

SEMARANG



SEMARANG

INDONESIA

INTRODUCTION

Semarang, the capital city of the province, is the only city in the province of Central Java that can be categorized as a metropolitan city.

From a regional development perspective, the position of Semarang Municipality is strategic. Besides being a transit point between the two main growth centers in Indonesia, Jakarta and Surabaya, it also connects three major development corridors in Central Java. Moreover, supported by an international seaport and national scale airport.

Semarang consists of 16 Districts with a total area of 373.7 km² and a population of 1.454.594 inhabitants. The biggest district is Mijen, in the eastern part of the city (62.15 km²) and the smallest is Candisari district (5.56 km²).

Location	Semarang is located at 6°50'-7°10' LS and 109°35'-110°50' LE with an area of 373.70 km ²
The city's administrative boundaries	North : Java Sea South : Semarang Regency East : Demak Municipality West : Kendal Municipality
Topography	The altitudes range from 0.75m to 350m above sea level. Topography consists of: a. Coastal plains: 1% of the total area, with an altitude of 0 - 0.75 meters above sea level (mainly northern parts of the city) b. Lowlands: 33% of the total area with an altitude of 0.75 - 5 meters above sea level (from northern to the centre area of the city) c. Uplands: 66% of the total area with an altitude of 5 to 348 meters above sea level (occupying in the most southern part of the city)
Climate and Rainfall	Equatorial/tropical climate The level of annual rainfall varies every year, from 2183 mm to 2215 mm.. The peak of the rainy season usually occurs from December to January. Air temperature is between 25° and 30°C, while the level of humidity is about 60 to 80 percent.
Land Use	The built-up area of Semarang Municipality takes up only about one-third (33.12%) of its total administrative territory. Thus, non-built up areas are dominant in the region, including agricultural land, conservation areas, production forests and coastal fishponds.
Demography	The population of Semarang has been steadily increasing. The growth rate is 1.41% per year. There are 77,800 poor inhabitants and the total population is 1,454,594 inhabitants.
Economy	The rate of economic growth during the period 2001-2006 was 4.61% per year. The trade, restaurant and hotel sectors contributed 30.38% to the overall economy in 2007 and the processing industries sector contributed 27.37%.
Drainage	Insufficient capacity during rainy season There are 2 flood ways: West Flood Way and East Flood Way and also 21 drainage sub systems
Waste	The amount of waste produced daily in Semarang is 4,651.39 m ³ Currently, the city can only dispose of 4153 m ³ of waste, leaving the other 567.05 m ³ of waste behind.
Electrical	Demand for electricity in Semarang increased in 2007 due to city development. There was an initiative from local government to use alternative energy such as biogas that was implemented in the sub district of Semarang Tengah.
Water	Almost all shallow ground water in Semarang, especially the wells with a depth of 10 meters has high salinity content. The over-usage of ground water in the coastal area has caused the sea water to overflow onto land shores. The public water company can only produce 196,346,592 liter/ day and still requires another production capacity of 53,142,188 liter/ day.
Sanitation	The disposal of liquid industrial waste by companies into the Tapak River has polluted the river, water, and wells in the surrounding community. The sanitation system is not equipped to handle such a large population

VULNERABILITY

Matrix of Climate Hazard in Semarang

Climate Hazard	Most vulnerable districts	Most Affected Sectors	Other Areas Affected	Most vulnerable Groups	Key Issues that worsen impacts
Rob Flooding	Semarang Utara	Fisheries Small industries Transportation Housing	- Fishery Port - Public Service - Unemployment - City revenue tends to decrease - Sanitation going worse - Salinisation	- People dependent on fisheries - Driver - Women - Entrepreneur - Farmer	- Poor waste management - Lack of good drainage, infrastructure
	Semarang Timur	Housing			
	Ganjar Sari	Housing			
	Genuk	Housing Transportation Small industries			
	Semarang Barat	Housing			
	Tugu	Tourism Housing Tourism Agriculture			
Coastal Erosion	Tugu	Fisheries	- Environment (Mangrove areas has been destroy) - Residence along the coast - Tourism	- People dependent on fisheries - Fisherman - People dependent on tourism	- Structural Transformation - Land Tenure - Jobless - Increase of operational fishery - Decrease of revenue (Rp. 15 million/year/person)
	Genuk	Fisheries Resource of Electricity Economy			
	Tiram Island	Tourism			
Drought	Mijen	Agriculture	- Health - Industry - Forestry - Housing	- Poor people - Entrepreneur - Farmers	- Salinisation - Clean Water Supply - Lack of early warning system - Structural transformation
	Gunung Pati				
	Banyumanik				
	Candi Sari				
	Tembalang				
	Tugu				
Landslide	Banyumanik	Housing	Transportation	- Poor people	
	Semarang Barat				
	Gajahmungkur				
	Ngalian				
	Gunungpati				
	Candisari				
Semarang Selatan					

Source: SLD result in Semarang, 20 August 2009

Semarang city is divided into Uptown Semarang and Downtown Semarang. Uptown Semarang is located on the top slopes of the Ungaran mountain while downtown is located on the coast.

- Disasters occurring in Semarang can be grouped into:
1. Disasters that occur periodically and can be predicted, such as flooding due to sea level rising, drought, dengue fever
 2. Sporadic disasters that occur suddenly and can not be predicted, such as landslides, epidemics etc.

Sea Level Rise

With an estimated sea water level rise of 0.8 m over the next 100 years, sea levels will reach approximately 1.70 – 3.20 km inland, with the flood covering 8.537,9 hectares. The sector that will be hit worst by the impact of sea water level rise is the fishery sector (fish pond) and residential areas. The most serious physical impacts of Sea Level Rise are:

- 1) Coastal erosion
- 2) Inundation and displacement of wetlands and lowlands
- 3) Increased coastal storm flooding and damage, and
- 4) Increased salinity of estuaries and aquifers (Barth and Titus 1984)

Land Subsidence

Terboyo industrial estate located in the north-eastern part of the city was estimated to have land subsidence up to 5 m. This was confirmed by leveling measurements that showed the rate of subsidence in an area located 3 km to the west was high, 21 cm in 3 years (Basuki, 2000).

Haryono (1995) wrote about the impact of land use changes in the hilly part of Semarang which caused reduction in the recharge of groundwater in lowland Semarang. The reduction, together with extensive groundwater extraction, was thought to be the cause of land subsidence.

Flooding

Flooding in Semarang is caused by a variety of factors, such as flooding from upstream areas, local flooding due to high local rainfall, flooding due to sea level rises. Almost all districts in Semarang are affected by flooding except the district of north Semarang.

People living near the port of Semarang, Tanjung Emas, said that they suffered from sea water flooding in 1992 and 1993. Rising sea levels have lead to continuous inundation in some parts of lowland Semarang. Some people were forced to flee from their homes, and many government buildings and private factories were abandoned. Suara Merdeka (13 July 2005), a local newspaper, reported that sea water flooding reached part of the airport of Semarang, Ahmad Yani airport.

Flooding due to Sea Level Rise (Rob Flooding)

Flooding due to sea level rising in Semarang is a major threat. It has resulted in damaging the infrastructure and the rapid decline of soil. Sea water flooding reach its peak in the dry seasons. People living near port of Semarang, Tanjung Emas, told that they start to suffer from sea water flooding in the year of 1992 or 1993. Furthermore, some people were forced to flee from their homes, and many government buildings and private companies factories were abandoned. Suara Merdeka (13 July 2005), a local newspaper, reported that the extent of sea water flooding reach part of the airport of Semarang, Ahmad Yani airport.

Drought

Climate change affects the local climate in Semarang. The dry season seems to be longer than the rainy season, causing drought in some parts of Mijen, Banyumanik, Candisari, Tugu, Gunungpati, Tembalang. The impact of drought is failed harvest, death of vegetation, increased dengue fever and also malaria. Drinking water has decreased also due to salinisation and land conversion from catchment areas into built up areas.

Cyclone Risk

Cyclones have reportedly occurred in Semarang. Cyclones occur due to extreme differences in air pressure. They can destroy trees, houses and public facilities.

Erosion

Damage occurred in the mangrove and coastal districts of Tugu, North Semarang, West Semarang and Genuk due to the abrasion. The river of Plumbon was also damaged. Landslides have occurred in Semarang in geologically unstable areas. They are triggered by heavy rain. These landslides occurred in districts of Gunung Pati, Tembalang, Banyumanik, Candisari, Pedurangan, Gajagmungkur, Tugu, West Semarang.



CITY SYMBOL

IMPACT OF SEA LEVEL RISE

FLOODING

LAND SUBSIDENCE

LAND USE CHANGE

FLOODING (ROB)

COASTAL DESTRUCTION

LANDSLIDES

PRONE TO ABRASION

LAND SUBSIDENCE

Impacts of Sea Level Rise in city of Semarang-Tambaklorok, Before (2006)

Impacts of Sea Level Rise in city of Semarang-Tambaklorok, After (2009)

Land Subsidence in Semarang

Land use change from Catchments area into Commercial Residential area

Flooding due to Sea Level Rise (Rob) in Semarang

Area that prone to abrasion in Mangunharjo
Source: Agency of Fishery and Maritime Semarang Municipality, 2009

Land slides and land subsidence in the hilly area of Semarang city
Source: Wahjono & Andiani, Center of Geology-Environment, Board of Geology Bandung