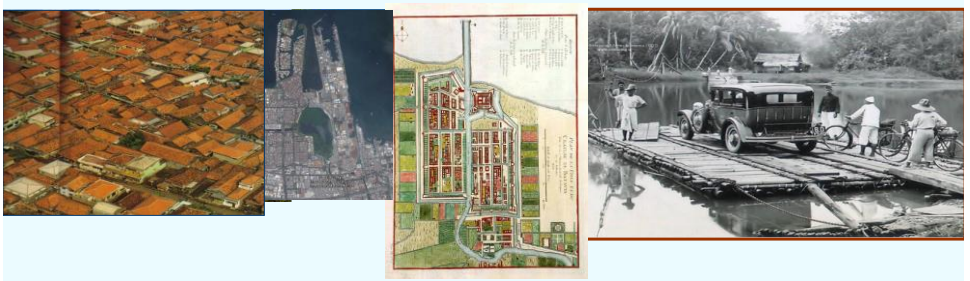
How sustainable is Jakarta?



ir. H.J. Mondeel

Content

- Indicators:
  - Water supply;
  - Sewerage and sanitation;
  - (Ground)watersystem.
- How sustainable is Jakarta?

	Indicator	Unit	Direction of preference
	Water supply (intake, treatment, transport, use, waste water: sewage, treatment and discharge)		
1	water supply costs	euro/m^3 drinking water euro/m^3 industrial process water euro/m^3 water for agriculture	the lower, the better
2	contribution to climate change	CO_2-emission/m^3 water supply CO_2-emission/m^3 waste water	the lower, the better
3	future proof water intake	water intake is smaller than available water resource? yes/no	yes= good, no= bad
4	accessibility to water of suitable quality	% of population with reliable drinking water % of industries with suitable process water % of farms with suitable water for live stock and crops	the higher, the better
5	water supply security	number of water supply stops per year	the lower, the better
6	water wasting / over use	m^3 water use/person/year m^3 water use / euro turn over/year in industry m^3 water use/hectare agricultural land/year *(or: yes/no water saving irrigation and crop choice)*	the lower, the better *yes= good, no= bad*
7	waste water costs	EUR/sewage connection/year	the lower, the better
8	access to safe sanitation	% households and industries connected to sewage or comparable sanitation systems	the higher, the better
9	sewage capacity	number of untreated discharge to surface water incidents per year	the lower, the better
10	effluent quality	effluent quality is not worse than desired surface water quality of receiving surface water: yes/no	yes= good, no= bad
11	reuse of effluent	% of effluent reused	the higher, the better
	Surface- and groundwater system		
12	surface water management costs	euro/person//year	the lower, the better
13	flood risk	expected flood damage (euro/year)	the lower, the better
14	water depth for ships	sufficient depth: yes/no	yes= good, no= bad
15	balance recreational use and natural carrying capacity	balance: yes/no	yes= good, no= bad
16	natural river banks	km nature friendly river banks / total km of river banks	the more, the better
17	frequency of cool water intake stops due to water shortage	number of stops/year	the fewer, the better
18	frequency of thermal pollution (i.e. high water temperature)	number of high temperature incidents/year (or: number of fish dying incidents/year)	the fewer, the better
19	future proof fisheries	over use or bad fishing techniques: yes/no	yes= good, no= bad
20	mining costs**	euro/ton sand, gravel etc.	the lower, the better
21	water quality sufficient for fish and swimming?	sufficient: yes/no	yes= good, no= bad
22	ground water management costs (quantity & quality)	euro/person/year	the lower, the better
23	ground water nuisance (or damage)	% of the city with ground water nuisance (or damage in euro/year)	the lower, the better
24	groundwater quality damage	% of the city with salty water nuisance (or crop damage/year)	the lower, the better

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Water supply

- Source potable water:
  - Water supply companies 60%;
  - Others: 40%;
- Non revenu water: 40%
- Tarif $ 0.1/m3 (poorest);
- No 24/7delivery

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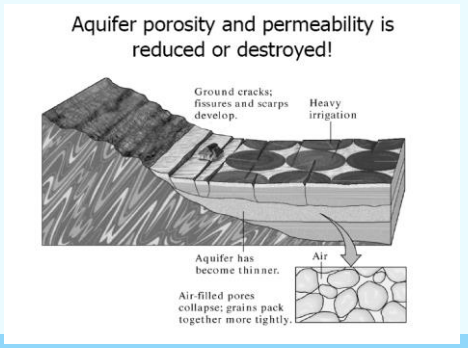
Water supply - Other sources

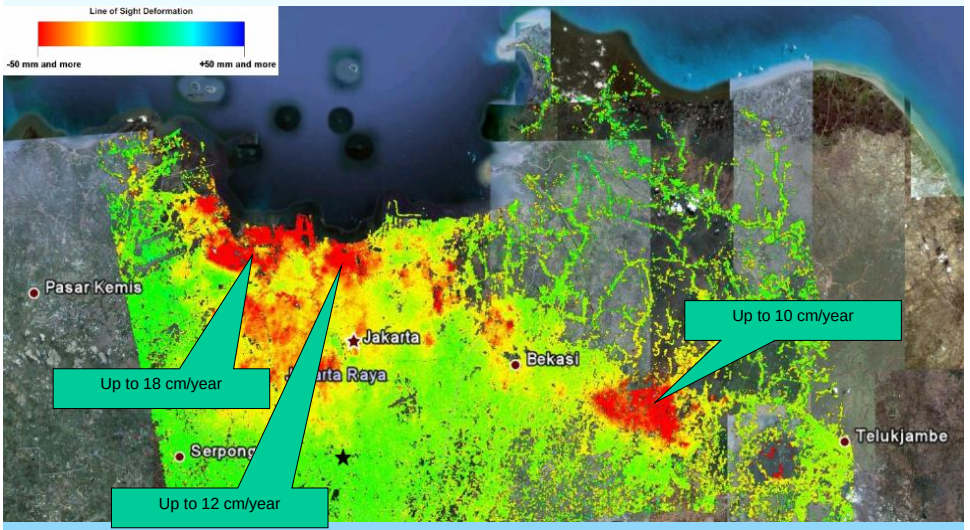
- Mostly poorest people or industries:
- Vendor of water tanks: > $ 5 per m3;
- Surface water. Not healthy;
- Groundwater extraction (shallow and deep) prefered by industries. Investment cost : $ 500 - 1000.

Water supply - Groundwater extraction

- Aquifers depleted;
- Salt water intrusion
- Land subsidence.



Water supply - land subsidence Jakarta



Overview water supply

	Indicator	Unit	Direction of preference
Water supply (intake, treatment, transport, use, waste water: sewage, treatment and discharge)			
1	water supply costs	euro/m^3 drinking water euro/m^3 industrial process water	$ 0.1 - 5 per m3 (tariff 1) poorest people pay more
2	contribution to climate change	CO_2-emission/m^3 water supply CO_2-emission/m^3 waste water	high losses, more emission. Emission trucks
3	future proof water intake	water intake is smaller than available water resource?	depletion aquifers
4	accessibility to water of suitable quality	% of population with reliable drinking water % of industries with suitable process water	80 % 100 %
5	water supply security	number of water supply stops per year	100 - 400 due to losses

Sanitation - sewerage

- No or limited sewerage system;
- Direct discharge into river;
- Septic tanks (maintenance).

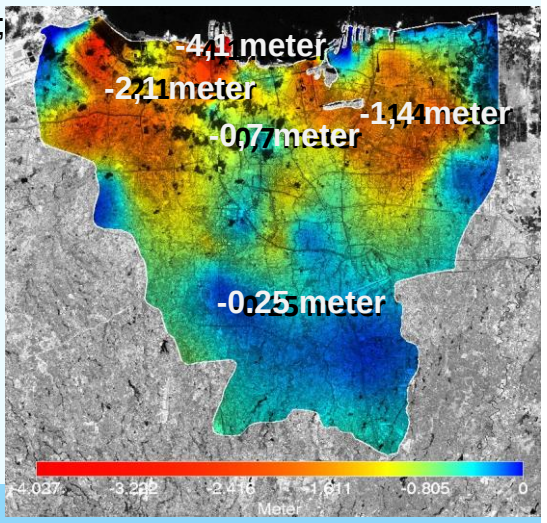
Sanitation – water quality

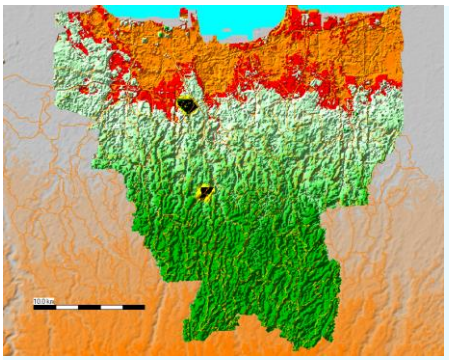
Sanitation - overview

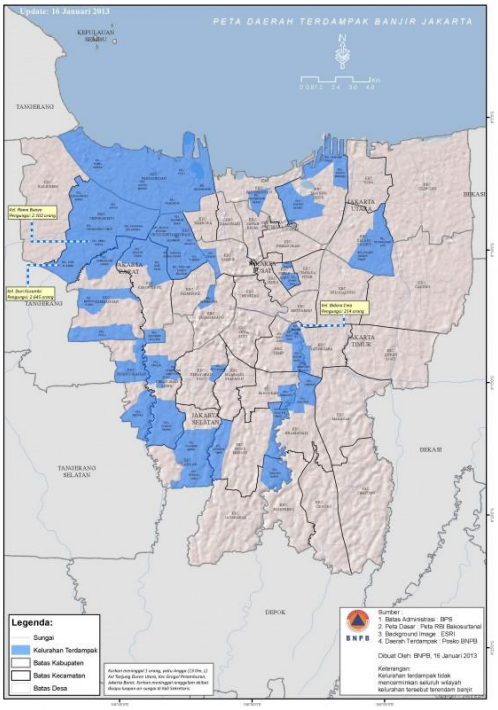
7	waste water costs	EUR/sewage connection/year	$ > 0
8	access to safe sanitation	% households and industries connected to sewage or comparable sanitation systems	
9	sewage capacity	number of untreated discharge to surface water incidents per year	> 50%
10	effluent quality	effluent quality is not worse than desired surface water quality of receiving surface water:	
11	reuse of effluent	% of effluent reused	

Surface and groundwatersystem

- Subsidence max. 4 m;
- 5-6 m predicted







Flood

- Damage (1-4 billion $ per event)
- 20-50 casualties per event
- Large economic impact to industries
- 4 million people in flood prone area

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Ecology

- Limited green embankments;
- Low ecological value

Overview

surface water management costs	euro/person//year	$ 0
flood risk	expected flood damage (euro/year)	$ 700 million/year $ 70 person/year
water depth for ships	sufficient depth:	limited
balance recreational use and natural carrying capacity	balance:	no recreation, good balance
impact ecology		very limited
ground water management costs (quantity & quality)	euro/person/year	$ 0
ground water nuisance (or damage)	% of the city with ground water nuisance (or damage in euro/year)	
groundwater quality damage	% of the city with salty water nuisance (or crop damage/year)	salt intrusion, but no damage

Conclusions

- Water supply is not sustainable, resulting in non-sustainable water supply and large flood problems;
- Sanitation. Cost-efficient (sustainable):
  - No or low cost (positive);
  - Impact on open water and hygiene limited (too dirty);
  - No or low ecological value (only improvements with industries and waste management)

Use of indicators

- Government:
  - How to enhance sustainability;
  - Where to invest.
- Companies:
  - new factory: right location;
  - the measures to ensure future production and enhace sustainability.

Thank you

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