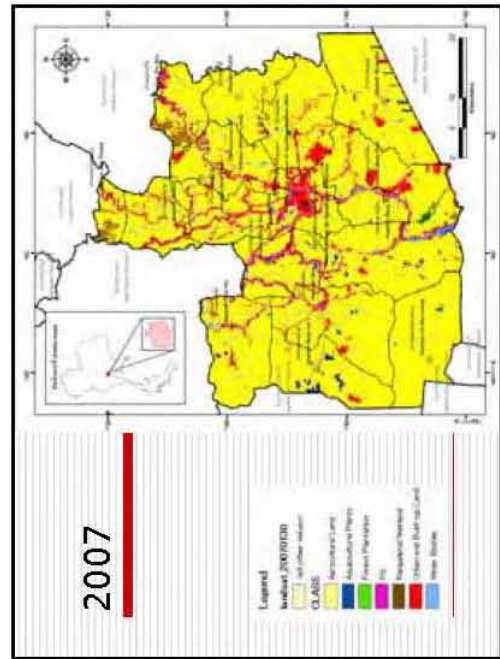
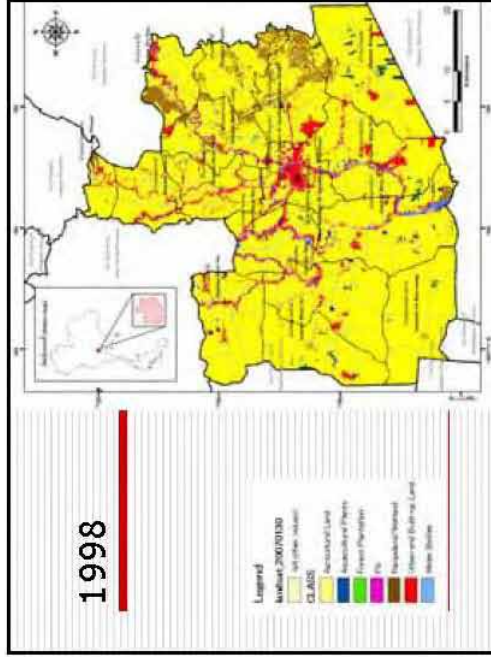
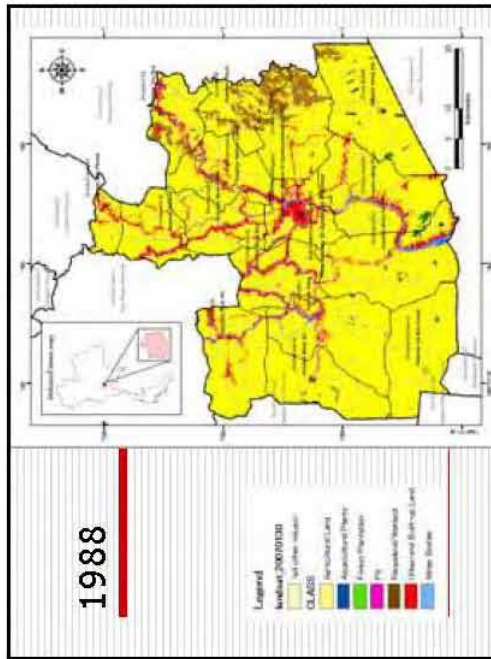
2. Development of Land Use Map

- Change of Land Use: LANDSAT 5 TM Satellite Image, Resolution 30mx30m, 3 scene in 1988, 1998, 2007**
- Detailed Land Use Map: SPOT 5 Satellite Image, resolution 5mx5m, one scene in 2005**

Process

- Acquisition of Satellite Image
- Geometric Correction
- Band combination
- Field Truth

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Change of Land Use

Land use	Area (sq.km.)			Percentage (%)		
	1988	1998	2007	1988	1998	2007
Urban and built up land	170.81	170.79	219.18	6.7%	6.7%	8.6%
Agricultural Land	2,228.39	2,219.11	2,222.85	87.4%	87.1%	87.2%
Aquaculture Area	6.60	12.38	14.08	0.3%	0.5%	0.6%
Orchard Plantation	6.07	8.09	4.06	0.2%	0.3%	0.2%
Water body	39.61	39.39	42.61	1.6%	1.5%	1.7%
Wetland/Rangeland	95.99	91.41	39.18	3.8%	3.6%	1.5%
Extractive (soil pits/sand pits)	1.37	7.68	6.88	0.1%	0.3%	0.3%
Total	2,548.84	2,548.84	2,548.84	100%	100%	100%

Findings-1

- Urban and Built up land
 - There is no increase since 1988 to 1998, but significant increase was observed since 1998 to 2007 and around 50 km² changed to urban and built up area in recent 10 years. According to the land use map, development of industrial estate was the main factor of this increase.
- Agricultural Land
 - This is the biggest land use in Ayutthaya Province and over 87% is used for the agricultural purposes. The percentage is no change since 1988 till now.
- Aquaculture Area
 - The area became double since 1988 to 1998 and new aquaculture land was developed near border of Pathum Thani Province. There is slight increase since 1998 to 2007. But the percentage of the land use in the whole province is merely less than 1 percent.

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Findings-2

- Orchard Plantation
 - There is very small forest area in Ayutthaya Province and it is merely 0.2 to 0.3 % of the whole province. Among them, biggest orchard plantation area is located in Amphoe Bang Sai. Furthermore, the orchard plantation area was decreased to half since 1998 to 2007.
- Water body
 - There is not much changed observed for the area.
- Wetland and Rangeland
 - There is a big change since 1998 to 2007 and the area was decreased to less than half. According to the land use map in 1988, there were big wet lands in Amphoe Phachi and utthai but the area became very small and changed to agricultural land.
- Extractive
 - There is a big increase since 1988 to 1998 and it is stable since 1998 to 2007. The pit was created due to supply of construction materials.

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3. Current Situations, Issues and Measures for Natural Resources and Environmental Management in AYP

- Social and Economic
- Natural Resources Management
- Social and Living Environment Management

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Social and Economic

- Population
- Economy

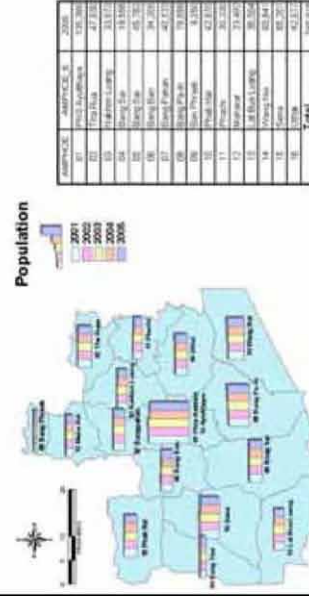
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Population

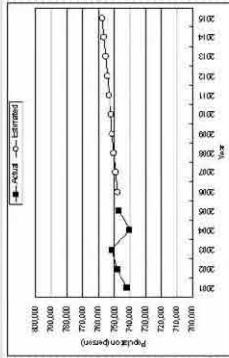
- Registered population growth is quite slow.
- Unregistered population is assumed to be fairly large but the fact is unknown.
- Population forecast will be done based on NESDB forecast (National Economic and Social Development Board) starting from actual record at 2005

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Population in Ayutthaya



Population Forecast



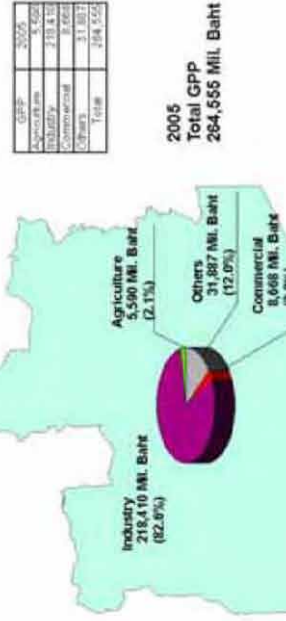
Year	Actual	Estimated
2001	74,174	
2002	74,823	
2003	75,259	
2004	74,307	
2005	74,919	
2006	74,969	
2007	74,019	
2008	75,053	
2009	75,119	
2010	75,219	
2011	75,219	
2012	75,269	
2013	75,319	
2014	75,369	
2015	75,419	

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Economy

- **GPP: 264,555 million Baht (2005)**
- **GPP per capita: 354,195 Baht/person/year**
- **Issues:**
 - **GPP of the province is steadily growing but the GPP of agricultural sector is merely 2% in spite of its area occupying 80%**
 - **Steering between environmental conservation and industrial development**

Gross Provincial Products and Composition of Category of Business

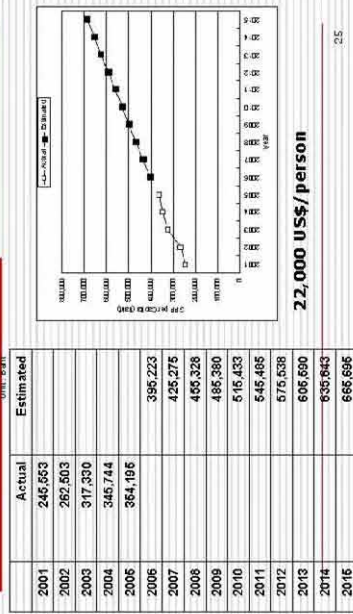


GPP Forecast

- **Actual GPP per Capita from 2001 to 2005 obtained from NESDB**
- **Regression Analysis (linear forecast) using past data from 2001 to 2005**
- **Future GPP per Capita x Future Population = Future GPP**

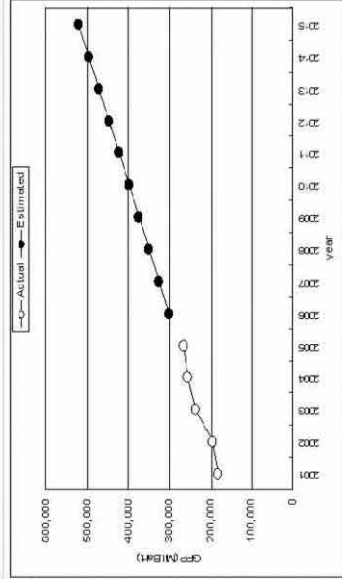
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Past and Future GPP per Capita



US

Past and Future GPP



Natural Resources Management

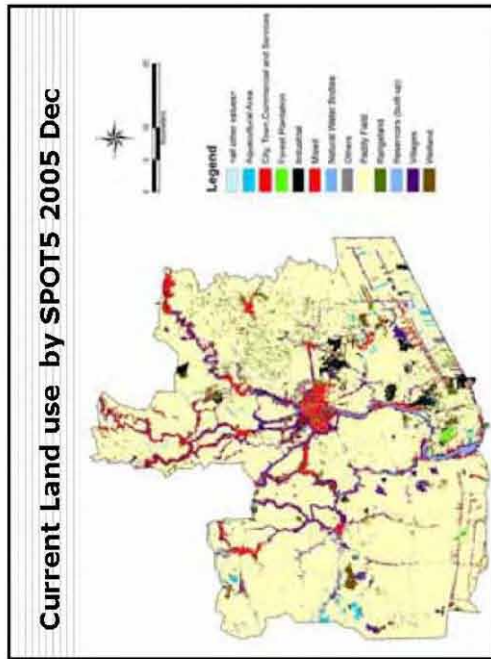
- Land and Soil Resources
- Forestry Resources
- Wildlife Resources
- Water Resources
- Mineral Resources
- Marine and Coastal Resources
- Biodiversity

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Land and Soil Resources Current Situations

- Located in the fertile delta of the Chao Phraya River basin and central plains formed by surrounding alluvial cone.
- Farmland with irrigation facilities are expanding In Thailand's old farm belt. More than 80% of the land is used for agriculture .
- Average elevation in this province is low at 4m above sea level

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Current Land use

Land Utilization	Area (sq.km)	percentage
City, Town, Commercial and Services	44.81	1.76
Villages	142.83	5.61
Industrial	41.37	1.62
Paddy Field	2,076.24	81.55
Mixed Plantation	68.95	2.71
Aquaculture Area	12.71	0.50
Greenery Area	4.36	0.17
Natural Water Bodies	39.12	1.54
Reservoirs – built up	19.71	0.77
Rangeland	47.50	1.87
Wetland	46.50	1.83
Others	1.92	0.08
Total	2,546.00	100.00

Land and Soil Resources Issues

- Salt damage to soil from ocean water invading groundwater due to industrial complex overdraw of groundwater.
- Erosion of rivers and channel slopes
- Riverbed sediment

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Land and Soil Resources Measures

- Develop a standard for groundwater usage to control over pumping up
- Protection of riverbanks such as protection of slope, etc.
- Benefits of appropriate land use, soil conservation and water management shall disseminate to the public

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Forestry Resources

1. Current Situations
 - No National Reserved Forest in this Province
2. Issues
 - Few greenery area in the town
3. Measures
 - Support for increasing greenery area in the town

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Wildlife Resources

- Current Situations
- There are no national forest preservation, wildlife conservation regions or national parks in this province.

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Water Resources

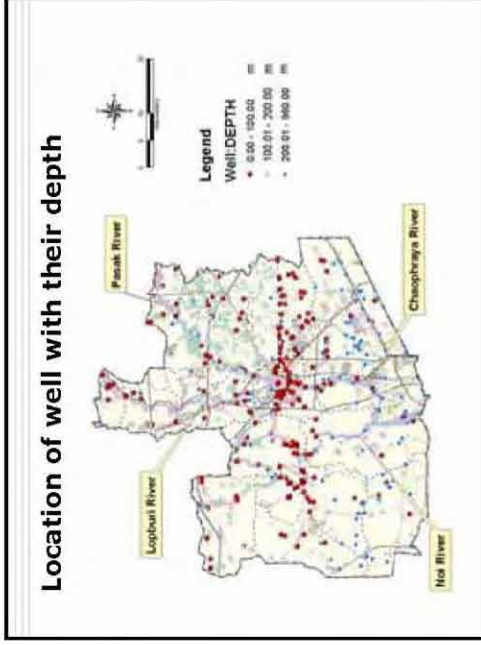
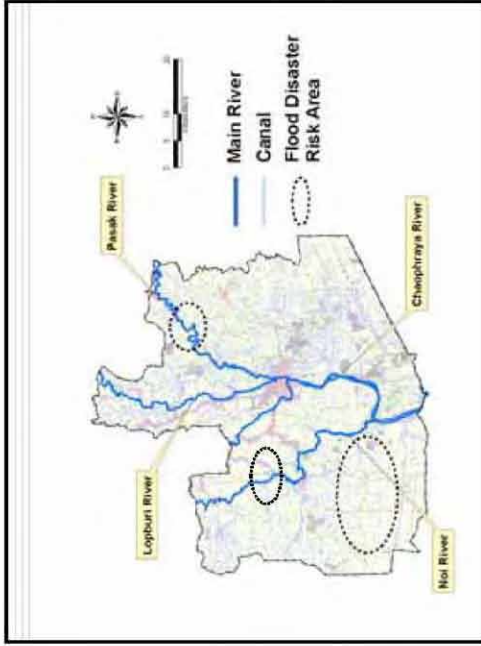
1. Current Situations
 - This province is rich in water resources with 4 main rivers, the Chao Phraya, Pasak, Lopburi and Noi Rivers
 - Natural and artificial waterways are interconnected with an extensive network through the entire province providing water transportation and irrigation.
 - Located in the Lower Chao Phraya Basin, which has been a rich and important area for groundwater supply in Thailand.

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Water Resources: Issues

- Flood caused by heavy water flows at four main rivers is the biggest issue.
- River pollution caused by business and common household activities.
- Waste water discharged from factories other than industrial estates

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Water Resources: Measures

- Flood prevention and mitigation plan shall be developed
- Development of voluntarily network for monitoring water quality
- Rehabilitation and improvement of natural and artificial canals
- Support activities for removing water hyacinth

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Mineral Resources

Current Conditions

- Sand supplied as building material for construction, otherwise no mineral resources of note.

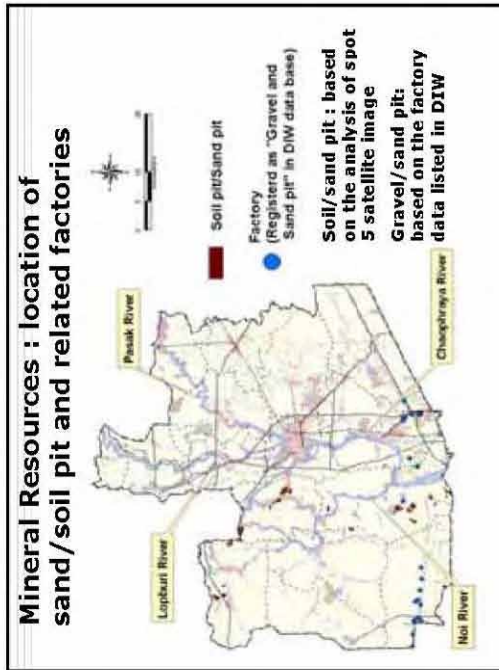
Issues

- Usage of borrow pit site improperly such as illegal dump site

Measures

- Monitoring for site usage plan, approve appropriate development plan

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Biodiversity

1. Current Situations

- The following endangered species exist in the province and surrounding area:
 - Birds: Milky stork, Baer's pochard, Black kite, Greater spotted eagle, Oriental darter, Great cormorant, Black-headed ibis, Spot-billed pelican
 - Fish: Giant stingray
 - Wat Tan En wetland of national importance is located and hunting is prohibited.

Source of data : Thailand Red Book by Department of Biodiversity/ONEP ⁴²

Biodiversity in AYP (1) (Endangered Species)

Scientific Name	Common name	Thai Name	Site	Photo
Milvus migrans	Black Kite			
Aquila clanga	Greater spotted Eagle			
Anhinga melanogaster	Oriental Darter			





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Biodiversity in AYP (2)

Scientific Name	Common name	Thai Name	Site	Photo
Phalacrocorax carbo	Great Cormorant			
Treskiornis melanocephalus	Black-headed Ibis			
Pelecanus philippensis	Spot-billed Pelican			

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Biodiversity in AYP (3)

Scientific Name	Common name	Thai Name	Site	Photo
Aythya baeri	Bare's Pochard			
Himantura chaophraya	Giant stingray			

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Biodiversity

2. **Issues**
 - Conservation of biodiversity
3. **Measures**
 - Formulate conservation plan
 - Conduct a campaign to educate local people on importance of biodiversity
 - Monitor and restrict phenomena that affect biodiversity
 - Biodiversity conservation with participation of local people

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Social and Living Management

- Waterworks
- Sewer System
- Water Pollution
- Solid Waste
- Air Quality
- Noise and Vibration
- Toxic and Hazardous Waste
- Urban Environment
- Natural and Cultural Assets
- Global Warming

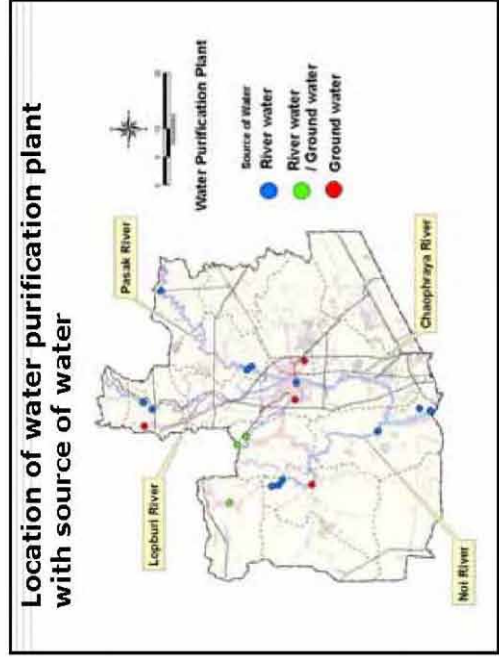
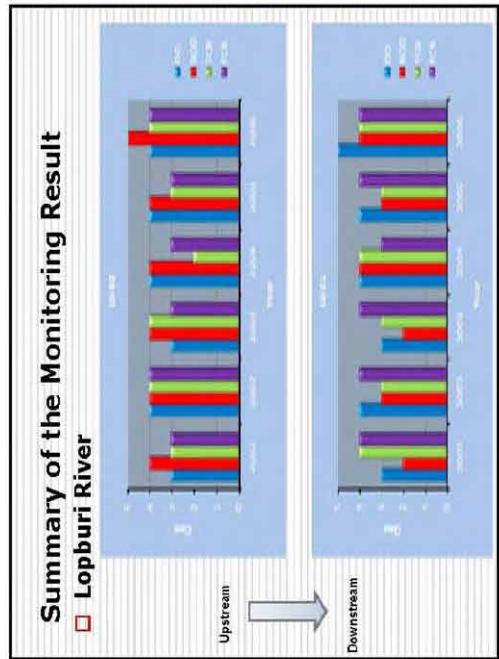
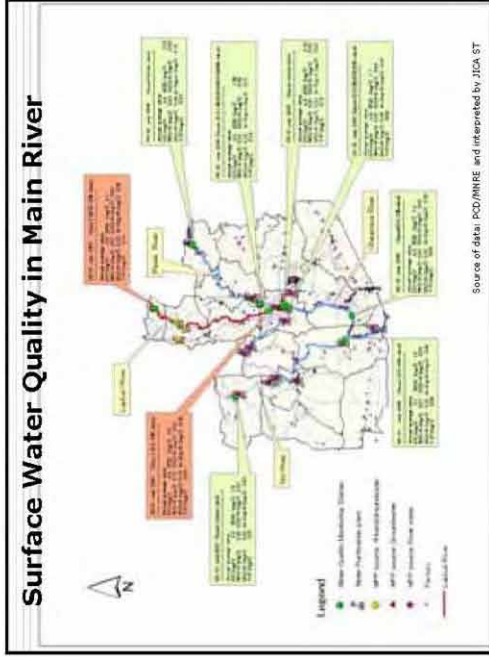
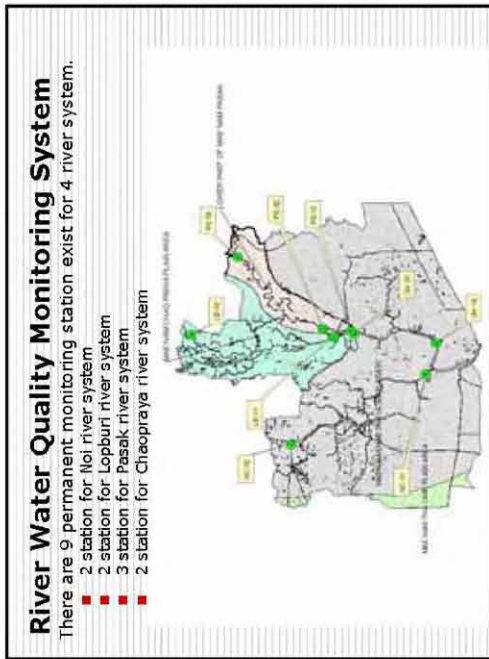
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Waterworks

- Current Situations**
 - 79% water supply ratio across entire local administration, partial water supply ratio is 21%.
 - Ratio of local people receiving water supply through household taps, shared/public taps is 99%(of which 41% are shared/public taps). For enterprises, the ratio is 99% (of which 40% are shared/public taps)
 - Water quality of river water which use for drinking purpose is sometime class 4 to 5.

Source of data : Opinion survey by the JICA ST
Monitoring data : PCD of MNRE

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Water pollution

- ❑ Issues: Eliminate source of water pollution by:
 - Appropriate treatment of household wastewater
 - Appropriate treatment of factory wastewater, solid waste drainage, agricultural and livestock wastewater, etc.

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Water pollution

- ❑ Measures
 - Develop appropriate waste water treatment plant according to the site conditions.
 - Effective use of water quality monitoring results (information disclosure and monitor/grasp understanding of water bodies)

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Solid Waste: Current Situations

Waste Generation, Collection and Final Disposal Amount in 2005

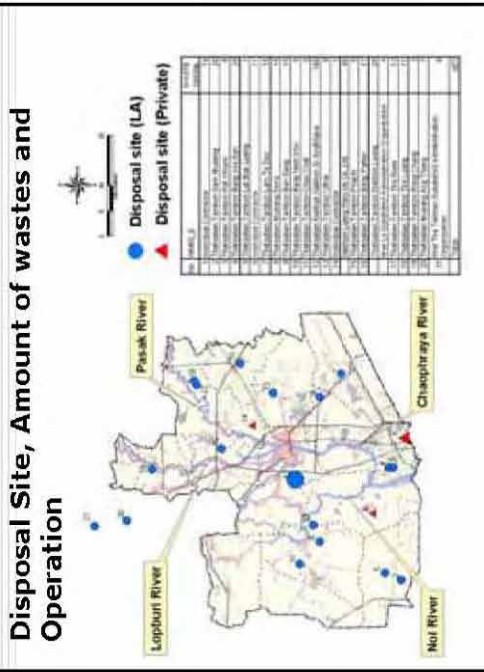
	Tessaban	Orbortor
Waste generation (t/day)	252	297
Population (2005)	253,316	493,603
Generation Ratio (kg/day/person)	0.995	0.602
Non-Collection rate (ratio to generation) %	9	25
Final disposal amount (t/day)	229	223

Source of data : PEQMP for KPT 2007 59

Solid Waste: Current Situations

- ❑ Current Situation
 - Waste Composition
 - ❑ Kitchen waste:44.7%, Paper:14.3%, Plastic 13.3%
 - SWM System
 - ❑ 19 final disposal sites in the province, almost all the waste generated in the province is finally disposed within the province.
 - ❑ Most (96%) local administrations offer collection services through direct operation.
 - ❑ Except for 3 sites, final disposal sites are managed by local administrations.
 - ❑ In 3 Orbortors, small scale incinerators are used to burn waste.
 - ❑ 93% of the population receives waste collection services.

Source of data : Opinion Survey by JIAC SI 60



Solid Waste: Issues

- Final disposal sites in 5 Tessaabans are near capacity, pressing for new final disposal sites to be secured quickly.
- Especially, this is a predicament for Phra Nakhon Si Ayutthaya Municipality which has the largest amount of waste to be disposed of.
- 10 of the 19 final disposal sites are crude dumps. It is necessary to quickly shift the Phra Nakhon Si Ayutthaya Municipality site, which receives a particularly large volume of waste, to a sanitary landfill in order to reduce the environmental impact.
- Household waste is not separated by residents nor when collected.
- Some Tessaaban and Orboritor are too small scale for operating solid waste management individually.

Solid Waste: Measures

- Advocate restricting solid waste generation to 0.8kg/person/day or less from households in the Tessaaban, according to the National SWM MP.
- The target ratio of non-collected household waste in Tessaabans is 5% or less, and 10% or less in Orboritor, according to the National SWM MP. Strive to further improve the collection ratio much more.
- Develop a recycle center and give guidance for waste to be separated when put out and collected, thus reducing the volume for final disposal. (92% of local people indicated in an opinion poll that they would comply with a system to separate waste into 3 types.)
- Construct sanitary final disposal sites in the province (the National MP recommends 50% or more of local administrations implement a clustering final disposal, and in Ayutthaya Province, FS survey has been completed for the construction of two central final disposal sites)
- Formulation of solid waste management organizations for taking care of several tessaabans and orboritors together.

Air Quality: Current Situations

- A station exists to continually measure air quality in the province, measuring common air quality items (carbon monoxide, nitrogen dioxide, sulfur dioxide, dust (PM-10), ozone, etc.) and climate data, and data measurements are disclosed on a PCD Web site.
- Regular air quality testing is done at 4 industrial complexes in the province.
- Problems were reported with dust and smoke when transport ships are unloading flour and coal, and dust, smoke and odor generated by factories.
- A problem with air pollution caused by open burning of agricultural waste products, particularly notable in the dry season.