

ANNUAL STATE OF ENVIRONMENTAL REPORT (ASER) 2007 TANGERANG MUNICIPALITY



**THE GOVERNMENT OF TANGERANG CITY
BANTEN PROVINCE**

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FOREWORD

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Assalamuala'ikum Wr. Wb.

Praise and thanks we give to Allah SWT that because of His blessings the Government of Tangerang City can compose the Annual State of Environmental Report (ASER) 2007 Tangerang Municipality Book.

The Annual State of Environmental Report (ASER) 2007 Tangerang Municipality is a report on the environmental condition and quality for Tangerang City area and is intended to provide information needed in making decisions, regulations or program interventions that are rational, holistic and integrated.

The composing of this book is one of the effort in implementing Regulation No. 23 year 1999 regarding Environmental Management which stated that "In order to manage the environment, the government is obligated to provide: environmental information and inform the people".

Hopefully what we have done will have a big impact on environmental management efforts in Tangerang City and in turn can benefit future generations. May Allah SWT always grant us with His blessings. Amen.

Wassalamuala'ikum Wr. Wb.


Tangerang,

MAJOR OF TANGERANG

H. WAHIDIN HALIM



A C K N O W L E D G E M E N T S



The Annual State of Environmental Report (ASER) 2007 Tangerang Municipality is an executive summary report on environmental condition in Tangerang City. This report is intended to encourage environmental awareness in various stakeholders towards clean, prosperous, and sustainable environment of Tangerang City.

We realize that there are still many uncovered environmental situations and problem in the city that we have not presented here due to our limitations. But we hope that those that we present here can be used as a reliable source of information for anyone who reads it.

In this opportunity, we would like to extend our appreciation to all parties that has contributed in the making of ASER. Agencies, Bodies and Institutions in Tangerang City for contributing data, information, pictures and photographs. We apologize if by chance we made inappropriate citations. Your critical response toward this ASER would be highly appreciated for better ASER in the future.

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LIST OF ABBREVIATIONS

AMDAL	Environmental Impact Assessment (process)
BAPEDA	Provincial Development Planning Agency
BMG	Meteorology and Geophysics Agency
BPS	Statistical Agency
COD	Chemical Oxygen Demand
CO	Carbon Monoxide
DAS	Watershed
Departement Kesehatan (Depkes.)	Ministry of Health
Departemen Perhubungan (Dephub.)	Ministry of Transportation
Dinas Kebersihan (Dinkes.)	Clean Agency
Dinas Pekerjaan Umum (PU)	Public Works Agency
DO	Dissolved Agency
Fe	Iron
ha	Hectare
HIV/AIDS	Human Immune Virus / Acquired Immune Deficiency Syndrome
IPLT	Feces Sludge Treatment Plant
ISPA	Throat & Breath-pipe Infection System
Kecamatan (Kec.)	District
Kelurahan (Kel.)	Sub-district
Kepmen	Ministry Regulation
km	kilometer
Kota	City
lt/cap/day	liter per capacity per day
m	meter
mg/l	milligram per liter
Mn	Mangan
NAB	Threshold rate
NGO	Non-Governmental Organization

O ₃	Ozone
Pb	Lead
PROKASIH	Clean River Program
PROPER	Company Rating Program
Puskesmas	Community Health Centre
RKL	Environmental Management Plan
RPJM	Middle Term Development Plan
RPL	Environmental Monitoring Plan
Rusunawa	Rented Apartment
SDA	Natural Resources
SDM	Human Resources
SO ₂	Sulfur Dioxide
Subdin.	Sub-Agency
SUPERKASIH	Clean River Statement Letter
TDS	Total Dissolved Solid
TPA	Final Disposal Site
TPS	Temporary Disposal Site
TSP	Total Suspended Particulates
UKL	Environmental Management Action
UPL	Environmental Monitoring Action
WWTP	Wastewater Treatment Plant
Yankes Dasar	Basic Health Service
Yankes Rujukan	Referral Health Service
µg/m ³	microgram per cubic meter
3R	Reduce, Reuse and Recycle

PROFILE OF TANGERANG CITY

Tangerang Municipality represents one of cities in Indonesia. This City is gifted with various potential natural resources, such as land resources, and economic resources.

Location of Tangerang City



Source: Bapeda Tangerang,

Tangerang Municipality covers the area of 18,424 hectares, and from the data in 2006, the density of population is about 8,397 persons per square kilometer.

Geographically, Tangerang Municipality lies between 5° 6' - 6° 13' South Latitude and 106° 36' - 106° 42' East longitude; it is bounded:

- on the north by Tangerang District
- on the east by Province of DKI Jakarta
- on the south by Tangerang District and
- on the west by Tangerang District

The strategic geographic position of Tangerang Municipality has many advantages for this regional, especially from transportation and communication point of view.

Topography of Tangerang Municipality

Most part of Tangerang Municipality is flat land area, with slope of land between 0 – 3 %, and some of it (at

south of the City) have slope between 3 – 8 % (at Kelurahan Parung Serab, Kelurahan Paninggalan Selatan, and Kelurahan Cipadu Jaya).

Tangerang Municipality lies at the height 10 – 30 meter above sea level. The north part of the City have average height 10 meter above sea level, like Kecamatan Neglasari, Kecamatan Batuceper, and Kecamatan Benda; and the south part of it have average height 30 meter above the sea level, like Kecamatan Ciledug and Kecamatan Larangan.

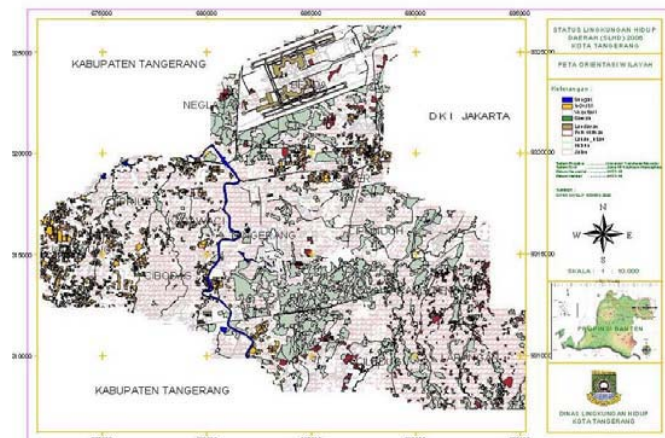
Rainfall at Tangerang Municipality average is 1,656 mm/year, with the humidity around 58.08 %.

Cimate of Tangerang Municipality, 2004

	Unit	Average in 2004
1. Rainfall	mm	1.656
2. Humidity	%	58.08
3. Sunlight Intensity	%	80.25
4. Temperature	°C	27.07

Source: BMG Tangerang Municipality, 2004

Orientation Map of Tangerang Municipality



Source: Bapeda Tangerang

There are 13 Kecamatan and 104 Kelurahan at Kota Tangerang, i.e.: Kecamatan Benda, Kecamatan Batuceper, Kecamatan Benda, Kecamatan Cibodas, Kecamatan Ciledug, Kecamatan Cipondoh, Kecamatan Jatiuwung, Kecamatan Karang Tengah, Kecamatan Karawaci, Kecamatan Larangan,

Kecamatan Neglasari, Kecamatan Periuk, Kecamatan Pinang dan Kecamatan Tangerang. Base on area width, the widest kecamatan at Tangerang Municipality is Kecamatan Benda (2.561 hectares), followed by Kecamatan Pinang (2.159 hectares) and Cipondoh (1.791 hectares).

Tangerang city is located about 20 km west of Jakarta. It is the second largest urban center in the Jabotabek region after Jakarta. Tangerang is an industrial and manufacturing hub on Java and is home to over 1,000 factories. Many international corporations have plants in the city. Tangerang tends to be hot and humid, with little in way of trees or geographical features. Certain areas consist of swamps, including the areas near the Soekarno-Hatta International Airport.

In recent years the urban expansion of Jakarta has covered Tangerang, and as a result many of its residents commute to Jakarta for work, or vice-versa. Many high-class and middle-class satellite cities have been developed in Tangerang, complete with their

own shopping malls, private schools and convenience centers. The government is working on expanding the highway system to accommodate more traffic flow to and from the area.

The Region Town of Tangerang is passed by Cisadane River which divides Town of Tangerang into 2 (two) part, i.e. West part of Cisadane River covers District of Jatiuwung and some of District of Tangerang, and East part of Cisadane River covers Discharge River Of Cipondoh, Angke River, Wetan River, Pasanggrahan River, Cantiga River, Pondok Bahar River. Besides rivers in Town of Tangerang there are also aquaducts covering Channel of Mookekart, Tanah Tinggi Irrigation Channel, Main Channel of West Cisadane, Main Channel of East Cisadane and Main Channel of North Cisadane.

Vision and Mission

Vision of Tangerang City

Tangerang City as Industrial Town, Commerce and friendly estate that is environmental friendly in a religious society.

Mission of Tangerang City

1. *Curing and Pushing Growth Of Economics Utilize To Improve Prosperity of Urban Community of Tangerang Self-Supporting, and have a religious behavior*
2. *Improving Quality and Amount of Public Service*
3. *Develop and Strengthen governance (Good Governance); and*
4. *Pushing its Form of Development With vision of Environment and Continuation (Sustainable Development)*

POPULATION AND URBAN FORM

Tangerang city's population growth increased by

2.62% per year in the year 2006. Together with that, the availability of undeveloped land for new housing development is declining. The number of new homes being built on redeveloped sites within Tangerang city increased. Average household size: declining, this will probably continue to increase the demand for housing together with the growth in population, posing challenges to the natural environment of Tangerang City and surrounding areas. Population density also increased (8.397 Cap/ km²).

Population Density per Km² According to Kecamatan

No.	Kecamatan	Luas Wilayah (km ²)	Jumlah Desa	Jumlah Penduduk	Jumlah Rumah Tangga (KK)	Rata-rata Jiwa / Rumah Tangga	Kepadatan Penduduk / km ²
1	Ciledug	8.77	8	108,195	20,577	5.26	12,337
2	Larangan	9.40	8	133,214	24,207	5.50	14,172
3	Karang Tengah	10.47	7	100,419	19,409	5.17	9,591
4	Cipondoh	17.91	10	150,241	33,018	4.55	8,389
5	Pinang	21.59	11	122,507	24,200	5.06	5,674
6	Tangerang	15.79	8	128,248	28,314	4.53	8,122
7	Karawaci	13.48	16	169,771	44,101	3.85	12,594
8	Cibodas	9.61	6	136,265	43,145	3.16	14,180
9	Jatiuwung	14.41	6	134,275	31,585	4.25	9,318
10	Periuk	9.54	5	118,361	28,646	4.13	12,407
11	Neglasari	16.08	7	93,657	10,786	8.68	5,824
12	Batuceper	11.58	7	82,944	18,565	4.47	7,163
13	Benda	25.61	5	69,040	21,071	3.28	2,696
	Kota Tangerang	184.24	104	1,547,137	347,624	4.45	8,397

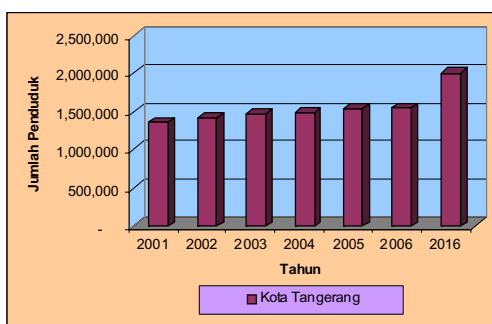
Source: BPS Kota Tangerang, 2006

Tangerang Population Year 2001 - 2006

No.	Kecamatan	Jumlah Penduduk Tahun 2006					Laju Pertumbuhan Penduduk Rata-rata (%)	2016	
		2001	2002	2003	2004	2005			2006
1	Ciledug	94,768	99,010	100,721	102,240	108,073	108,195	2.60	139,798
2	Larangan	120,801	126,039	127,033	128,946	132,706	133,214	1.93	161,234
3	Karang Tengah	84,768	88,208	96,129	97,577	99,697	100,419	3.29	138,855
4	Cipondoh	127,102	133,921	144,367	146,540	147,300	150,241	3.26	207,002
5	Pinang	107,471	111,451	116,031	117,779	122,098	122,507	2.57	157,966
6	Tangerang	113,595	117,960	120,584	122,403	127,992	128,248	2.39	162,348
7	Karawaci	150,574	155,959	161,371	163,799	169,536	169,771	2.36	214,418
8	Cibodas	120,317	126,328	129,217	131,162	135,793	136,265	2.45	173,526
9	Jatiuwung	119,150	126,237	123,045	124,900	134,076	134,275	2.30	168,549
10	Periuk	101,736	107,818	111,510	113,188	117,392	118,361	2.97	158,556
11	Neglasari	72,275	85,775	90,162	91,521	92,552	93,657	4.88	150,775
12	Batuceper	82,024	75,308	80,087	81,293	82,193	82,944	0.11	83,833
13	Benda	59,627	62,828	66,320	67,318	68,150	69,040	2.87	91,624
	Kota Tangerang	1,354,208	1,416,842	1,466,577	1,488,666	1,537,558	1,547,137	2.62	2,003,568

Source: BPS Kota Tangerang, 2006

Chart of Tangerang Population Growth



The growth of Jakarta is the cause of suburbanization in Jakarta's peripheral areas. The higher economic growth of Jakarta becomes, the higher the pressure will be in Jakarta's peripheral areas to suburbanize, such as Tangerang city. As long as Jakarta still becomes the primary growth machine of the nation,

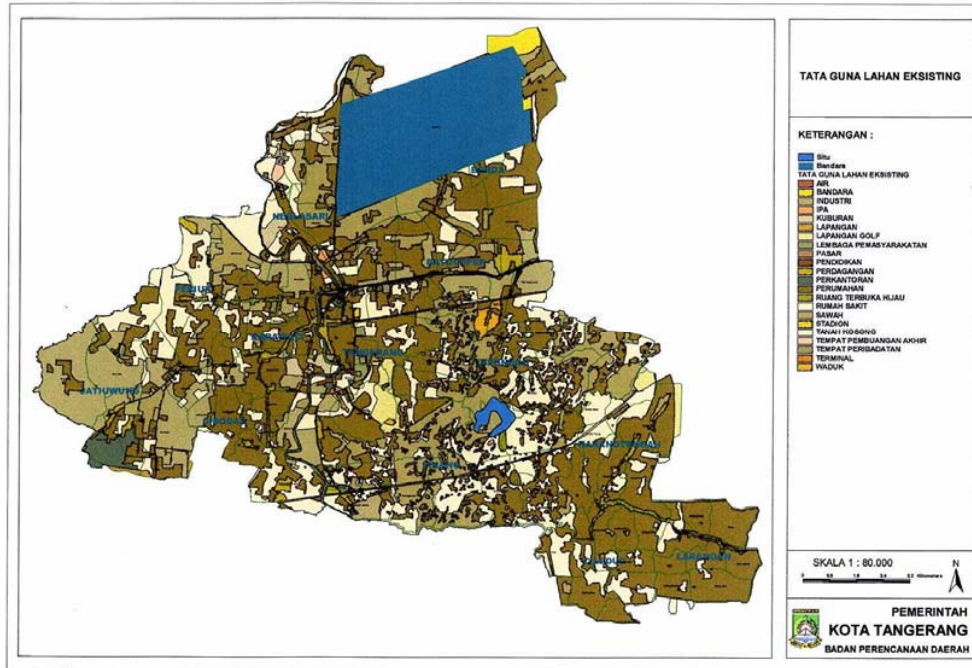
the economic growth of Jakarta will be strongly associated with the pace of Indonesia's economic growth and will correspond to the suburbanization in

Jakarta's neighboring areas. In addition, the suburbanization of Tangerang city, as one of Jakarta's peripheral areas, is generated by the influx of migrants from other parts of the nation particularly from poor regions of Java Island. During 1995-2005 the average number of migrants who migrated to neighboring areas of Jakarta was 1.6 million people a year. Poverty in rural areas in Java Island became a factor that pushed people from rural areas to move to urban areas. The rural poor migrate to urban area as

a way of escaping from the poverty. There is inextricable link between rapid suburbanization in Tangerang city, as Jakarta's peripheral areas and poverty in Java's rural areas.

Land use of Tangerang City can be seen at picture below.

Land Use of Tangerang City



Source: Bapeda Kota Tangerang

From the picture we can find that most of the land at Tangerang city has been occupied. The condition make the poor people can not buy some land for their houses so they occupied riverbank and other places and make it to be slum area.

Riverbank occupation

Riverbank occupation is a serious problem when it comes to reducing the flood carrying capacity of rivers and main drainage channels in Jakarta. The process usually occurs gradually, starting with a couple of temporary sheds or huts made of bamboo and soon turning into dozens or hundreds of permanent buildings. Encroachment will continue even over the

wet area of the channels.

The complexity in overcoming this problem can be analyzed as follows:

a. Regulations related to River Right of Way have been stipulated in national laws, but detailed local government regulations for specific river stretches in most cases have not been issued, so that the occupation of riverbanks cannot be prevented at their early stages.

b. Though there are definite regulations regarding channel occupation, they cannot be enforced meaningfully. Resistance from the occupants is usually strong, and often amplified by NGOs support. What makes things worse is the hesitation of government officials when they consider the financial and social consequences which

may arise from removing people from river channels. They have to negotiate compensation, consider schooling of the children, and so on.

c. Weak coordination among government agencies have strengthened the legal stance of the occupants, who claim that they have obtained formal recognition from public institutions, because they pay taxes for their land and their small kiosk, they obtain electricity and water from public utilities, etc.

d. Resettlement is costly and the result is often doubtful. Illegally occupied riverbank stretches are generally located in developed urban areas where people are close to their work or where they can earn their income more easily. Resettlement is usually prepared in suburban areas where the

price of land is still low. If this makes sense given the lack of the budget, it is a hardship to the people moved, who find themselves a long way away from their sources of income. When they find it too difficult to earn a living in the resettlement areas, they sneak back to their old haunts on the riverbanks.

Community participation in solving this problem is certainly minimal. Not only because dwellers enjoy the benefits which arise from weaknesses in existing regulations and government policies, but also because they seem prepared to pay the cost of living dangerously along river channels.

Cisadane River Also Used for Washing, Bathing etc.



Generation by the influx of migrants from other parts of the nation particularly from poor regions to Jakarta's peripheral like Tangerang city, make slum condition at several area. Slum is defined as a heavily populated urban area characterized by substandard housing and squalor. The term traditionally referred to housing areas that were once respectable but which deteriorated as the original dwellers moved on to newer and better parts of the city, but has come to include the vast informal settlements found in cities in the developing world. Although their characteristics vary between geographic regions, they are usually inhabited by the very poor or socially disadvantaged. Slum buildings vary from simple shacks to permanent and well-maintained structures. Most slums lack clean water, electricity, sanitation and other basic services.

In many slums, many live in very narrow alleys that do not allow vehicles (like ambulances and fire trucks) to pass. The lack of services such as routine garbage collection allows rubbish to accumulate in huge quantities. The lack of infrastructure is caused by the informal nature of settlement and no planning for the poor by government officials. Additionally, informal settlements often face the brunt of natural and man-made disasters, such as landslides, as well as earthquakes and tropical storms. Slum life often entails enduring some of the most intolerable housing conditions, which frequently include sharing toilets with hundreds of people, living in overcrowded and insecure neighborhoods, and constantly facing the threat of eviction. Slum dwellers are also more likely to contract water-borne diseases, such as cholera and typhoid, as well as opportunistic ones that accompany HIV/AIDS. Slum life, therefore, places enormous social and psychological burdens on residents, which often leads to broken homes and social exclusion.

Although the common perception is that slums are breeding grounds for crime, the report shows that slum dwellers, in fact, are more often victims than perpetrators of crime. Many slum dwellers employ themselves in the informal economy. This can include street vending, drug dealing, domestic work, and prostitution. In some slums people even recycle trash of different kinds (from household garbage to electronics) for a living - selling either the odd usable goods or stripping broken goods for parts or raw materials. The slum locations at Kota Tangerang are mostly situated at kelurahan Babakan, Kelurahan Mekarsari, Kecamatan Neglasari, kelurahan Kedaung Wetan and Kelurahan Kedaung Baru.

Response and Recommendation

Lessons from several countries underscore the importance and fundamental role of sustained political will and commitment to improving or reducing slums. For instance, some countries in Latin America have implemented wholesale tenure regularization programs, which have significantly reduced the number of squatter households. South Africa's national housing program may not be perfect, but it has reduced the number of informal settlements in its cities.

The report also suggests that **in-situ slum upgrading is a far more effective solution to improving the lives of slum dwellers than is resettlement.** It means that the purpose is not to displace or resettle slum residents unless it was absolutely necessary, and to include them and their communities in all aspects of the upgrading process, from the planning to the implementation stages. **The Government also has to invest more in the provision of public housing, in order to ensure that there is a sufficient stock of housing that is affordable to low-income groups. The Government must have a rent-control system that would ensure that unscrupulous landlords do not over-exploit the poor.**

The other solution is to relocate the dwellers to the outskirts of the city, where it would make more sense to open up public land within the city for low-income settlement, thereby reducing congestion in the existing slum areas. While most Governments place heavy emphasis on home ownership as a solution, the reality is that the majority of low-income households in cities are only able to afford housing of a rental nature.

The fact is that even if decent housing is made available to the urban poor, most cannot afford to buy homes. Therefore, **indirect cost recovery and other**

subsidies would have to be developed.

The Government of Tangerang city has made some program to solve the problem of slum area at the city. The programmes include make a cheap rent apartment for them (see the table below).

Program for Dwellers at slum area

Squater Location	Activities
☞ Kel Babakan	4# housing movement from Cisadane River Edge Border
	4# Training in making Batako
☞ Kel. Mekarsari	4# Sanitation facilities development
☞ Kec. Neglasari	4# Plan to build Rusunawa (Rental Apartment) Mekarsari*
☞ Kel. Kedaung Wetan	4# Sanitation Facilities, Public roads, Clean Water Facilities, Drainage
	4# -12 House renovation
	4# Land certification plan (In process)
☞ Kel. Kedaung Baru	4# Housing development for Squatters
	4# 40 Unit
	4# Area ± 1 Acre

4# Rusunawa
Mekar Sari

Budget : APBN Departemen PU
Area : ± 2 Acre
Plan : 192 Unit Type- 21 Room

The other thing is that **the government of Tangerang City must have some regulation concerning population growth, specially regarding fast growth of residential development and the development of residential** which already

spread over in all Town of Tangerang have exceeded ability of development planning of urban facilities and basic facilities.

Government also has to conduct the implementation of law to people who break the regulation without exception and represent strong commitment from all executive, legislative and judicial levels. Also to control resident growth rate either due to natural growth and/or migration and also manage its spreading according to guidelines from spatial planning development regulations.

The other recommendation for Tangerang city is to formulate monitoring and management of high resident accumulation through creating prime service of population sector, development and operation of Administrative System of Population Sector (SIAK = *Sistem Administrasi Kependudukan*)

SOLID WASTE

Solid waste represents one of the environmental problems in urban area. Increase in urban population causes the increasing of solid waste disposal. This acceleration could not be managed by current infrastructure and facilities. For example, available waste disposal area is very limited. Even if available, local community is doubted to give their agreement.

The community assumes that the existence of waste disposal area in their surroundings will disturb their health and comfort and also decrease their land price. Therefore, it's often heard and observed that community will complaint to oppose their surroundings to be developed as waste disposal area.

Based on the data obtained from Dinas PU Subdin Kebersihan, solid waste generated in Tangerang Municipality reaches 3,094.274 m³/day while available final disposal area is only 10 Hectares. At this moment, Tangerang Municipality operates their management system under governmental institution (Dinas PU Subdin Kebersihan).

Final Disposal Site at Rawa Kucing, Tangerang City



One of the factor that is often missing in consideration of institutional determination is their service load which must be prepared. One of the success

indicators of the institution in waste management is service level that measured to the number of population served or the amount of waste that can be managed.

The amount of solid waste that can be managed in year 2002 can be seen in this table below.

Managed Solid Waste at Tangerang City Year 2002

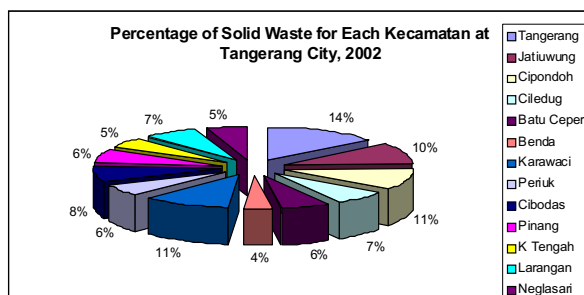
Kecamatan	Domestic (m ³ /day)	Non Domestic (m ³ /day)					TOTAL (m ³ /day)
		Market	Industry	Office	Commercial	Social	
Tangerang	198	42	2	1	3	0.5	246.5
Jatiuwung	142	24	1	1	2	0.4	170.4
Cipondoh	152	24	1	1	2	0.4	180.4
Ciledug	87	24	1	1	1	0.3	114.3
Batu Ceper	92	12	1	1	1	0.3	107.3
Benda	55	6	0	0	1	0.2	62.2
Karawaci	180	6	2	1	3	0.5	192.5
Periuk	93	6	1	1	1	0.3	102.3
Cibodas	121	6	1	1	2	0.4	131.4
Pinang	99	6	1	1	1	0.3	108.3
K Tengah	78	6	1	0	1	0.2	86.2
Larangan	111	6	1	1	2	0.3	121.3
Neglasari	80	6	1	1	1	0.2	89.2
TOTAL	1488	174	14	11	21	4.3	1712.3

Source : Dinas Pekerjaan Umum Kota Tangerang, 2003

The percentage of solid waste at each kecamatan is about 4 – 14 % from total solid waste at Tangerang City, as the picture below.

Percentage of Solid Waste for Each Kecamatan at Tangerang City, 2002

Source: Dinas Pekerjaan Umum Kota Tangerang, 2003



Waste collection methods necessarily involve some or all of the following steps: collection from households or other premises; consolidation in temporary storage sites (*Tempat Pembuangan Sementara – TPS*); transport to a transfer station; and transport to a final disposal site.

Location of Temporary Storage Sites (TPS) at Tangerang Municipality

No.	Location	Number of Facility (unit)	
		TPS (unit)	Container Base (unit)
1	Tangerang & Karawaci	245	8
2	Jatiuwung, Periuk & Cibodas	59	6
3	Cipondoh & Pinang	77	4
4	Ciledug, Larangan & Karang Tengah	17	5
5	Batuceper, Benda & Neglasari	58	4
	Jumlah	456	27

Source: Subdin Kebersihan, DPU Tangerang Municipality, 2003

Household waste reaches temporary storage sites (large bins, enclosed sites, market areas, or designated roadside areas) in a variety of ways:

- in kampung areas householders place rubbish in containers at the front of their property, where it is collected by handcart. Householders pay for their rubbish to be collected 2 to 4 times a week depending on local circumstances;
- solid waste is taken by the householder or trader to the disposal site as often as desired;
- a rubbish truck regularly passes through a community giving a musical signal, the household waste is brought out by individual householders and dumped into the truck;
- in higher income residential areas, a waste disposal truck comes directly to each household and removes the waste stored in bins; such a system is only available in areas that are easily accessible by truck.



Garbage at Market

For market wastes, it is removed from market areas by the

Market Authority using open trucks and is taken to temporary or final disposal sites. Waste from some markets are sometimes collected by local government workers using handcarts and taken to the nearest temporary storage site. Some markets are serviced by Cleaning Department workers using open trucks.

Prior to collection, solid waste is dumped near the market area on the roadside, on open land or in open concrete bins. The high content of biodegradable matter of market waste makes this unsightly, creates unpleasant odors and is unsanitary. Waste often spreads from these sites into drains causing blockages leading to local flooding.

Since most markets are adjacent to roads and accessible by trucks they are ideal sites for the use of covered steel bins serviced by 'roll-arm' trucks. Smaller, less accessible traditional markets may still need to be serviced by handcart collection, but should be provided with covered bins for temporary storage.

Solid waste from small commercial and industrial areas is usually collected by handcart and taken directly to a temporary storage site. Larger commercial and industrial areas are serviced by trucks that transfer the waste directly to temporary or final disposal sites. As with households and market areas, the greatest threat to health and sanitation is the use of open concrete bins for temporary disposal of waste. These need to be progressively replaced with covered bins of appropriate size for the next transfer stage.

Sum of Truck for Solid Waste

No.	Area	Number of Trucks (unit)
1	Tangerang & Karawaci	35
2	Cipondoh & Pinang	10
3	Benda	4
4	Batuceper, & Neglasari	5
5	Jatiuwung, Periuk & Cibodas	17
6	Ciledug, Larangan & Karang Tengah	11
7	At 8 Market Locations	8
8	Kecamatan Trucks	13
	TOTAL	103

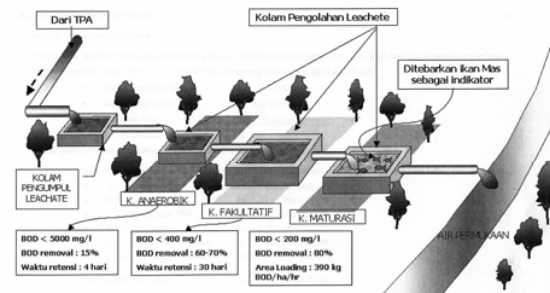
Source: Subdin Kebersihan, DPU Tangerang Municipality, 2003

In residential areas, each householder is responsible for the removal of any solid waste from the front of their house. Streets in non-residential areas, such as commercial areas and main roads, are swept by local government employees.

In Rawa Kucing Final Disposal Site, since year 2001 processing of organic garbage become compost have been conducted, with capacities between 24 - 30 m³/day yielding around 600 - 1000 kg pure compost per day. The raw material is market waste that's rich in organic content like fruit and vegetables. To enrich manure of organic unsure, it is mixed with additional materials like livestock dirt, to yield pure compost. Besides compost, Unit Processor of Organic Garbage in Final Disposal Site Rawa Kucing also make liquid manure from leachate.

And the process for leachate can be seen at the next picture.

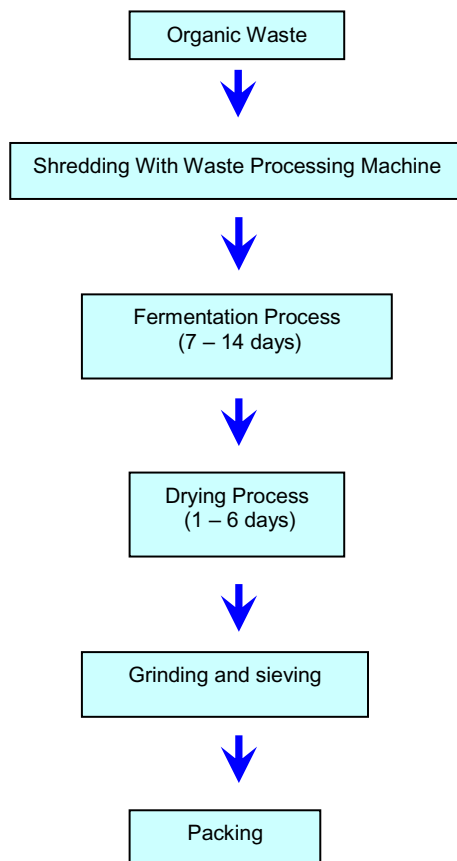
Leachate Processing



Gambar 9. Sistem pengolahan leachate

The height of the dumped waste at Rawa Kucing right now is up to five meters. Therefore the government of Tangerang city already prepare land for final disposal at Jatiwaringin (10 acres).

Process at TPA Rawa Kucing



With assumption that the rise of garbage equals to 2 lt/cap/day or 0,002 m³/cap/day, with amount of resident of Tangerang year 2006 equals to 1.547.137 person, hence volume garbage yielded by 2006 reached 3.094,274 m³/day. So, in the year 2016 with resident projection of 2.003.568 person, hence the rise in yielded garbage will be equal to 4.007,136 m³/day. The high level of garbage volume in Tangerang will give big influence to the garbage processing system. If the garbage processing system still relies on disposal to TPA, hence this matter will quicken the age of usage of TPA. Even right now, the capacity of TPA Rawa Kucing is not enough to accommodate the rise of garbage in Tangerang city.

Solid Waste at Riverbank

Most of Tangerang's rivers and drainage channels are in bad shape because they carry too much solid waste. River and drainage channel stretches along slum areas are the main sources of waste. To a lesser extent, markets and commercial areas contribute to the amount of waste in channels. This creates major problems during the rainy season, especially because of the reduction in discharge-carrying capacity,

clogging, and mechanical failures.

Overflow and flooding caused by channel clogging are a common occurrence. The point of blockage is usually a confluence, screens, gates and siphons. Flood and drainage pump failures due to garbage load happen often, not only because of total clogging due to the accumulation of garbage during a heavy storm but also because of broken propellers hit by hard materials in the garbage.

Slum area at riverbank



The community understands that it is forbidden to dispose anything into rivers. It is also generally conscious about the detrimental effects of dumping garbage directly into rivers and drainage channels. But most inhabitants of a slum community quite often have to do that simply because there is no alternative or no other practical means to get rid of the garbage out of their neighbourhood. Some other people choose that way because it is cheap and easy and there is almost no legal risk.

Pressure—State—Response

The cause factor (*Pressure*) on waste management in Tangerang City are:

- # Water treatment is still at the downstream (Final Disposal Site)
- # Lack of waste pick-up vehicles
- # Community awareness for 3R (*Reduce, Reuse and*

Recycle) is relatively low

- # Community habits by throwing waste not at the proper place.
- # Habits on using material that is hard to naturally destroy for daily activities.
- # Lack on regulations regarding solid waste treatment.
- # Lack of human resources quality and quantity
- # Unadvance waste treatment methods at Final Disposal Site (*open dumping*)
- # Socialization on waste handling for the community is still limited.
- # The presence of wild Temporary Disposal Site (*illegal dumping*) located at Tangerang City boundary area.

The above conditions cause (*impact*) on the *state* of Tangerang City:

- # Uncontrolled waste generation at several locations.
- # Environmental pollution (land, air and water)
- # The presence of odor and digestion illness.
- # Decrease of city aesthetic
- # Pollution in land and groundwater for area surrounding Final Disposal Site due to leachate infiltration; and
- # Fire generation at Final Disposal Site location due to methane gas reaction produced by organic waste from decomposition process.

Efforts already taken (*Response*) to control and overcome waste taken by the Government of Tangerang City :

- # Increase government, people representative and community awareness through socialization and campaign.
- # Composing regulation regarding solid waste management.
- # Increase institution management capability, from the human resources, equipment, cost and management aspects.

Response and Recommendation

Having many problems in solid waste, **various efforts has been done to anticipate and overcome those problems, for instance, socialization and direct furthermore to overcome the solid waste problems, an attempt to establish an integrated management of solid waste with other local governments.**

Solid waste is one of the most serious environmental problems in the world at present. Many countries, especially those in the developed world, try to promote environmental policies that solve this problem.

Examples of Household Wastes



The other recommendation here is to promote Zero Waste as the main principle and philosophy for the 21st century that deals with this serious situation. To this end the government has produced some innovative and unique recycling programs. The zero waste program that is recommended here has some principle, that principle includes not only recycling but also 'whole system' approach to the amount of resources and waste through society.

Zero Waste has five basic principles:

- (1) developing new ecological products
- (2) enforcing corporation's responsibility about waste and ecology
- (3) using tax for building new technologies and infrastructures to take the place of a landfill or incinerator
- (4) doing away with paying subsidies for wasteful and polluting industries

- (5) encouraging jobs and new businesses from wasting materials

Then, Zero Waste will be achieved when:

- (1) Public begins to think about discards as resources.
- (2) Responsibility of waste and recycling is shared by corporations. If they do not accept the responsibility, we will have to make new rules and laws to eliminate recourse wasting behavior and to reward resource conserving behavior toward corporations.
- (3) Local governments support comprehensive choice to landfills incinerators and other resource destruction technologies. It means doing away with landfills and incinerators.

Another recommendation is to ask the public to recycle their things.

Benefits of Recycling:

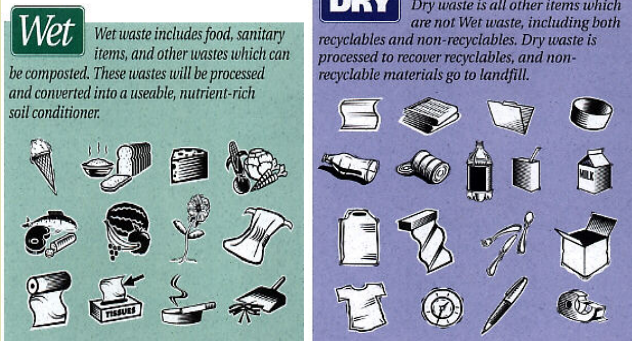
- # Conserves resources for our children's future.
- # Prevents emissions of many greenhouse gases and water pollutants.
- # Saves energy.
- # Supplies valuable raw materials to industry.
- # Creates jobs.
- # Stimulates the development of greener technologies.
- # Reduces the need for new landfills and incinerators.

Recycling turns materials that would otherwise become waste into valuable resources. In addition, it generates a host of environmental, financial, and social benefits. Materials like glass, metal, plastics, and paper are collected, separated and sent to facilities that can process them into new materials or products.

Campaign public can be done to separate garbage and rubbish, so the city can start to recycle (composting). Cooperation between planners and

NGOs and also the mass media in serving public welfare must be promoted. Certain NGOs are dedicated to specific problems, so that they have superior capability and experience in analysing those problems. NGOs and mass media also have the capability to disclose certain problems which the community themselves could not be expected to rise.

Examples of Wet Waste and Dry Waste



For Final Disposal, the recommendation is to change the method from open dumping to sanitary landfill. Open dumping is an apparently low cost waste disposal option, but only in the short term. In the medium and long-term it is costly due to inefficient land use and the remedial effort needed to make the land available for other uses. The sanitary landfill method is specifically aimed at minimizing the adverse impacts of open dumping. The next table compares open dumping and sanitary landfills.

Comparison Between Open Dumping and Sanitary Landfills

OPEN DUMPING	SANITARY LANDFILL
Formal sites are indistinguishable from illegal sites and therefore encourage indiscriminate dumping.	Control and check the amount and type of waste and prevent disposal of hazardous materials.
Waste is poorly compacted and occupies an unnecessarily large area.	Ensures the maximum compaction of disposed waste.
Provides a breeding site for vermin.	Prevents breeding of insects and vermin.
Sites give off foul odors.	Prevents foul odors.
Prone to subsidence limiting future development options.	Maintain site stability and reduce the rate of leachate generation by regular coverage with soil.
On sloping sites, dumps can become unstable and damage down-slope facilities.	Proper planning reduces impact on adjacent sites and provides for site restoration and other uses after the landfill is closed.
Lack of drainage and leachate recovery leads to contamination of groundwater.	Protect groundwater by the recovery and re-circulation/treatment of leachate.
Smoldering fires are common producing smoke and noxious fumes.	Prevent air pollution caused by rubbish fires.
Landfill gases are difficult to recover for use as fuel, cause foul odours and are potentially explosive.	Facilitate the management, possible recovery and use of landfill gases.

Existing Condition of Medical Waste Management

Medical waste is defined as "any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals." This definition includes, but is not limited to:

- # blood-soaked bandages
- # culture dishes and other glassware
- # discarded surgical gloves
- # discarded surgical instruments
- # discarded needles used to give shots or draw blood (e.g., medical sharps)
- # cultures, stocks, swabs used to inoculate cultures
- # removed body organs (e.g., tonsils, appendices, limbs)
- # discarded lancets

Regulatory definitions and management requirements for medical waste, however, vary from state to state and may include more waste streams than the federal definition.

Waste generated by hospital and other medical clinic could harm patient, employee and public community if there is no proper management (according to: PP 18/1999 jo PP 85/1999 concerning hazardous waste management and Ministry of Health Decree No:1204/Menkes/SK/X/2004 concerning Hospital and Medical Clinic Waste Management Guidelines). Some hospital have incinerators to manage their waste, yet with small capacity and inefficient design for large and various type of waste. Those incinerators commonly is not equipped with air pollution control devices such as proper chimney and gas scrubber, as a result they couldn't meet current environment quality regulations.

Examples of Medical Waste



Number of Health Facility in Tangerang Municipality, 2006

Source: Subdin Yankes Rujukan – Subdin POM Dinkes Kota Tangerang, 2006

No.	Kecamatan	Puskesmas	Puskesmas Keliling Roda 4	Jumlah Pustu	Nama Pustu	Pos Obat Desa
1	Ciledug	Tajur	1	-	-	
		Ciledug	1	-	-	
2	Larangan	Larangan Utara	1	1	Larangan Indah	
				1	Cipadu	
3	Karang Tengah	Pondok Bahar	1	1	Karang Tengah	
				1	Pedurenan	
4	Cipondoh	Cipondoh	1	1	Gondrong	
				1	Ketapang	
		Poris Plawad	-	-	-	
5	Pinang	Panungganggan	-	1	Banjar	
		Kunciran	-	-	-	
6	Tangerang	Sukasari	1	-	-	
		Tanah tinggi	1	-	-	
7	Karawaci	Karawaci Baru	1	-	-	
		Bugel	-	-	-	
		Pab. Tumpang	1	1	Nambo Jaya	
		Pasar Baru	-	-	-	
8	Cibodas	Cibodasari	-	-	-	
		Jalan Baja	-	-	-	
9	Jatiuwung	Jatiuwung	1	-	-	
10	Periuk	Periuk Jaya	1	1	Bayur	
				1	Sangiang	
		Gembor	1	-	-	
11	Neglasari	Neglasari	-	1	Selapajang	
		Kedung Wetan	-	-	-	
12	Batuceper	Batuceper	1	-	-	
		Poris Gaga	-	-	-	
13	Benda	Benda	1	1	Jurumudi Lama	
		Jurumudi Baru	-	1	Pajang	
Jumlah			14	13		

Number of Puskesmas, Puskesmas Pembantu (Pustu), Puskesmas Keliling and Pos Obat Desa in Tangerang Municipality, Year 2006

No	Health Facility	OWNERS						
		Pem. Pusat	Pem Prop.	Pem. Kota	TNI/Polri	BUMN	Private	Total
1	Rumah Sakit				1		8	9
2	RS Jiwa							
3	RSIA						6	6
4	RS Khusus	1						1
5	Puskesmas			25				25
6	Puskesmas Pembantu			13				13
7	Puskesmas Keliling			14				14
8	Posyandu			938				938
9	Polindes							
10	Rumah Bersalin						19	19
11	Balai Pengobatan/ Klinik						110	110
12	Apotik			1		2	157	160
13	Toko Obat						32	32
14	GFK			1				1
15	Industri Obat Tradisionil							
16	Industri Rumah Tangga Pangan						353	353
17	Praktek Dokter Bersama							
18	Praktek Dokter (Perorangan)						623	623
19	Praktek Dokter Gigi						174	174
20	Praktek Bidan						233	233

Source: Subdin Yankes Dasar, Dinkes Kota Tangerang, 2006

From the health facilities above, only a few which have incinerators as disposal methods (4 hospitals from 18 hospitals).

Availability of Incinerator at Hospitals in Tangerang City

No.	Hospital	Class	No. Of Beds	WWTP	Incinerator
1	HONORIS	C (Pratama)	154	Yes	Yes
2	SITANALA	C (Pratama)	220	Yes	Yes
3	RSIA AN-NISA	C (Pratama)	58	Yes	No
4	USADA INSANI	C (Pratama)	377	Yes	Yes
5	AMINAH	C (Pratama)	57	Yes	No
6	SARI ASIH	C (Pratama)	145	Yes	No
7	RSU TANGERANG	B	380	Yes	Yes
8	DAAN MOGOT	D (Tingkat IV)	31	No	No
9	RSIA MUTIARA BUNDA	C (Pratama)	24	Yes	No
10	RSIA MELATI	C (Pratama)	42	Yes	No
11	BHAKTI ASIH	C	60	Yes	No
12	SARI ASIH CILEDUG	C (Pratama)	100	Yes	No
13	RSIA KELUARGA IBU	C (Pratama)	31	Yes	No
14	RSIA MEDIKA LESTARI	C (Pratama)	36	Yes	No
15	MULYA	C (Pratama)	52	Yes	No
16	GLOBAL MEDIKA	C (Pratama)	110	Yes	No
17	RSIA SARI ASIH SANGIANG	C (Pratama)	25	Yes	No
18	RSIA DINDA	C (Pratama)	53	Yes	No

Source: Dinas Kesehatan Kota Tangerang, 2006

Response and Recommendation

From the table, we can see that there are many hospitals that simply dumped all waste streams together, from reception-area trash to operating-room waste, and burned them in incinerators. And most of them even do not have any incinerator. But the study recently found that incineration is a leading source of high toxic dioxin, mercury, lead and other dangerous air pollutants. The U.S. EPA identifies medical waste incineration as the third largest known source to the environment of highly toxic dioxin, a known carcinogen that has been linked to birth defects, immune system disorders and other harmful health effects. Incineration is also responsible for about 10 percent of mercury emissions to the environment from human activities. Mercury is a potent neurotoxin that can cause developmental defects and harm the brain, kidneys and lungs. Other pollutants from incineration include furans, acid gases, heavy metals and particulates.

Health care clinics and hospitals have to eliminate the dangerous practice of incineration, as well as to minimize the amount and toxicity of all waste generated by the health care sector. In order to fulfill the medical ethic to "first do no harm," the health care industry has a responsibility to manage waste in ways that protect the public and the environment. **The first step is waste minimization and segregation.** The infectious waste stream must then be treated to prevent the spread of disease. Minimizing waste not only protects people and the environment, but it can save facilities substantial amounts of money. **Waste minimization techniques include:**

- ## **Segregation: Separating different types of waste at the point of generation and keeping them isolated from each other.** By doing this, appropriate resource recovery and recycling techniques can be applied to each separate waste stream. The amounts of

infectious waste, hazardous waste and low-level radioactive waste that must be treated according to special (and usually costly) requirements are minimized.

- ## **Source Reduction: Minimizing or eliminating the generation of waste at the source itself** through techniques such as product substitution, technology change and good operating practices. Through purchasing and product substitution, toxicity of waste can also be reduced.
- ## **Resource Recovery and Recycling: Recovery and reuse of materials from the waste stream.** The majority of waste from health care facilities is surprisingly similar to that of an office building or hotel -- paper, cardboard and food waste. Hospitals can implement fairly simple programs that divert these materials from the solid waste stream, lowering disposal costs.

Procedure of Handling Medical Waste at Hospital



AIR POLLUTION PROBLEMS

Air pollution especially in major cities is a problem that needs to be immediately addressed. The pollution is due to increased human activities, population growth, development of science and technology, the increasing number of industries and means of transportation. Small scale activities by individuals such as burning garbage, smoking and other household activities also cause air pollution.

The table below is a summarization of the sources, health and welfare effects for the Criteria Pollutants.

Sources, Health and Welfare Effects for Criteria Pollutants

Pollutant	Description	Sources	Health Effects	Welfare Effects
Carbon Monoxide (CO)	Colorless, odorless gas	Motor vehicle exhaust, indoor sources include kerosene or wood burning stoves.	Headaches reduced mental alertness, heart attack, cardiovascular diseases, impaired fetal development, and death.	Contribute to the formation of smog.
Sulfur Dioxide (SO ₂)	Colorless gas that dissolves in water vapor to form acid, and interact with other gases and particles in the air.	Coal-fired power plants, petroleum refineries, manufacture of sulfuric acid and smelting of ores containing sulfur.	Eye irritation, wheezing, chest tightness, shortness of breath, lung damage.	Contribute to the formation of acid rain, visibility impairment, plant and water damage, aesthetic damage.
Nitrogen Dioxide (NO ₂)	Reddish brown, highly reactive gas.	Motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels.	Susceptibility to respiratory infections, irritation of the lung and respiratory symptoms (e.g., cough, chest pain, difficulty breathing).	Contribute to the formation of smog, acid rain, water quality deterioration, global warming, and visibility impairment.
Ozone (O ₃)	Gaseous pollutant when it is formed in the troposphere.	Vehicle exhaust and certain other fumes. Formed from other air pollutants in the presence of sunlight.	Eye and throat irritation, coughing, respiratory tract problems, asthma, lung damage.	Plant and ecosystem damage.
Lead (Pb)	Metallic element	Metal refineries, lead smelters, battery manufacturers, iron and steel producers.	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ.	Affects animals and plants, affects aquatic ecosystems.
Particulate Matter (PM)	Very small particles of soot, dust, or other matter, including tiny droplets of liquids.	Diesel engines, power plants, industries, windblown dust, wood stoves.	Eye irritation, asthma, bronchitis, lung damage, cancer, heavy metal poisoning, cardiovascular effects.	Visibility impairment, atmospheric deposition, aesthetic damage.

Air pollution in Tangerang Municipality is already in unhealthy condition. The contribution is contributed by vehicle emission, industrial emission and the rest comes from other combustion sources, such as household, waste combustion and others. Although one of the reasons of the high temperature increase was sun position, which was coming close to the earth, and long dry season, nevertheless this condition was getting worse by the number of pollutants, both origins from vehicles emission and factories smokestack.

In previous years, it was indicated that diesel and gasoline vehicles fuel did not meet the mobile source emission standard quality. This condition makes Tangerang City with high vehicle density, had unhealthy condition.

For the year 2007, on May, there were 39 locations monitored, i.e.:

1. Kecamatan Periuk Office
2. Kelurahan Periuk Office
3. Sangiang Gasoline Station
4. Kecamatan Jatiuwung Office
5. Manis industrial Zone
6. Kelurahan Pasirjaya Office
7. Kecamatan Cibodas Office
8. Simpang Tiga Pinangsia Junction
9. Malabar Market
10. Kecamatan Karawaci Office
11. Terminal Cimone
12. Simpang Tiga Gd. Cisadane Junction
13. Puspem Building Tangerang City
14. Fly Over Cikokol
15. Simpang Tiga Robinson Junction
16. Kecamatan Batucapeper Office
17. Tatung Bridge
18. Tiga Kebon Besar Junction
19. Kecamatan Cipondoh Office
20. Terminal Poris Pelawad
21. Kelurahan Petir Office
22. Kecamatan Pinang Office

23. Pasar Bengkong Junction
24. Kelurahan Panunggangan Office
25. Kecamatan Ciledug Office
26. Kelurahan Parung Serab Office
27. Mencong Road Junction
28. Kecamatan Karang Tengah Office
29. Ciledug Indah – Hasyim Ashari Junction
30. Ruko BPI
31. Kecamatan Larangan Office
32. Batas Tangerang – DKI
33. Puri Beta Housing Estate
34. Kecamatan Neglasari Office
35. PAP II Housing Estate
36. KORPRI Housing Estate
37. Kecamatan Benda Office
38. Kelurahan Benda Office
39. Duta Garden Market

All of 39 locations which monitored in May 2007, level of carbon monoxide is above the national standard (10 µg/Nm³). This is mainly due to un-improvements in motor vehicle engine design and lack of addition of catalytic emission controls.

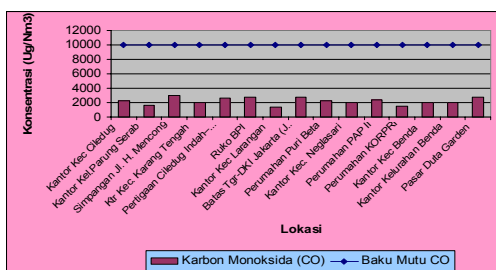
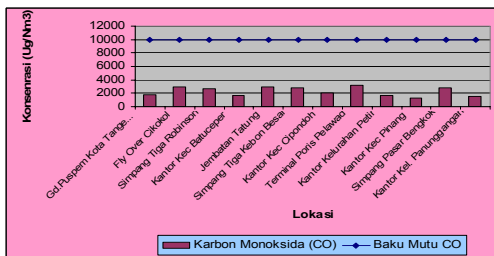
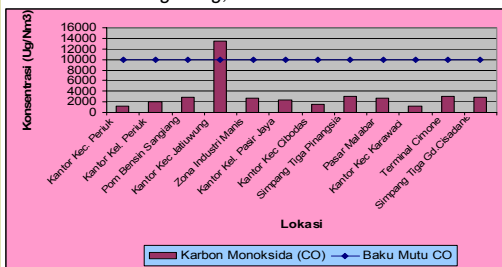
Sulfur Dioxide

In the metropolitan area sulphur dioxide (SO₂) is monitored at bus station (terminal) which was a primary source of this air pollutant. There is no overlimit of the National Standard. Monitoring is also commenced at junctions in metropolitan area, with no overlimit of the standard detected.

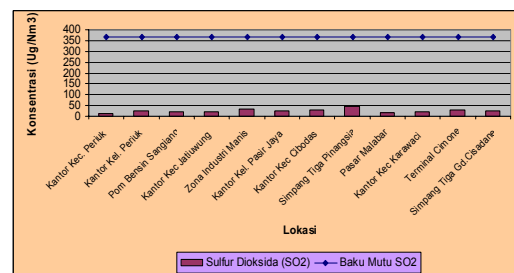
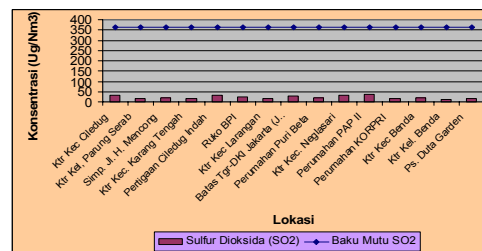
The results of the first six months of monitoring in 2007 are provided in Figure 4.6 below. During this time there have been no overlimit of the National SO₂ standard. However, several asthma studies undertaken to date in Tangerang Municipality have not demonstrated a relationship between these emissions and health.

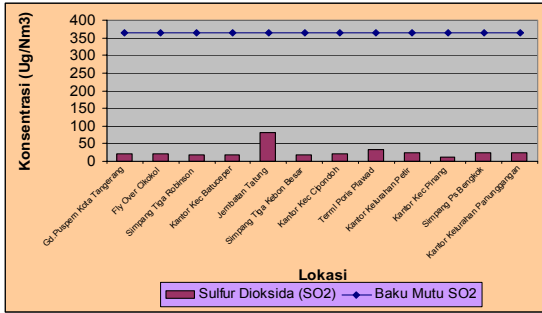
Carbon Monoxide

Carbon Monoxide Monitoring Results - Source: DLH Kota Tangerang, 2007



SO₂ Monitoring Results



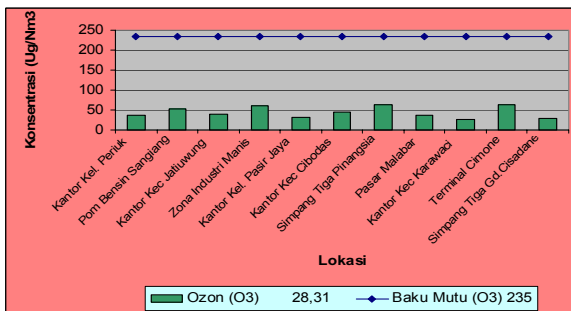


Source: DLH Kota Tangerang, 2007

Ozone is monitored at a variety of locations throughout the Tangerang airshed, but no overlimit of National standards have been recorded for many years. Formation of ozone is dependent on strong sunlight to promote the chemical reactions between nitrogen oxides and hydrocarbons released into the air and thus is more prevalent during long hot summers.

Monitoring for ozone commenced in May in 2007; no overlimit was recorded.

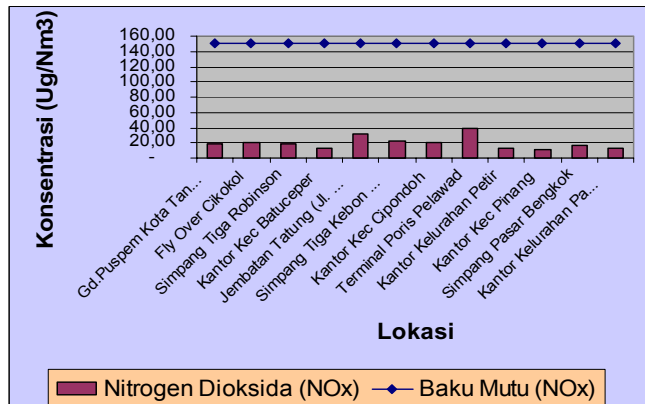
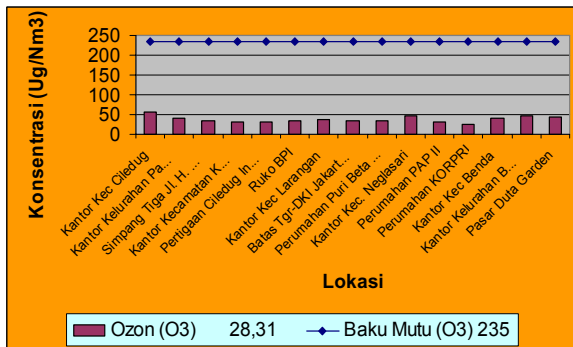
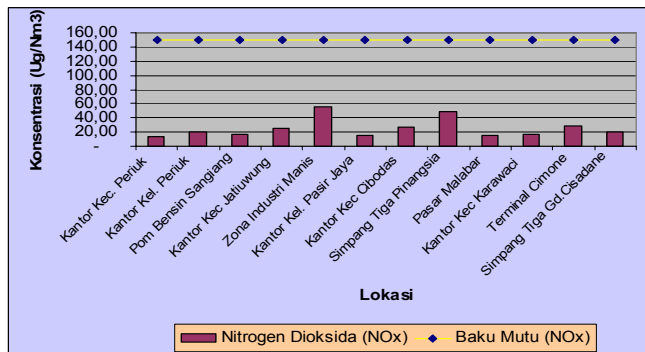
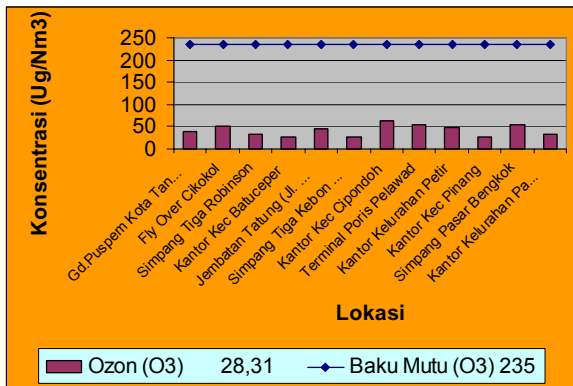
Ground Level Ozone



Nitrogen Dioxide

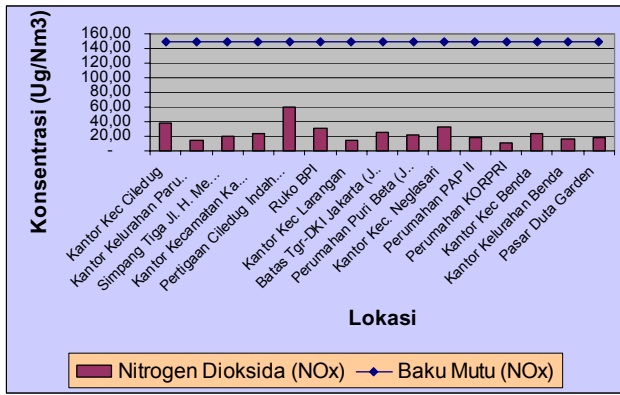
Nitrogen dioxide levels in the air are recorded at a variety of locations in the Tangerang airshed, but no overlimit of the National Standards have been recorded since many years and average concentrations are well within the guidelines. Nitrogen dioxide monitoring also commenced in May in 2007, but no overlimit were recorded.

Nitrogen Monitoring Results



Ozone Monitoring Results

Source: DLH Kota Tangerang, 2007

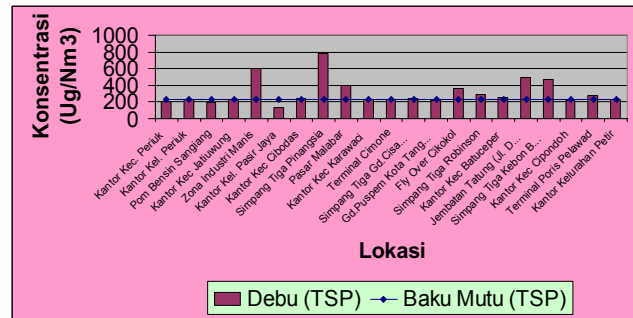
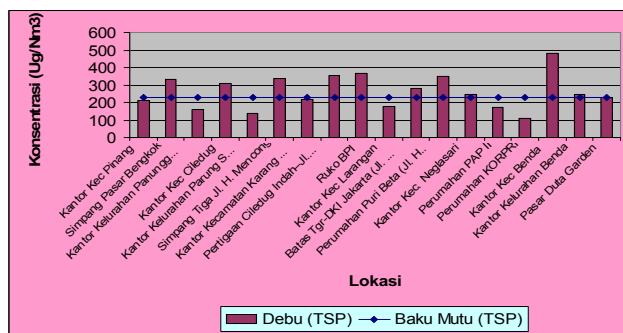


Source: DLH Kota Tangerang, 2007

Particulate Matter (Airborne Dust)

Particulate matter is monitored in the Tangerang metropolitan area, industrial estate and highway. Particulate matter generally refers to airborne dust or solids. Some industrial processes can create dust as a consequence of processing raw materials. Dust storms and bush fires can also result in high levels of particulates. This dust has been implicated in a range of health problems, particularly respiratory and cardiovascular difficulties. PM10 refers to particles that are less than 10 micrometers (one thousandth of a millimeter) in diameter. Total Suspended Particulates (TSP) refers to slightly larger particles with a diameter less than 50 micrometers. The TSP level recorded in Industrial zone and some highway zone exceed the National Standards.

Particulate Matter Monitoring Results



Source: DLH Kota Tangerang, 2007

In Tangerang, there are several industries that have potential to contaminate the quality of air:

Contamination of Production Process

- a. Industrial of Accu Car (2 Industry)
- b. Industrial of Metal (1 Industry)
- c. Industrial of Copper (2 Industry)
- d. Industrial of Moulding of Steel Forge (1 Industry)

Contamination of Industrial Utility :

- a. Industry Paper (10 Industry)
- b. Textile Industry (14 industry)

Beside ambient air measurement, emission test for vehicle and ambient air quality on the highway has been done in Tangerang Municipality. The latest result of vehicle emission monitoring conducted by DLH Tangerang Municipality (year 2005) showed that more than 51 % vehicles with gasoline and diesel fuel do not meet Standard Quality of Mobile Source Emission (Ministry of Environment Decree No 13/1995).

Air pollution is usually invisible; its impact can not be felt immediately and arise slowly. For example, air pollution caused by Pb (lead), that the lead particle could be inhaled into respiratory system and accumulated in the human body. Even to the children could cause degradation of intelligence level.

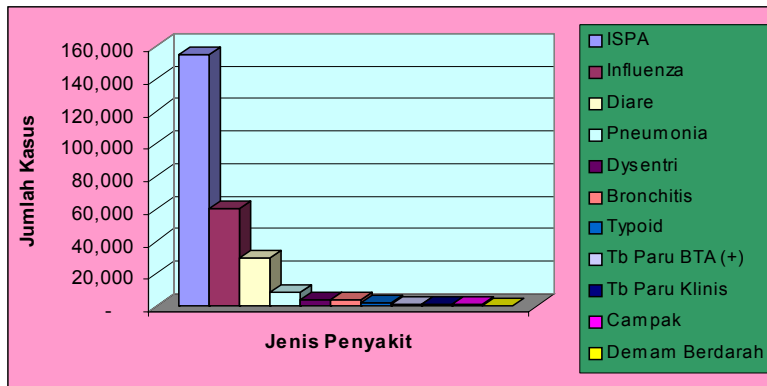
In the year 2006 there is 11 contagion perceived in Town of Tangerang and noted about 155.397 cases

respiratory diseases which emerge compared to highest of other contagion and occupy first rank in 10 of big disease case that happened in Town of Tangerang,

Scene of Air Pollution during Traffic



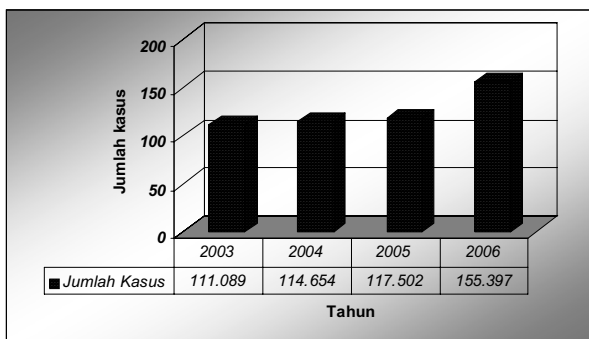
Contagious Cases in Tangerang City year 2006



Source: Dinas Kesehatan Kota Tangerang, 2006

Data from Dinas Kesehatan Kota Tangerang shows that in year 2006 sum of case of respiratory diseases increased when compared with the year before.

Cases of Respiratory Diseases Year 2003 – 2006



Source: Dinas Kesehatan Kota Tangerang, tahun 2006

Tangerang Municipality already had air monitoring equipment since year 1996 from JICA – Japan with cooperation with PUSARPEDAL-BAPEDAL. The location of the station is at Cikokol. The capability of this equipment is to measure concentration of CO, SOx and NOx, and Oxidant.

The Station performance have several times problem for example damage of measurement for O₃, the difficulty to get graph paper as marker of concentration in Indonesia, condensation ending of reagent, and lack of conservancy fund budgeted by Government Of Town of Tangerang. But since 2004 up to now the condition is gradually improved by enhancing equipments of meteorology (wind direction grader, speed of wind, temperature, dampness, and rainfall), even in the year 2005 attached a logger data system in the form of computer software so it isn't use graph paper anymore. Data result of record-keeping kept [in a server which is taken by its once a week. Some innovation planned to do development of Station Watcher of Ambient Air, for example by striving data communications result of record-keeping use system of real time.

The monitoring range in 2007 between 1 and 31 January can be seen at the table below.

Ambient Air Quality Monitoring Results around Cikokol Air Station Periode of 1 – 31 January 2007

DATE	CO		NO ₂		SO ₂	
	ug/m ³	NAB	ug/m ³	NAB	ug/m ³	NAB
1-Jan-2007	102	10000	0	150	7	365
2-Jan-2007	76	10000	0	150	7	365
3-Jan-2007	94	10000	39	150	9	365
12-Jan-2007	57	10000	28	150	18	365
13-Jan-2007	89	10000	24	150	14	365
14-Jan-2007	133	10000	26	150	10	365
15-Jan-2007	136	10000	30	150	17	365
16-Jan-2007	101	10000	32	150	20	365
17-Jan-2007	90	10000	36	150	84	365
18-Jan-2007	78	10000	50	150	15	365
19-Jan-2007	111	10000	55	150	25	365
20-Jan-2007	82	10000	53	150	32	365
21-Jan-2007	128	10000	40	150	15	365
22-Jan-2007	98	10000	40	150	29	365
23-Jan-2007	94	10000	36	150	43	365
24-Jan-2007	92	10000	41	150	24	365
25-Jan-2007	171	10000	29	150	35	365
26-Jan-2007	116	10000	40	150	43	365
27-Jan-2007	119	10000	61	150	107	365
28-Jan-2007	104	10000	58	150	22	365
29-Jan-2007	65	10000	55	150	19	365
30-Jan-2007	86	10000	119	150	30	365
31-Jan-2007	91	10000	63	150	27	365

Source : Dinas Lingkungan Hidup, Kota Tangerang, 2007

Air Pollution Standard Index

Category	Range	Description
Good	0-50	Air quality level does not affect human or animal health and does not affect plants, buildings nor esthetic values
Moderate	51-100	Air quality level does not affect human or animal health, but affect sensitive plants and esthetic values
Unhealthy	101-199	Air quality level that is hazardous to humans or sensitive animals or can damage plants, buildings nor esthetic values
Very unhealthy	200-299	Air quality level that is hazardous to the health of exposed segment of the population
Dangerous	≥ 300	Dangerous air quality level, which generally poses serious health hazard on the population

Source : Minister of Environment Decree No. 45/1997 on Air Pollution Standard Index

Another thing that can cause air pollution is the number of vehicle in Tangerang city.

In the table below we see that the number of vehicles at Tangerang city rises year to year.

Number of Vehicle in Tangerang Municipality Year 2002 - 2005

No.	Types of Vehicles	Type: Public Non-Public	Year			
			2002	2003	2004	2005
1	Sedan, Jeep and similar type	Public	1.246	1.327	2.216	2.345
		Non-Public	17.178	11.679	13.820	22.942
2	Minibus, Station Wagon and similar type	Public	7.639	6.073	4.626	4.731
		Non-Public	26.815	20.134	30.354	42.317
3	Bus, Microbus and similar type	Public	324	315	288	443
		Non-Public	835	657	588	823
4	Truck, Pickup (Load)	Public	149	100	45	37
		Non-Public	12.742	11.230	13.177	17.537
5	Motorcycle	Public	144.132	151.813	207.709	283.306
		Non-Public	9.358	7.815	7.175	7.556
4 Wheels or more		Public	57.570	43.700	57.939	83.619
		Non-Public	144.132	151.813	207.709	283.306
2 Wheels or more		Public	9.358	7.815	7.175	7.556
		Non-Public	201.702	195.513	265.648	366.925
Total Vehicles			211.060	203.328	272.823	374.481

Source: Dishub Kota Tangerang year 2006

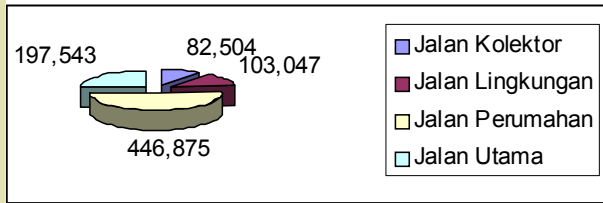
Transportation Infrastructure Condition

One of the important infrastructures supporting economic activities is the availability of road transportation. Improvement in all aspects of economic development requires more improvement in transportation, especially in road development. This development is intended to facilitate population mobility and distributive trade from one region to another region.

The length of roads in Tangerang Municipality at the

end of year 2004 was 829.969 km.

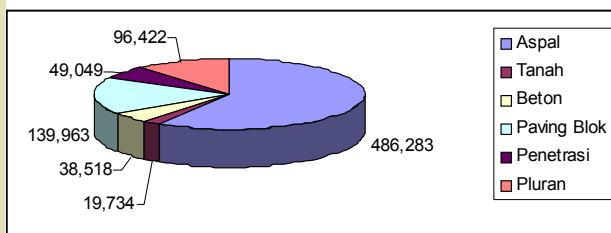
Road Length Data in Tangerang City



Source : Dinas PU, Tangerang City, 2004

According to type of road surface, 486.283 km or 58 percent is asphalted. Overall, the quality of road slightly increased compared to last year

Road According to Type of Surface, Tangerang City



Source : Dinas PU, Tangerang City, 2004

Pressure—State—Response

The cause factor (*Pressure*) on air pollution are:

- # Increase of motor vehicles
- # Decrease of Green Open Area due to land conversion
- # There are still industries that discharge their pollutant through chimney stacks without prior treatment.

The above conditons cause *Impact* toward the *State* of Tangerang City in the form of air quality decrease.

Efforts already taken (*Response*) to control and overcome air pollution taken by the Government of Tangerang City are:

1. Installation of pollution control (*end of pipe treatment*), whereas the pollutant will not be discharged but collected, for example using *cyclone, scrubber, filter (baghouse filter, cartridge filter)*.
2. Waste recycling, using waste caught by air pollution control equipment to be used in self process or other industrial process.
3. Waste prevention, exampels leak plugging, waste piling control or reuse of product container.
4. Implement periodical vehicle control and maintenance, especially for those using red and yellow plates and tighten KIR procedure.

STEPS TO HANDLE AIR PROBLEMS

Efforts to handle air control is meant to decrease the amount of air pollution from source. The activities already taken are:

1. Implement Blue Sky Program (Program Langit Biru) and Proper.
2. Installation of pollution control equipment (called *end of pipe treatment*), whereas the pollutant will not be discharged but collected, for example using *cyclone, scrubber, filter bag or electrostatic precipitator*.
3. Waste recycling, using waste caught by air pollution control equipment to be used in self process or other industrial process.
4. Waste prevention, exampels leak plugging, waste piling control or reuse of product container.
5. Increase community participation in pollution control.
6. Implement periodical vehicle control and maintenance, especially for those using red and yellow plates and tighten KIR procedure.

Response and Recommendation

In the metropolitan region, such as Tangerang city, any decisions on major policies are likely to have a direct impact on land use and air quality.

The evaluation of different packages of infrastructure policies (such as higher fuel taxes and parking fees, area traffic restraint schemes – like three-in-one areas -- and integrated multimodal fares) were crucial to arriving at an integrated urban transportation, land use and air quality strategy. Furthermore, decision-makers know that while the interlinking of the rail-based network would attract bus and auto users, thereby reducing road congestion, it is necessary to ensure that the rail stations are accessible through a combination of infrastructure which includes not only roadways for private cars but also motorcycle ways and safe walkways.

Indeed, the role of non-motorized transport cannot be underestimated since high percentages of all trips in Tangerang city are made on foot, and there is a high accident rate among pedestrians. **Decisions to use quieter and cleaner vehicles have a direct impact on noise and air quality. Likewise, decisions to enforce the inspection and maintenance of road vehicles (such as KIR regulation) are likely to impact the air quality of the Tangerang city area.**

Measures to discourage private car and motorcycle use and encourage the use of public transport are essential to reducing traffic congestion and controlling urban sprawl.

The objective should be as soon as possible to **make public transportation attractive not only to lower-income classes but also to middle and upper-income users**, who are the main users of the automobile.

Appropriate design of roads, intersections and traffic controls can eliminate bottlenecks,

accommodate public transportation and smooth traffic flow at moderate costs.

Some new toll roads, flyovers and underpasses, carefully targeted to relieve bottlenecks and accommodate public transportation, are probably essential, but should be developed only as part of an integrated plan. Planning should encourage urban forms which minimize transportation needs, encourage non-motorized transportation (cycling, walking) and allow for efficient public transportation service. Land-use will determine the most adequate urban transportation mode.

These can dramatically reduce air pollution, noise and other environmental impacts of road transportation. **The strategy should also provide for continuous updating and monitoring of effectiveness, by means of an ongoing process of vehicle emissions and traffic measurement, updating of emissions inventory, and transportation and air quality modeling.**

An integrated program, incorporating all of these elements, will be required to achieve the long-term goals set by the government. For example, building new roads, flyovers and underpasses in the absence of measures to limit transportation demand and improve traffic flow may simply result in more roads full of traffic jams.

Disincentives to the continued growth of automobile use in the city such as the introduction of congestion pricing and other demand management measures, will require a parallel improvement in public transportation service. Since road transportation is a major source of pollution, all proposed transportation policies should be evaluated based on their contribution to reduction of noise, air pollution and accidents as well as moving people.

Noise Pollution Issues

Noise Pollution generally refers to unwanted sound produced by human activities—unwanted in that it interferes with communication, work, rest, recreation, or sleep. Unlike other forms of pollution, such as air, water, and hazardous materials, noise does not remain long in the environment. However, while its effects are immediate in terms of annoyance, they are cumulative in terms of temporary or permanent hearing loss. Society has attempted to regulate noise since the early days of the Romans, who by decree prohibited the movement of chariots in the streets at night.

Charged with developing national noise-emission standards, identifying major sources of noise, and determining appropriate noise levels that would not infringe on public health and welfare, the Ministry of Environment produced its so-called Noise Level Standard, now the standard reference in the field of environmental noise assessment (Ministry of Environment Decree No. 48 year 1996). In the document, the MOE established an equivalent sound level as measure and descriptors for noise exposure. Soon thereafter, Tangerang City adopted the standard, including levels compatible with different land uses.

Aircraft noise

Studies on the effects of chronic exposure to aircraft noise on children have found:

- # consistent evidence that noise exposure harms cognitive performance;
- # consistent association with impaired wellbeing and motivation, but to a slightly more limited extent;
- # moderate evidence of effects on blood pressure and catecholamine hormone secretion (adrenaline and non-adrenaline); and

little evidence of effects on child mental health, cortisol secretion and sleep disturbance.

Because aircraft noise is a specific type, how it affects human beings deserves separate exploration. The highest numbers of complaints of sleep disturbance and annoyance come from people living around airports. Several measures are being studied in European countries to reduce exposure through housing insulation programs and the regulation of flights schedules and routes. There is relationship between aircraft noise and children, as Linear exposure-effect associations were found between chronic aircraft noise exposure and impairment of reading comprehension and recognition memory.

The noise condition at Tangerang airport can be seen at table below.

Noise Degree at Residential Area Around Soekarno-Hatta Airport May 2007

NO	LOCATION	UNIT	STAND ARD	RESULT *)	COORDINATE	
					SL	EL
Kecamatan Batuaceper						
1	Kantor Kecamatan Batuaceper	dB(A)	65	79,4	06° 19' 45,1"	106° 39' 46,0"
2	Kantor Kelurahan Batusari	dB(A)	65	68,9	06° 09' 13,8"	106° 39' 23,5"
3	Pesantren Yayasan Al-Shidiqiyah 2	dB(A)	65	75,3	06° 13' 31,5"	106° 42' 12,9"
Kecamatan Neglasari						
4	Kantor Kelurahan Kedaung Baru	dB(A)	65	90,7	06° 07' 41,8"	106° 37' 15,5"
5	Kantor Kelurahan Kedaung Wetan	dB(A)	65	89,2	06° 07' 32,0"	106° 37' 32,0"
6	Kampung Sukatani	dB(A)	65	90,5	06° 08' 56,7"	106° 37' 22,0"
7	Perumahan KORPRI	dB(A)	65	66,6	06° 08' 11,7"	106° 37' 22,0"
8	Kantor Kelurahan Selapanjang	dB(A)	65	96,6	06° 08' 02,4"	106° 40' 16,9"
Kecamatan Benda						
9	Kantor Kecamatan Benda	dB(A)	65	81,4	06° 07' 10,2"	106° 41' 17,7"
10	Kantor Kelurahan Benda	dB(A)	65	80,8	06° 06' 50,8"	106° 41' 17,5"
11	Gang Kemandoran	dB(A)	65	76,5	06° 07' 23,1"	106° 41' 13,9"
12	Kantor Kelurahan Panjang	dB(A)	65	91,0	06° 08' 02,4"	106° 40' 16,9"
<p><u>Note :</u> *) = Noise degree is equivalent for 10 minutes measurement with 5 second interval. • KEP. 48/MENLH/XI/1996 Annex I, Noise Degree Standard 1. Government and Public Facility = 60 dB(A) 2. Office and Commercial = 65 dB(A) 3. Residential = 55 dB(A) 4. Commercial = 70 dB(A) 5. Open Space = 50 dB(A) 6. Recreation = 70 dB(A) 7. Industry = 70 dB(A)</p>						

Aircraft as Source of Noise PollutionResponse and Recommendation**Noise mitigation**

Noise mitigation is a set of strategies to reduce unwanted environmental sound. The main topics of noise mitigation (alternatively known as **noise abatement**) are: transportation noise control, architectural design, and occupational noise control. Roadway noise and aircraft noise are the most pervasive sources of environmental noise worldwide, and remarkably little change has been effected in source control in these areas since invention of the original vehicles.

Roadway Noise Mitigation

Source control in roadway noise has provided little reduction in vehicle noise. (Highway noise is little affected by automobile type, since those effects are aerodynamic and tyre noise related.) **The most fertile area for roadway noise mitigation is in urban planning decisions, roadway design, noise barrier design, speed control, surface pavement selection and truck restrictions.** Speed control is effective since the lowest sound emissions arise from vehicles moving smoothly at 30 to 60 kilometres per hour. Above that range sound emissions double with each five miles per hour of speed. At the lowest speeds, braking and (engine) acceleration noise dominates. Selection of surface pavement can make a difference of a factor of two in sound levels, for the speed regime above 30 kilometres per hour. Quieter pavements are porous with a negative surface texture and use medium to small aggregates; the loudest pavements

have a transversely tined/grooved surface, and/or a positive surface texture and use larger aggregates. Obviously surface friction and roadway safety are important considerations as well for pavement decisions.

Noise barriers can be applicable for existing or planned surface transportation projects. They are probably the single most effective weapon in retrofitting an existing roadway, and commonly can reduce adjacent land use sound levels by ten decibels. A computer model is required to design the barrier since terrain, micrometeorology and other locale specific factors make the endeavor a very complex undertaking. For example, a roadway in cut or strong prevailing winds can produce a setting where atmospheric sound propagation is unfavorable to any noise barrier.

Aircraft Noise Abatement

As in the case of roadway noise, surprisingly little progress has been made in source quieting of aircraft noise, other than elimination of gratuitously loud engine designs from the 1960s and earlier. Because of its velocity and volume, jet turbine engine exhaust defies any simple means of quieting. **The most promising forms of aircraft noise abatement is through land planning, flight operations restrictions and residential soundproofing.** Flight restrictions can take the form of preferred runway use; departure flight path and slope; and time of day restrictions. These tactics are sometimes controversial since they can impact aircraft safety, flying convenience and airline economics. The simplest form of residential soundproofing is building natural barriers around the airport area. While the most expensive method is by providing noise insulation for each household located at a certain radius from the airport

WATER RESOURCES PROBLEMS

Water is an important element for the survival of human life. Therefore its quality and quantity is a major concern in environmental development.

Surface Water

The potential of surface water in Tangerang City are from rivers, lake (situ) which are grouped into drainage basin. In Tangerang City, there are three drainage basin, i.e : DAS Cisadane (River of Cisadane and Outlet of Mookervart), DAS Cirarab, and DAS Angke. DAS Cisadane has 19 watercourses and rivers, DAS Cirarab has 4 watercourses and rivers, DAS Angke has 6 watercourses and rivers, and also Mookervart Outlet DAS Cisadane have 18 watercourses and rivers. (Subdin Pengairan, Dinas PU Kota Tangerang, 2007)

Angke Drainage Basin



Cirarab Drainage Basin

Cisadane Drainage Basin



In line with the growth of resident with all of its activities, which affected the town physical growth, the quantity of clean of water required in Town of Tangerang is increasing. On the other side, contamination of watercourse and river as consequence of growth also occurred. This phenomenon can be clearly seen at Cisadane river.

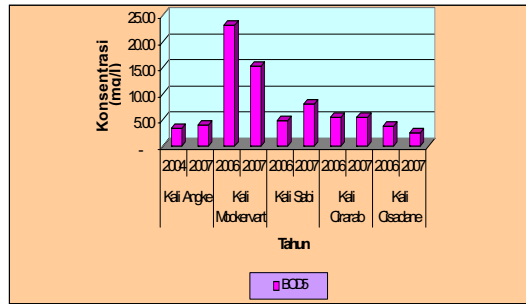
Classification of Water Quality

According to GR 82/2001 water is classified into:

- Class I water used as raw water for drinking, or other uses with similar quality requirements
- Class II water used for recreation, fishery, life stock and irrigation, or other uses with similar quality requirements.
- Class III water used for fishery, life stock and irrigation, or other uses with similar quality requirements
- Class IV water used for irrigation or other uses with similar quality requirements

From water quantity and quality, Cisadane River fulfills standard quality of class I or can function as source of raw water for clean water for Tangerang city. On the other side, Cisadane River becomes the disposal site of domestic and industrial liquid waste.

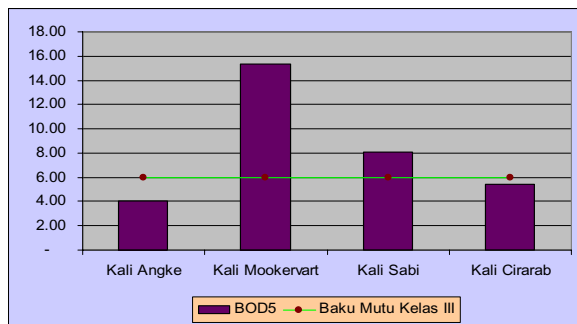
BOD Concentration of Each River at Tangerang City



Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

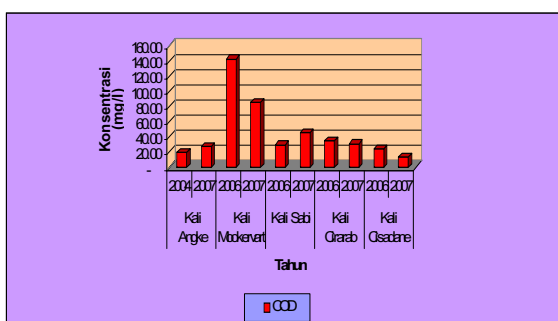
For BOD concentration at Kali Angke, Kali Sabi and Kali Cirarab, the condition increase if compared with the year before (2006), for Kali Mookervart and Kali Cisadane it decreases. Concentration of BOD year 2007 in Cisadane river is 2,3 mg/l, that means it's already above the standard level for class 1 (2 mg/l).

BOD Concentration of Angke River, Mookervart River, Cirarab River and Sabi River Compared to Class 2 Standard



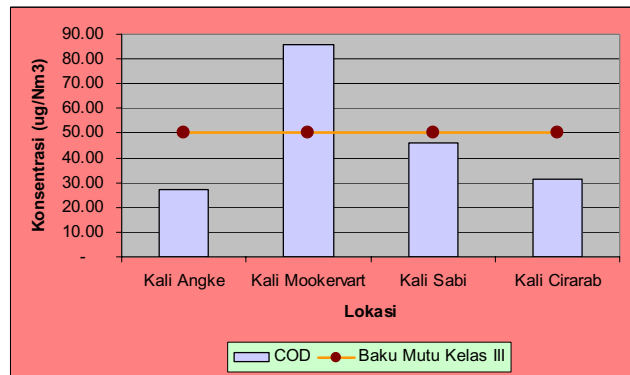
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

COD Concentration of Each River at Tangerang City



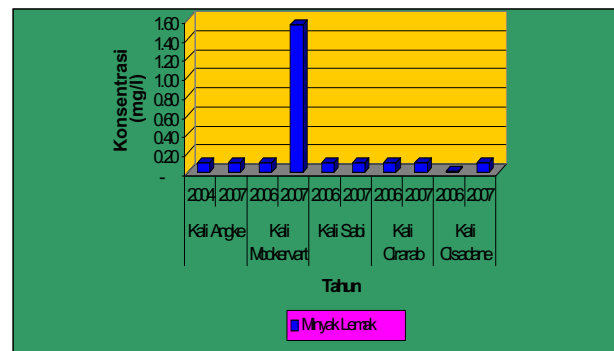
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

COD Concentration of Angke River, Mookervart River, Cirarab River and Sabi River Compared to Class 2 Standard



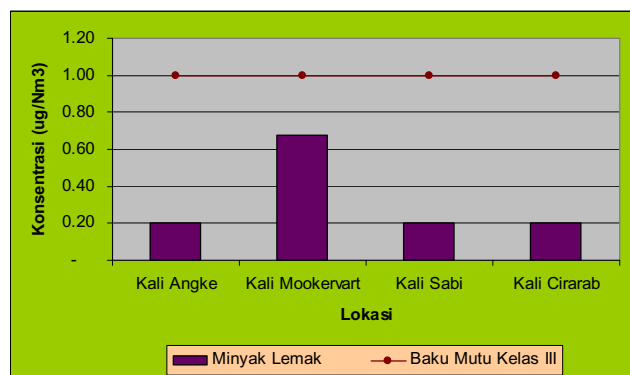
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Oil and Grease Concentration of Each River at Tangerang City



Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Oil and Grease Concentration of Mookervart River, Cirarab River and Sabi River Compared to Class 2 Standard



Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Coliform Amount in Kali Cisadane

NO	PARAMETER	SATUAN	BAKU *) MUTU	Kali Cisadane
1	Fecal Cdiform	MPN/100ml	100	56,320
2	Total Coliform	MPN/100ml	1000	56,320

Source : Dinas Lingkungan Hidup Kota Tangerang, 2007



Situ Cipondoh, 2007

Amount of Coliform in Kali Mookervart, Kali Sabi and Kali Cirarab

Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

NO	PARAMETER	SATUAN	BAKU *) MUTU	Kali Mookervart	Kali Sabi	Kali Cirarab
1	Fecal Cdiform	MPN/100ml	1000	240,000	182,325	113,717
2	Total Coliform	MPN/100ml	5000	240,000	182,325	113,717

Situ Cangkring

Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

The present condition of Situ Cangkring tends to experience deterioration especially because of *eceng gondok* plants which fulfill water level of Situ Cangkring! From the sampling conducted on June 2007, TDS, pH, Fe, Mn, BOD, COD level and Coliform amount exceed the National standard for Class 2.

Cisadane River as Raw Water for Industry at Tangerang City

Situ Cangkring



Sumber : Dinas Lingkungan Hidup Kota Tangerang, 2007

Condition of Situ at Tangerang City

Situ Cipondoh

Besides the rivers, there are situ (lakes) at Tangerang city. Situ Cipondoh is located in District of Cipondoh with an area of around 126,2 Acres. There is some part of Situ Cipondoh that is naturally used for the wet farm agricultural activity, so it needed tighter control in order not to change function. During this time, Situ Cipondoh functions as flood control, irrigation, standard cistern and recreation. From the sampling conducted on June 2007, COD level, TDS and Coliform amount has not exceed the National standard for Class 2.

Situ Gede

From the sampling conducted on June 2007, COD level, TDS, Zn and Coliform amount has not exceed the National standard for Class 2.

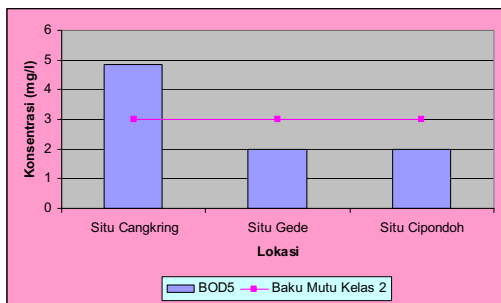
Besides the three situs, there are 8 situs at

Tangerang City. But the area of the situ is decreasing from 195.8 Ha to 136.4 Ha (year 2002). And the capacity is also decreasing from 3,260,000 m³ to 1,304,000 m³ (source : DG Spatial Planning, 2002).

Tangerang City has important roles in West Java. Economic and human growth in Tangerang city for the last couple of years have increased rapidly, therefore Tangerang city has to develop its infrastructure according to the city planning. Tangerang city development and its function as a tourism, educational and also as Jakarta's buffer cities attract people to migrate. One of the results is domestic wastewater becoming larger in quantity. Waste water flow resulting from this area quite large, and is resulted from citizen and city facility waste. Most of this wastewater is treated with on-site system and discharged into the river. Because of the limited area for on-site treatment, then an off-site wastewater sewerage and treatment system would be the best option to handle the domestic wastewater for this area.

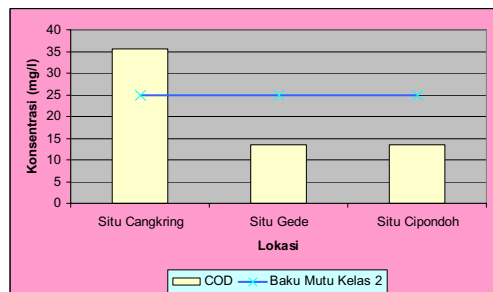
The parameter condition of each situ can be seen at the tables below.

BOD Concentration of Each Situ in Tangerang City, Year 2007



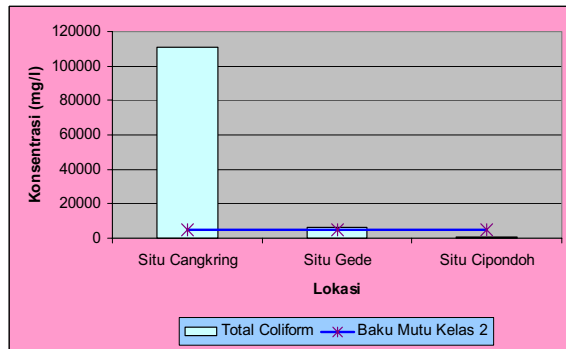
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

COD Concentration of Each Situ in Tangerang City, Year 2007



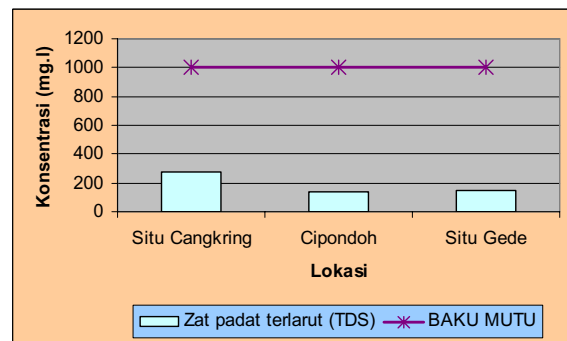
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Coli Amount of Each Situ in Tangerang City, Year 2007



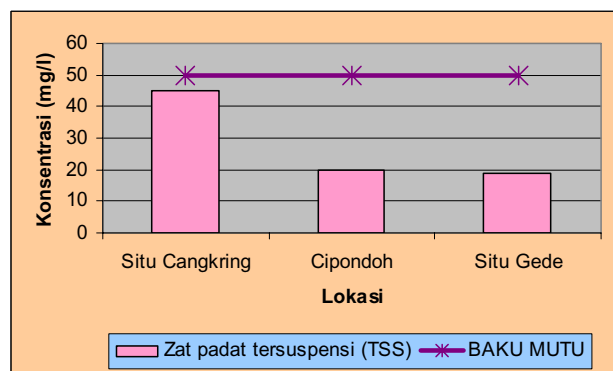
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

TDS Concentration of Each Situ in Tangerang City, Year 2007



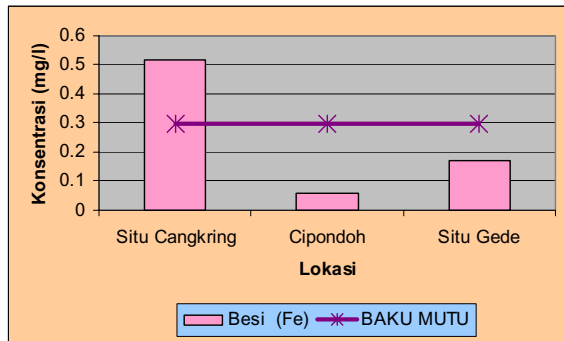
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

TSS Concentration of Each Situ in Tangerang City, Year 2007



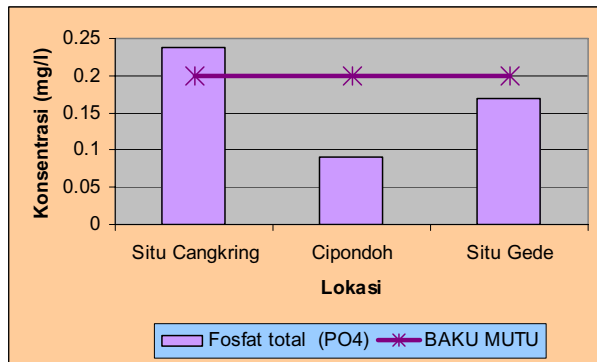
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Fe Concentration of Each SITU in Tangerang City, Year 2007



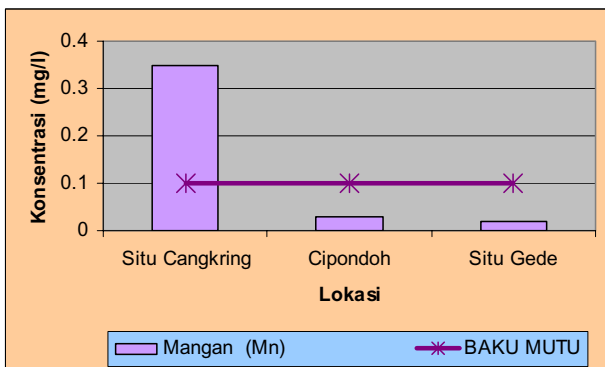
Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

PO₄ Concentration of Each SITU in Tangerang City, Year 2007



Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Mn Concentration of Each SITU in Tangerang City, Year 2007



Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

There are some types of industry that can produce chemical wastewater.

Types of Industry and Their Potential Wastes.

Industry	Chemicals generate pollution
1. Fertilizer industry	Ammonia
2. Food & beverage industry	Caustic soda, amylum, organic substance/chemicals
3. Chemical/drug industry	organic salts, inorganic salts calcium nitrate
4. Sugar industry soda	Organic substance, CaO, H ₂ S, Hypochlorite and caustic
5. Textile industry	Organic and inorganic substance, coloring substances
6. Wood industry	Phenol, Pb, cellulose, BMC
7. Galvanizing industry	Heavy metal (Hg, Zn, and Cr)
8. Paper industry	Phenol, Sulphite, heavy metal organic substance containing hemicellulose and lignite
9. Tapioca industry	H ₂ S, Phosphate, ammonia, metanol Co ₂ , and HCN
10. Petrochemical industry	Ammonium sulphate
11. Detergent industry	Sulfuric acid
12. Mining industry	Al, Pb, Bauxit
13. Oil refinery industry	Phenol, Pb salt, acid
14. Heavy metal industry	Hg, Pb, Cd, Cr and Zn

Some of them can endanger fisheries if it's thrown away without treatment to the river.

Level of Some Industrial Wastes Which Endangers Fish Kept in Netcages.

Chemicals which generate pollution	Source/cause of pollution	Details
1. Chlorine, alkali lignin and sulphite	Wood industrial wastes	Doses of 0.2 ppm endanger fish
2. Sulfuric (H ₂ SO ₄)	Wastes from the detergent industry and from household	Doses of 1.0 ppm poison fish
3. Ammonium sulphate	petrochemical industrial wastes	Doses of 1.5 ppm lethal to fish
4. Alkaline	Textile industrial wastes	Increase pH and BOD of water, endanger fish
5. H ₂ S, Phosphate, ammonia, metanol Co ₂ and HcN	Tapioca industrial wastes	Harm and poison fish
6. Heavy metals, Zn, Cr, Cd, Pb, Hg	industrial wastes	Doses above 1.0mg/1 endanger fish

Source: Panjaitan (1982)

Panjaitan, 1982. T. H. *Impact of industrial waste towards fishery culture Sub-Directorate of Environment protection, Directorate of Living Resources Management Directorate General of Fisheries. 8 pp (Manuscript).*

Pressure—State—Response

The cause factor (*Pressure*) of water pollution are:

- # Lack of community awareness on environmental persevation, especially because there are still people who throw garbage into rivers.
- # Untreated domestic wastewater discharged directly into rivers.
- # The existance of industries that directly discharge wastewater into rivers without treatment.

The above conditions causes *Impact* on the *State* of Tangerang City in the form of water quality decrease.

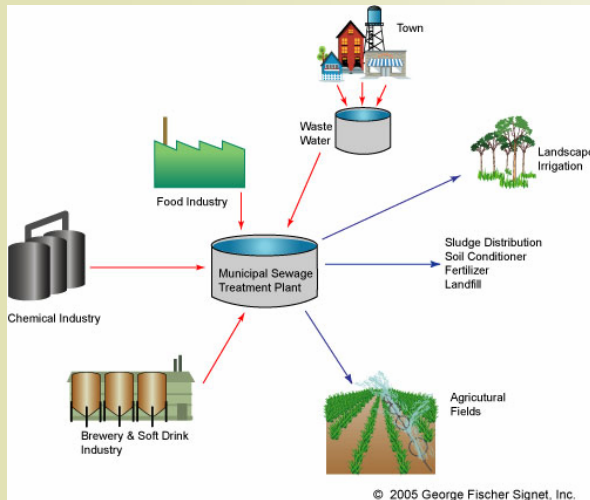
Response already taken by the Government of Tangerang to control and overcome water pollution are:

- # Implement Clean River Program (Program Kali Bersih (PROKASIH)/SUPERKASIH).
- # Increase routine control on all activities through mandatory wastewater sampling to laboratory recommended by the government of Tangerang City.
- # Increase monitoring by government institution such as Instansi Pembina (Dinas Lingkungan Hidup, Dinas Perindustrian, Dinas Pertanian, Dinas Kesehatan, etc.) toward the implementatin of RKL/ RPL from AMDAL (Environmental Impact Assesment) and UKL/ UPL for activities not specified in AMDAL according to Permen LH No. 11 Year 2006 regarding Types of Industry or Activity That Must be Provided with Environmental Impact Assesment (Analisis Mengenai Dampak Lingkungan Hidup, AMDAL).
- # Development of communal water treatment system in dense residential area.
- # Development of centralized industrial wastewater treatment system.
- # Increase and optimize ownership of WWTP for industries in Tangerang City.
- # Increase community awareness and participation to manage the river and situ sanitation and preservation.
- # Implementation and upholding of Environmental Law and Regulation.

Response and Recommendation

Sewerage system is one type supporting facilities to increase the quality of environmental sanitary. The wastewater sewerage system that is being planned is a conventional system by using gravity for the flowing purpose. Even though economically more expensive compared to other systems, this system provides more optimal WWTP (Wastewater Treatment Plant), function and the Feces Sludge Treatment Plant would no longer be required. Sewerage system design will increase the quality of environmental sanitary, which is very influential in actualizing a healthy and productive inhabitant. In designing the appropriate sewerage system, several pipe-line alternatives have to be designed and then will be chosen according to some technical factor.

Wastewater Sewerage System



The number of Feces Sludge Treatment Plant (IPLT) at Tangerang Cty can be seen at the table below.

IPLT Location at Tangerang Municipality

NO.	LOCATION	CAPACITY		NUMBER OF CONNECTION (UNIT)
		INSTALLED	TREATMENT	
1	Oxidation Pond – Bawang Perumnas Karawaci I		355,75	1.423
2	Oxidation Pond – Kecipir Perumnas Karawaci I		17	68
3	Oxidation Pond – Pandan Perumnas Karawaci I		398,5	1.594
4	Oxidation Pond – Karang Perumnas Karawaci I		393	1.572
5	Oxidation Pond – Cemara Perumnas Karawaci I		350,5	1.402
6	Oxidation Pond – Gede Perumnas Karawaci I		300	120
7	Oxidation Pond – Mujaer Perumnas Karawaci I		206,5	826
8	Oxidation Pond – Wijaya Kusuma Perumnas Karawaci I		171,25	685
9	Tanah Tinggi WWTP	3.024	675	2.700
TOTAL		3.024	2.867,50	10.390

Source: Dinas Perumahan dan Permukiman, 2005.

The government of Tangerang City also has some plan for WWTP (Wastewater Treatment Plant), that's already programmed as Middle Term Development Plan (RPJM).

Biodiversity Condition of Tangerang City

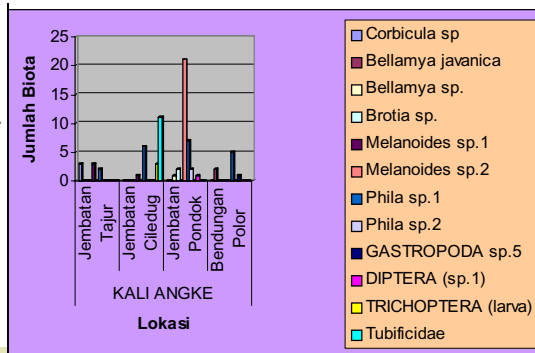
Variety of biodiversity in Town of Tangerang in general doesn't differ far with situation of other biodiversity in Java. This matter's caused by geographical unity though in this time have experienced much reduction due to the effect of high development. Plant types in Tangerang City quite vary especially tropical crop type starting from coastal plant type until mountain continent plant type and of palawija. However till now, it hasn't been known the amount of the entire/all plant types that exists in Tangerang City . In line with the growth of Tangerang City, there is some destruction of plant variety involved. The increase of its resident with all their activities which require land, will cause land conversion for the settlement of and allotment of its supporter.

Kali Angke

The result of identified composition of benthos in Kali Angke shows that composition of benthos in Tajur Bridge consists of *Corbicula sp*, *Sp.1 Melanoides* and *Phila sp.1* with variety index equal to 1,56. For location in Ciledug Indah Bridge, benthos composition consists of *Melanoides sp.1* and *Phila sp.1*, *TRICHOPTERA* (larva), *Tubificidae* with variety index equal to 1,62. For location Pondok Bahar Bridge, benthos composition consist of *Bellamyia sp.*, *Sp Brotia.*, *Melanoides Sp.2*, *Phila Sp.1*, *Phila Sp.2*, *DIPTERA* (sp.1). with variety index equal to 1,68. For location [in] Barrage of Polor, benthos composition consists of *Bellamyia javanica*, *Sp.1 Phila*, *GASTROPODA Sp.5*. with an index to variety value equal to 1,30.

Benthos at Kali Angke

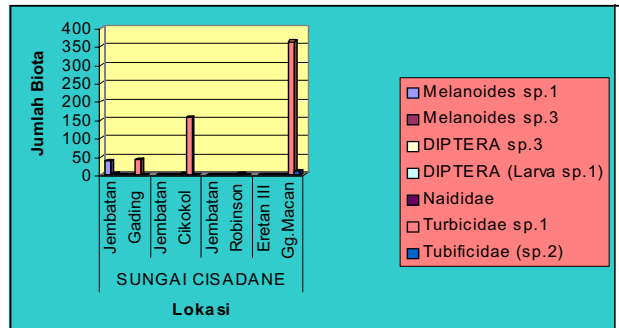
Source: Dinas Lingkungan Hidup Kota Tangerang, 2007



Kali Cisadane

Most of sampling point at Cisadane river contains *Turbicidae sp.1* and its variations. The worst condition is at Cikokol Bridge that the diversities index reaches 0.2.

Benthos at Cisadane River

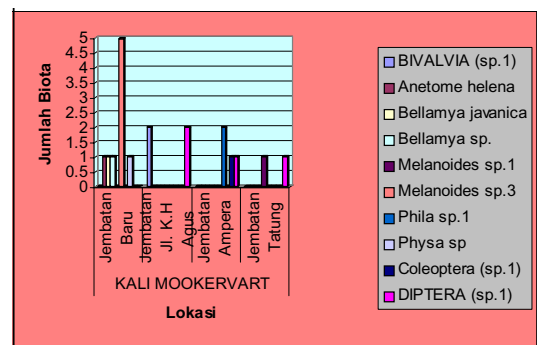


Source: Dinas Lingkungan Hidup Kota Tangerang, 2007

Kali Mookervart

The condition of Mookervart River is better than Cisadane River. From the sampling location, the worst point is at K H Agus Salim Bridge and Tatung Bridge with diversity index up to 1.00 . The biota which lives at this river mostly is *Melanoides sp.1*.

Benthos at Mookervart River

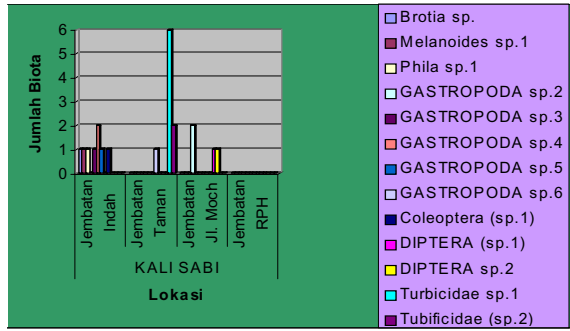


Source : Dinas Lingkungan Hidup Kota Tangerang, 2007

Kali Sabi

The condition of Sabi River is better than any other rivers at Tangerang city. The worst index diversity is 1.22 (at Taman Cibodas River) which means middle polluted, and at Jembatan Indah Jaya is only 2.75.

Benthos at Kali Sabi



Source: Dinas Lingkungan Hidup Kota Tangerang, 2007

The summary of diversity index at Tangerang city can be seen at the table below.

Diversity Index of Each River at Tangerang City

No.	Location	Diversity Index Value (H')	Condition
Kali Mookervart			
1.	Jembatan Baru	1.80	Medium Diversity
2.	Jembatan K. H. Agus Salim	1.00	Low Diversity
3.	Jembatan Ampera	1.50	Medium Diversity
4.	Jembatan Tatung	1.00	Low Diversity
Kali Sabi			
1.	Jembatan Indah Jaya	2.75	High Diversity
2.	Jembatan Taman Cibodas	1.22	Medium Diversity
3.	Jembatan Jl. Moch. Toha	1.50	Medium Diversity
4.	Jembatan TPH Sangego	-	-
Kali Cirarab			
1.	Jembatan Bunder	1.00	Low Diversity
2.	Jembatan Siliwangi	0.93	Low Diversity
3.	Jembatan Regency	1.06	Medium Diversity
4.	Jembatan Kotabumi	1.00	Low Diversity
Sungai Cisadane			
1.	Jembatan Gading Serpong	1.40	Medium Diversity
2.	Jembatan Cikokol	0.20	Low Diversity
3.	Jembatan Robinson	0.92	Low Diversity
4.	Eretan Gg. Macan	0.24	Low Diversity
Kali Angke			
1.	Jembatan Tajur	1.56	Medium Diversity
2.	Jembatan Ciledug Indah	1.62	Medium Diversity
3.	Jembatan Pondok Bahar	1.68	Medium Diversity
4.	Bendungan Polor	1.30	Medium Diversity

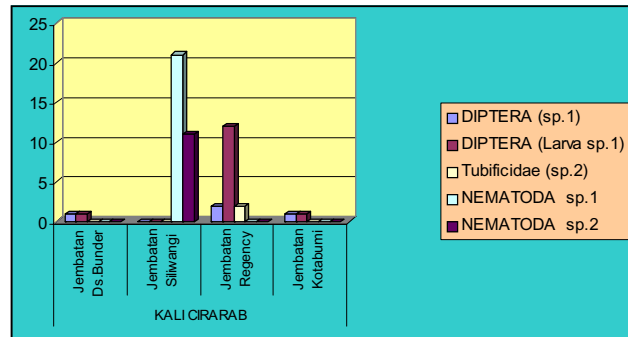
Benthos biodiversity index value, 0 until > 2 (Shannon Weaver, 1949)

- H' = 0 – 1 → Low Diversity
- H' = 1,1 – 2 → Medium Diversity
- H' = > 2 → High Diversity

Kali Cirarab

Tubificidae sp.1 is the benthos mostly found in that river. The condition of the river is heavily polluted at every sampling point. (at the range between 0.7 – 1.2).

Benthos at Kali Ciracab



Source: Dinas Lingkungan Hidup Kota Tangerang, 2007

Effects of Biodiversity Degradation

Some effects of biodiversity degradation are:

1. Biodiversity decrease causes the loss of existence value belonging to biodiversity due to their presence in a certain place (natural habitat). Although the benefits gained from existence value is difficult to measure monetarily, the benefits pertaining to human psychological welfare is quite clear.
2. The loss or decrease of environmental or ecological benefit value for human, for instance forest protection towards the stabilization of hidrological and water cycle regarding flood danger and drought.
3. Loss of nutrients provision thus increasing the risk of erosion and micro climate change.
4. Loss or reduction of heritage value regarding the will to maintain biodiversity continuation for the use of future generations.
5. Loss or decrease of choice value regarding biodiversity potential not yet realized or used by present people.
6. Decrease of direct benefits gained in form of food, clothing and housing.
7. Decrease or even loss of production value, that is the market value gained from biodiversity trade in local national or international markets.

Response and Recommendation

In order to preserve biodiversity, Government of Tangerang city specified some area as forest area and town garden. Besides functioning as area protector and support, the area is expected to become the habitat for living including for wild fauna and flora (in-situ).

Forest and Garden Area at Tangerang City

No	Location	Area (Ha)	No. of Trees	Type of Trees
1	Hutan Kota Cikokol	2	880	Mahoni, Tanjung, Trembesi
2	Taman Kota Daan Mogot	6,04	2650	Mahoni, Trembesi
3	T a m a n Pujalidane	2	880	Kupu-kupu, Filicium
4	Taman Pasar Cikokol	2	880	Mahoni
5	T a m a n Angsana	1	440	Angsana, Filicium, Bungur
Total	13,04	5730		

Source: Dinas Lingkungan Hidup Kota Tangerang, 2006

Tightening of licensing to every activity that can generate change opening of land which directly can lessen the existence of existing wild flora and fauna is also conducted.

Flood Problem

Drainage System

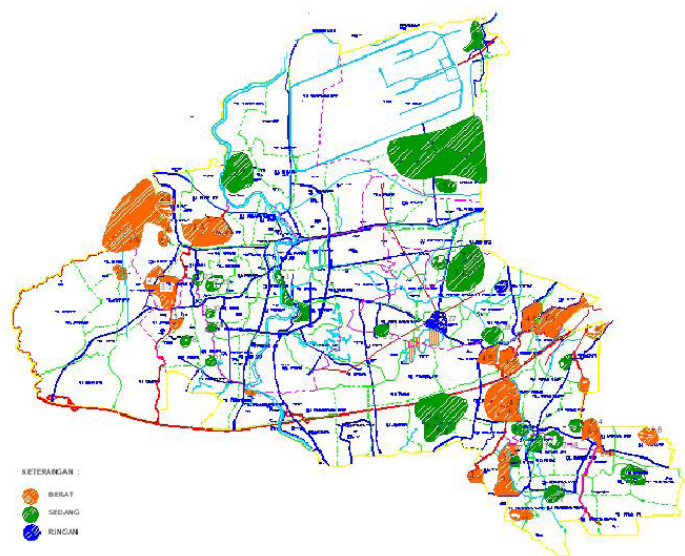
One of the most important neighborhood facilities - which makes a neighbourhood a reasonable place to live, and making it dry, clean, healthy, and beautiful - is indicated by the fact that it has a good, reasonable, well-planned, and well-maintained drainage system. Drainage system and its behavior in a lower neighborhood, such as Tangerang City, (where the tide takes effect) are different from a higher (non-tidal) one, not to mention a hilly one. Higher and hilly ones have a reasonable enough slope that is important for the drainage system to immediately channel water to the final water dispenser. In addition to this, the drainage in this area always seems dry. These conditions, however, do not apply in the non-tidal neighborhood because of its typical topography feature, which is flat. And because of this condition it leads to the slowing down of the water flow to the final dispenser. In addition, its drainage performs another function, that is, to lower the level of ground water elevation. The water drift in this area (as a result of the sea tide or river), is a common phenomenon. The drainage system of a tidal neighborhood has multifunction. Apart from the function of channeling water, it also channels the sewage. Since the tidal neighborhoods being researched in this area are located by rivers, their communities' daily activities are dominantly oriented towards these rivers. Consequently, their drainage system changes its function from channeling of water to the function of water transportation infrastructure and facility. Factors relating to the social and cultural aspects of these communities cause difficulties in implementing technical criteria in the development planning for the purpose of preventing the area from flood or water footing. It is because of the social and cultural behavior of the local communities, that there is a versed-interest conflict in the implementation of the criteria, particularly in the areas that apply the open-space principle. In these open-space areas, tidal waters can easily ebb and flow. The technical criteria

and social - cultural factors of community could actually be accommodated well into the development planning and in developing areas, as has already been carried out in the areas being researched in this study. In this study, the planning also takes into account environmental considerations, communities' social and cultural character and topography features (flat and tide behavior). In conclusion, it is expected that the management of the drainage system of areas being researched in this study can be used as a model for other similar areas.

The development of physical growth on a city consequently changes the land condition, which was initially open land and water free area to become a land area closed by its above hardening layer and airtight. It causes the rain water unable to be absorbed into the soil and causes flood during the rainy season. The flood is also caused by the drainage channel that could not accommodate drainage flow anymore.

On February 2007, flooding occurred at Tangerang City, and most of them happened not at Cisadane basin.

Picture of Flood location at Tangerang City



Source: Subdin Pengairan Dinas PU, Kota Tangerang, 2007

In the year 2004, there were 18 locations affected by flood, with water level more than 100 cm, and it reached 300 cm in 2007.

Source : *Tempointeraktif.com, 29 Januari 2002*

Heavy flooding happened in early year 2007 (13-02-2007) suffusing 63 location for the area of 1.725 ha in 13 districts of Tangerang city. 31 location with an area of 313 ha experienced heavy damage while 32 locations with an area of 215,5 ha experienced light damage. Floods Location compared to year 2003 decreased but area of flood grew larger (becoming 518,5 ha) with water level of floods up to 300 cm. This matter generates problems which are serious enough and require immediate handling to immediately control the loss impact.

Data on Flooding in Tangerang City 1994 -2007

Year	Number of locations	Flood Level	Duration (+hours)	Area of Flooding
1994	18 locations	100 cm	-	-
2000	49 locations	150 cm	72 hours	248.85 ha
2002	67 locations	300 cm	72 hours	± 400.00 ha
2003	55 locations	100 cm	6 hours	67,64 ha
2004	43 locations	100 cm	6 hours	53,16 ha
2005	23 locations	50 cm	6 hours	32,8 ha
2006	22 locations	80 cm	6 hours	29,8 ha
2007	63 locations	300 cm	96 hours	1.725 ha

Flood Location of Tangerang City

No.	Kecamatan	No. Of Location	Water Level (± M)	Area (± Ha)	Duration (± Hour)	Overflow from river/stream
1	Ciledug	11	1-3	290	72	Sal. Pembuang Ciputat, Sal. Pembuang Sudimara Barat, Sal. Pembuang Sudimara Selatan, Kali Angke, Kali Wetan
2	Larangan	3	1.5-2	70	72	Kali Cantiga
3	Karang Tengah	9	1-3	285	72	Sal. Pembuang Cantiga, Kali Cantiga, Kali Angke
4	Cipondoh	7	0.4 - 1.5	195	72	Rawa Cipondoh, Sal. Pembuangan Kel. Cipondoh, Sal. Pembuangan Kel. Kenanga, Sal. Pembuangan Kel. Ketapang, Kali Angke
5	Pinang	5	1-3	125	72	Kali Angke, Pembuangan Kunciran
6	Tangerang	3	1	30	24	Sal. Pembuangan GJA, Kali Cisadane
7	Karawaci	5	0.6-3	125	72	Sal. Pembuang Bugel, Sal. Pembuang Cibodas, Sal. Pembuang Cisarung, Sal. Pembuang Pabuaran, Kali Sabi
8	Cibodas	4	0.7 - 1.5	70	48	Sal. Pembuang Cibodas, Kali Sabi, Kali Cisadane
9	Jatiuwung	1	2	50	96	Kali Cirarab dan Kali Keroncong
10	Periuk	8	1.5-3	280	2 minggu	Kali Sabi, Kali Cirarab dan Kali Keroncong
11	Neglasari	1	1	5	12	Kali Cisadane
12	Batuceper	4	0,6	130	48	Sa. Pembuang Cipondoh
13	Benda	2	1	60	48	Sal. Pembuang Kel. Benda, Sal. Pembuang Rawa Bamhan

Source: *Subdin Pengairan Dinas PU, Kota Tangerang.Tahun 2007*

Picture of Flood at Ciledug Indah, 2007



Source : *Subdin Pengairan Dinas PU, Kota Tangerang.Tahun 2007*

Response and Recommendation

There are many different measures that can be used to solve flood problems as well as to meet other objectives. Many are inexpensive and easy to use, and some are probably already being implemented. The entire planning process is meaningless unless all possible alternatives are examined.

One of them is **Review of City-Wide Strategies, which includes:**

- **The City's drainage system maintenance program continues.**
- **The City's regulatory programs (floodplain management, water quality, and sediment and erosion control) continue.**

A strong flood mitigation program can also help to address the issue of repetitive loss properties within a community by determining the most appropriate way to reduce future flood losses. The plan may also identify funding sources that can be used to implement flood hazard reduction initiatives.

As a conclusion, there is a Flood Hazard Mitigation Measures that includes:

1. Preventive activities keep problems from getting worse.

The use and development of the floodplain and contributing watershed are limited through planning, land acquisition, or regulation. These activities are usually administered by building, zoning, planning, and/or code enforcement officials:

- ☞ Planning and zoning
- ☞ Open space preservation
- ☞ Building code development and enforcement
- ☞ Storm water management
- ☞ Drainage system maintenance
- ☞ Dune and beach maintenance

2. Property protection is usually undertaken by property owners on a building-by-building or parcel basis. Such measures include:

- ☞ Relocation
- ☞ Acquisition
- ☞ Retrofitting

- ☞ Insurance

3. Emergency services measures are taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities:

- ☞ Warning
- ☞ Dam condition monitoring
- ☞ Emergency response planning
- ☞ Evacuation
- ☞ Critical facilities protection
- ☞ Health and safety maintenance

4. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- ☞ Reservoirs
- ☞ Levees/floodwalls/seawalls
- ☞ Diversions
- ☞ Channel modifications
- ☞ Beach nourishment
- ☞ Storm sewers

5. Natural resource protection preserves or restores natural areas or the natural functions of floodplains and watersheds. Such measures are usually implemented by parks, recreation, or conservation agencies or organizations. They include:

- ☞ Wetlands protection
- ☞ Best management practices
- ☞ Erosion and sediment control
- ☞ Coastal barrier protection

6. Public information programs advise property owners, potential property owners, and visitors of the flood hazards as well as ways to protect people and property from them. They are usually implemented by a public information office. They can include:

- ☞ Flood maps and data
- ☞ Library resources
- ☞ Outreach projects
- ☞ Technical assistance
- ☞ Real estate disclosure information
- ☞ Environmental education programs

GROUNDWATER ISSUES

There are two main issues for groundwater, i.e.:

1. Contamination of groundwater
2. Depletion of groundwater

Contamination of Ground water

Groundwater contaminants come from two categories of sources: point sources and distributed, or non-point sources. Landfills, leaking gasoline storage tanks, leaking septic tanks, and accidental spills are examples of point sources. Infiltration from farm land treated with pesticides and fertilizers is an example of a non-point source. Septic systems are designed so that some of the sewage is degraded in the tank and some is degraded and absorbed by the surrounding sand and subsoil. Contaminants that may enter groundwater from septic systems include bacteria, viruses, detergents, and household cleaners. These can create serious contamination problems. Despite the fact that septic tanks and cesspools are known sources of contaminants, they are poorly monitored and very little studied. Once an aquifer is contaminated, it may be unusable for decades. The residence time, as noted earlier, can be anywhere from two weeks or 10 000 years.

Furthermore, the effects of groundwater contamination do not end with the loss of well-water supplies. Several studies have documented the migration of contaminants from disposal or spill sites to nearby lakes and rivers as this groundwater passes through the hydrologic cycle, but the processes are not as yet well understood.

Preventing contamination in the first place is by far the most practical solution to the problem. This can be accomplished by the adoption of effective groundwater management practices by governments, industries and all community.

Depletion of groundwater

Traditionally, management of water resources has focused on surface water or ground water as if they were separate entities. As development of land and water resources increases, it is apparent that development of either of these resources affects the quantity and quality of the other. Nearly all surface-water features (streams, lakes, reservoirs, wetlands, and estuaries) interact with ground water. These interactions take many forms. In many situations, surface-water bodies gain water and solutes from ground-water systems and in others the surface-water body is a source of ground-water recharge and causes changes in ground-water quality. As a result, withdrawal of water from streams can deplete ground water or conversely, pumpage of ground water can deplete water in streams, lakes, or wetlands. Pollution of surface water can cause degradation of ground-water quality and conversely pollution of ground water can degrade surface water. Thus, effective land and water management requires a clear understanding of the linkages between ground water and surface water as it applies to any given hydrologic setting.

Through human intervention, groundwater is subject to artificial discharge, that is, the process of pumping groundwater from an aquifer to satisfy a socioeconomic need. In some instances, groundwater may also be subject to artificial recharge. Some progressive communities are presently accomplishing the artificial recharge of their aquifers in order to conserve the groundwater resource.

Excessive pumping can lead to *groundwater depletion*, wherein groundwater is extracted from an aquifer at a rate faster than it can be replenished. Depletion can have significant effects on surface and unsaturated subsurface (vadose) waters, and on the terrestrial, riparian, and other ecosystems which depend on these waters.

Impacts Of Groundwater Depletion

The impacts of groundwater depletion are many and varied.

The first and most direct impact is the loss of baseflow. The loss of baseflow can trigger a chain reaction of negative impacts to various components of the landscape. Direct, or primary, impacts to the landscape can be expressed in terms of:

- increased magnitude and frequency of floods,
- loss of wetland and riparian vegetation,
- loss of phreatophytes and aquatic-terrestrial transition zones,
- changes in channel morphology,
- accelerated erosion and gully development,
- increased severity and frequency of droughts, and
- loss of wildlife habitat and reduction in biodiversity.

Other impacts related to groundwater depletion include:

- drying up of wells,
- increased cost of pumping and well infrastructure,
- land subsidence (Galloway et al, 2001),
- salt-water intrusion, and
- changes in surface albedo and related climate change (Ponce et al, 1997)

The impacts of groundwater depletion are pervasive and, in most cases significant enough to justify a detailed evaluation. A sensible strategy is to develop baseline data on selected ecosystem components, prior to the proposed groundwater development. These components include:

- surface water,
- baseflow,
- channel morphology,
- aquatic ecosystems,
- wetland and riparian ecosystems,

- phreatophytes and other aquatic-terrestrial transitional ecosystems,
- terrestrial ecosystems,
- wildlife resources, including corridors and flyways, and
- Climatology and climate change.

In the absence of baseline data, it is difficult to ascertain a cause-effect linkage between groundwater development and its environmental consequences. The effects of groundwater development tend to become apparent gradually, with time often measured in decades, such as in the case of climate change (Alley and Leake, 2004). Other impacts, such as the loss of baseflow, can become apparent within a shorter timeframe, typically in a few years.

In correlation with Tangerang City, groundwater quantity is affected by the activities of people and industries that took groundwater for their various activities. The industry which takes groundwater at Tangerang City can be seen at the table below.

List of Companies That Has License for Taking Groundwater

NO	COMPANY'S NAME	ADDRESS	COMMODITY	Type OF WELL	AMOUNT OF FLOW (M ³ /DAY)	NUMBER OF LICENSE
1	ABB SAKTI INDUSTRI	Jl. Gajah Tunggal	Service Dinamo Motor	Pant. 1	20	616/KEP 423-KPMP/SIPA/2003 616/KEP 425-KPMP/SIPA/2003 616/KEP 411-KPMP/SIPA/2003
				Pant. 2	20	
				Pant. 3	20	
2	ABDI PEMBANGUNAN	RT.001/05 . Meksarsari	Penyamakan Kulit Sapi	Bor 1	40	546.2/SK.825-Distamb/1992
3	ADYATAMA RATANGGA KARTIJAYA	Jl. Raya Mauk KM. 2	Filling Kabinet	Pant. 1	10	546.2/KEP.1317-Perek/1999
4	AGUNG DIAN EKATAMA GARMENT	Jl. Dipati Unus, Kp. Cibodas	Industri Garment	Pant. 1	60	546.2/Kep.1317-Perek /1999
5	AIR TECH INDUSTRIES	Jl. Teuku Umar No. 20	Pendingin	Bor 1	30	16/SK.01-KPMP/SIPA/2001
6	ALAM KACA PRABAWA INA.	Pabuaran Tumpeng	Kaca Cermin	Pant. 1	35	546.2/SK.1206-Perek/1997
7	ALFA JAYA SEJAHTERA	Bojong Larang, Jatiuwung	Botol Plastik & Garisan	Pant. 1	20	616/KEP 342-KPMP/SIPA/2002
8	ALFA RETAILINDO	Jl. MH. Thamrin, Tangerang	Perdagangan	Bor 1	48	546.2/KEP 227-PEREK/2000
9	ALPHA TUNGAL SEJAHTERA	Km. 3,1 Gembor, Jatiuwung	Ind. Cat tembok	Bor 1	25	546.2/SK.860-Perek/1999
10	ALUMEX PERKASA JAYA	Palim Manis, Jatiuwung	Perakitan Aluminium	Pant. 1	20	BARU
11	ANEKA KOMKAR UTAMA	Alam Jaya, Jatiuwung	Industri Barang dari karet	Pant. 1	6	546.2/SK.750-Perek/1999
12	ANEKA SUBUR	Jl. Gatot Subroto Km. 7	Perdagangan/ Swalayan	Pant. 1	15	BARU
13	AN-NISA	Jl. Gatot Subroto Km. 2	Rumah Sakit Ibu dan Anak	Pant. 1	22	616/KEP 465-KPMP/SIPA/2003
14	ANUGRAH PRIMA PERDANA	Jl. Raya Siliwangi Km. 3	Non Woven	Pant. 2	22	616/KEP 467-KPMP/SIPA/2003
				Bor 1	30	546.2/K.860-PEREK/1999
15	ARAYA INDONESIA	Poris Plawad, Cipondoh	Peleg Sepeda	Bor 1	110	1385.K/101/DDJG /1994
16	ARGO INTAN GRIYATAMA	Jl.MH.Thamrin .Cikokol	Depstore & Swalayan	Bor 2	180	616/KEP 213/DU-SIPAKPMP/04
				Bor 1	90	546.2/SK.547-Perek/97

NO	COMPANY'S NAME	ADDRESS	COMMODITY	Type OF WELL	AMOUNT OF FLOW (M ³ /DAY)	NUMBER OF LICENSE
17	ARTAMITRA USAHA MULIA	Jl. Pulau Putri Raya, Cikokol	Jasa Pengelolaan	Pant. 1	10	546.2/SK.530-Perek/1999
				Pant. 2	20	BARU
18	ARTOIS PHARMACEUTICAL IND. CO. LTD	Keroncong, Jatiuwung	Industri Farmasi	Pant. 1	20	616/KEP.543-KPMP/SIPA/2003
19	ARWANA CITRAMULYA	Kel. Alam Jaya, Jatiuwung	Ind. Keramik Lantai	Bor 1	60	28.K/101/DDJG/1995
20	ASIA KARTON LESTARI	Kel. Pasir Jaya, Jatiuwung	Karton Box	Bor 1	50	546.2/Kep.487-Perek/2000
21	ASIA PAPERCON	Rawa Bamban	Karton Gelombang	Pant. 1	5	BARU
22	ASIA PAPERCON INTERNUSA ASIAPLAST INDUSTRIES	Jatiuwung	Ind. Plastik	Bor 1	45	546.2/KEP.234-Perek/2000
				Bor 2	100	
23	ATAP MAKMUR KENCANA, PT	Kp. Dumpit Rt.01/07	Genteng Beton	Bor 1	75	BARU
24	AUTOCHEM INDUSTRI	Jatake, Jatiuwung	Blending Minyak Rem	Bor 1	45	546.2/SK. 2869-Distamb/1991
25	BALI NIRWANA GARMENT	Larangan		Bor 1	25	546.2/SK.930-Perek/1999
				Bor 2	80	546.2/SK.1276-Bapair/89
26	BANDO INDONESIA	Desa Pasir Jaya, Jatiuwung	Fan Belt dan barang Karet	Pant. 1	25	223.K/101/DDJG/1992
				Pant. 2	10	546.2/SK.941-Perek/1999
27	BANGAU SARI MEGA JAYA	Mekarsari, Neglasari	Pabrik Sirup	Bor 1	90	BARU
28	BENTENG TANGGUH ASLINDOTAMA	Pinang, Panunggan	Perhotelan	Pant. 1	15	546.2/SK.930-Perek/1999
				Pant. 2	15	546.2/SK.930-Perek/1999
				Pant. 3	15	546.2/SK.930-Perek/1999
				Pant. 4	15	546.2/SK.930-Perek/1999
29	BERLINA Tbk.	Priuk Jaya, Periuk	Ind. Kemasan Plastik	Bor 1	50	546.2/SK.346-Perek/1999
30	BHAHTI ASIH	Ciledug	Pelayanan Kesehatan	Pant. 1	25	BARU
31	BINA MAKMUR	Sudirman	Show room & Service Station	Pant. 1	15	616/SK-70/KPMP/SIPA/2001
32	BINA USAHA MANDIRI MIZUSAWA	Ds. Alam Jaya, Jatiuwung	Pemgecoran Logam	Bor 1	50	546.2/SK.929-Distamb/1992
				Bor 2	30	546.2/SK.930-Perek/1999
				Bor 3	30	546.2/SK.930-Perek/1999

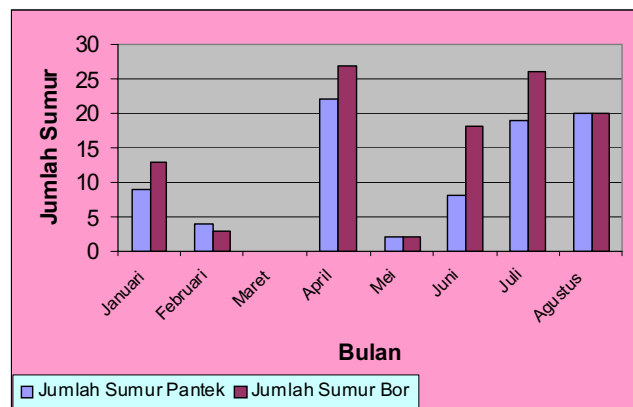
NO	COMPANY'S NAME	ADDRESS	COMMODITY	Type OF WELL	AMOUNT OF FLOW (M ³ /DAY)	NUMBER OF LICENSE
34	BUMI MEGAH INDUSTRIES	Ujung Jaya, Jatiuwung	Ornamen Keramik	Pant. 1	20	BARU
				Pant. 2	20	BARU
35	BUMI PRIMA ALAM INDAH	Komp. Taman Babuara	Kolam Renang & Sport Centre	Pant. 1	20	616/KEP.491-KPMP/SIPA/2003
36	BUMI TANGERANG MESINDOTAMA	Cibodas	Industri Coklat	Bor 1	100	616/KEP.537-KPMP/SIPA/2003
37	BUMI TANGERANG ALAM CITRA	Jatiuwung	Perhotelan	Bor 1	70	616/KEP.514/DU-SIPAKPMP/03
				Bor 2	70	616/KEP.165-KPMP/SIPA/2004
38	BUNITOP INDONESIA	Jl. Gebang Raya RT.01/04	Pakaian Jadi	Bor 1	50	BARU
39	BUNTARA MULTI INDUSTRI	Jl. Sangiang RT. 01/03	Perajutan dan Pakaian Jadi	Bor 1	50	546.2/SK.329-Distamb/1992
				Bor 2	40	546.2/SK.346-PEREK/1999
40	BUSANA RAMA TEXTILE	No. 32, Batu Ceper	Textile & Garment	Pant. 1	30	546.2/SK.531-Perek/1999
				Pant. 2	30	546.2/SK.531-Perek/1999
				Pant. 3	10	546.2/SK.531-Perek/1999
				Pant. 4	10	546.2/SK.531-Perek/1999
41	CACAO WANGI MURNI	Pasir Jaya, Jatiuwung	Peng. Biji Cokelat	Pant. 1	11	546.2/SK.1416-Perek/1998
42	CAHAYA KALIMANTAN CEMERLANG	Neglasari, batu Ceper	Suku cadang Motor	Pant. 1	19	616/SK.244-KPMP/SIPA/2002
43	CIMONE JAYA CHEMICAL IND.	Cimone, Tangerang	Ind. Kulit Imitasi	Bor 1	80	1195.K/101/DDJG/1993
				Bor 2	65	749.K/101/DDJG/1994
				Bor 3	65	740.K/101/DDJG/1994
44	CIPTA RASA SEMPURNA	Kel. Priuk, Tangerang	Minuman	Bor 1	80	546.2/SK.218-Perek/1996
45	CIPTA SARANA MANDIRI	Bojong, Karawaci	Jasa Pencucian Pakaian	Bor 1	90	616/KEP.284-KPMP/SIPA/2004
				Bor 2	70	616/KEP.286-KPMP/SIPA/2004
46	CIQUITA TALONPLAS ZIPPER Co, Ltd.	No. 88 Kbn Besar, Batu Ceper	Zipper	Bor 1	75	546.2/SK.652-Bapair/1991
47	CISADANE RAYA CHEMICALS	Jl. Imam Bonjol No. 88	Oleochemical	Pant. 1	11	546.2/SK.1416-Perek/1998
48	CITRA PATI ABADI	Pasir Jaya, Jatiuwung	Snack	Bor 1	40	546.2/SK.355-Perek/1999
49	CITRA PLATING	Kel. Keroncong, Jatiuwung	Galvanis	Bor 1	85	546.2/SK.1585-Distamb/1992

Potency of ground water in town of Tangerang is so far not yet entirely known. The latest, the condition of ground water of around 4 (four) district have been known, that is District Of Batuceper, District Of Benda, District of Jatiuwung, and District of Periuk. From study result regarding the condition of ground water, it's identified that in District of Batuceper and District of Benda, there is superficial ground water that reside in a depth of 5-25 meter, while ground water resides in depth of 40-80 meter. Superficial ground water level is at 2-10 meter and ground water level at 40-60 meter. Typology of ground water is volcano sediment and of alluvial.

So far, result of monitoring by Dinas Lingkungan Hidup of Tangerang City year 2006 mentioned that volume intake of ground water by 275 licentiate industry (12,35 % of industrial company in Town of Tangerang) is equal to 40.285 m³/ day. Intake of this ground water covers ground water in equal to 5.460 m³/ ground water and daily depth equal to 34.835 m³/ day.

Monitoring result of Dinas Lingkungan Hidup Tangerang City year 2006 shows that amount of recommendation wells is 253 wells, including 116 dug wells and 137 drill wells. On the year 2007, amount of recommendation well is 193 wells including 84 dug wells and 109 drill wells.

Amount of Recommendation Well Year 2007 (Until August 2007)



Source: DLH Tangerang, 2007

Groundwater Management and Pollution Control Efforts

Efforts already taken to control and manage groundwater pollution are:

1. Compiling regulations on environmental pollution and damage control
2. Implement Clean River Program (Program Kali Bersih (PROKASIH)) and PROPER (Program Peringkat Kinerja Perusahaan). Prokasih is described through Program Superkasih
3. Increase community participation in environmental management
4. Routine test on people well water quality
5. Building solid/liquid waste pollutant disposal site
6. Pollution socialization and control
7. Monitor implementation of environmental regulations
8. Coordinate the management of natural resources conservation
9. Natural water resources conservation and pollution control
10. Increase water catchment area conservation
11. Control and Monitor Natural Resources Usage

Response and Recommendation

The recommendation for this problem is with by limiting giving license to industries in ground water conservation region, especially in the case of usage of water resource. Giving permission to industries that use large amount of ground water are not recommended, while warehouses or industries that use small amount of ground water is much recommended.

ASER 2007 COMPILATION TEAM

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7.	Drs. Ruseno Widodo NIP. 010 236 619	Dinas Perumahan dan Permukiman	Member
8.	Diana Anggraini, STP, MT NIP. 480 119 169	Bapeda	Member
9.	Widi Hastuti ST, MSc. NIP. 110 054 233	Dinas Pekerjaan Umum	Member
10.	Yeni Anita Anggraini	Dinas Tata Kota	Member
11.	Eko Handoyo, AMKL NIP. 900 004 846	Dinas Kesehatan	Member
12.	Radjiman	Badan Pusat Statistik	Member
13.	Ir. Ratih Widyaningsih, MBA	Consultant	Member
14.	Hilmi Gazali, ST	Consultant	Member
15.	Elisabeth Tarigan, ST	Consultant	Member
16.	Ahmad Setiadi	Consultant	Member
17.	Ir. E. S. Indasari	Consultant	Member
18.	Ir. Wisnu Djati Prasodjo, M.Eng.Sc.	Consultant	Member