

GRUP DISKUSI - FORUM GURU BESAR ITB, BANDUNG 28 MEI 2016
REKLAMASI PANTAI UTARA JAKARTA

**Land Subsidence Jakarta dan
Dampaknya Terhadap Strategi Penanganan Banjir
(dari Perspektif Geotechnical Engineering)**

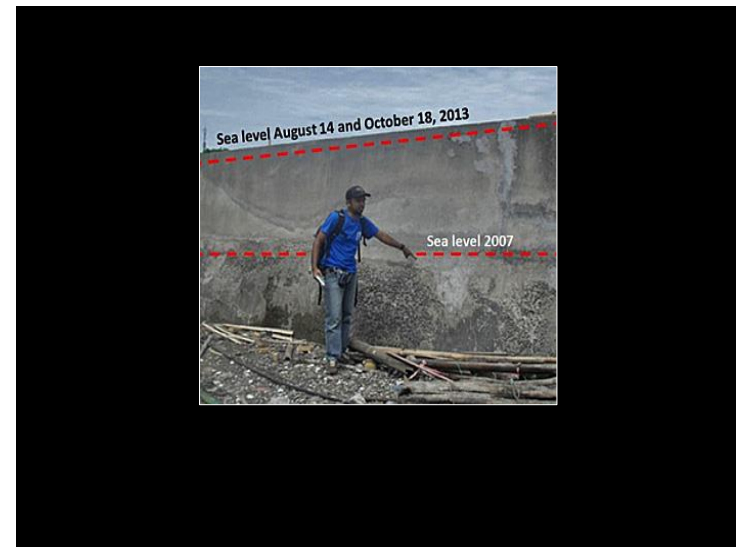
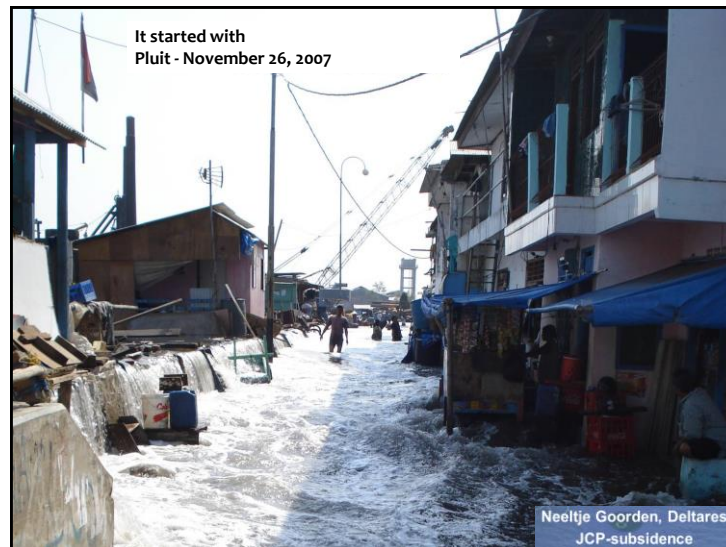
 Masyhur Irsyam



What is causing Jakarta Flood?

- Causes of flood, naturally, is not only high rainfall, sea level rise, or not functioning optimally of drainage system but is also caused by **land subsidence**
- Land subsidence phenomenon in Jakarta result in inundation area that become more widely

Masyhur Irsyam 

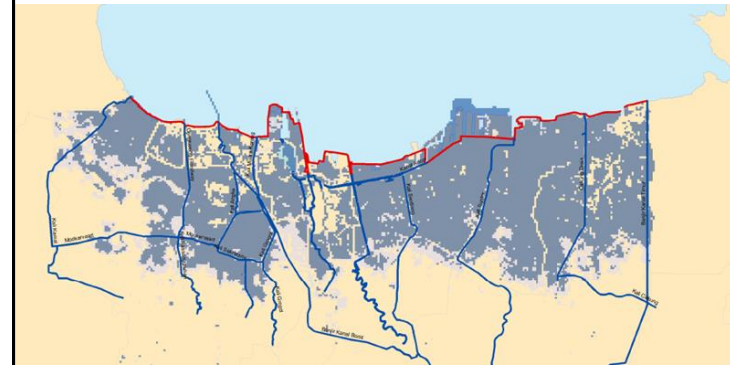


Pluit Seawall, October 18, 2013



Only 5-10 cm left

Jakarta Future Inundation (2030)



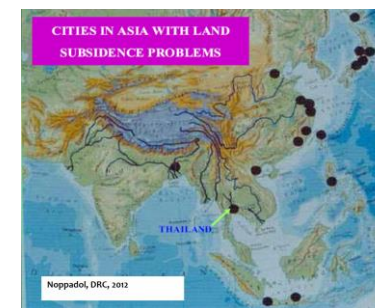
Sumber :
PPT The NCICD Project: Short Term Measures (Sawarendro, Dedi Waryono, Bastien van Veen)

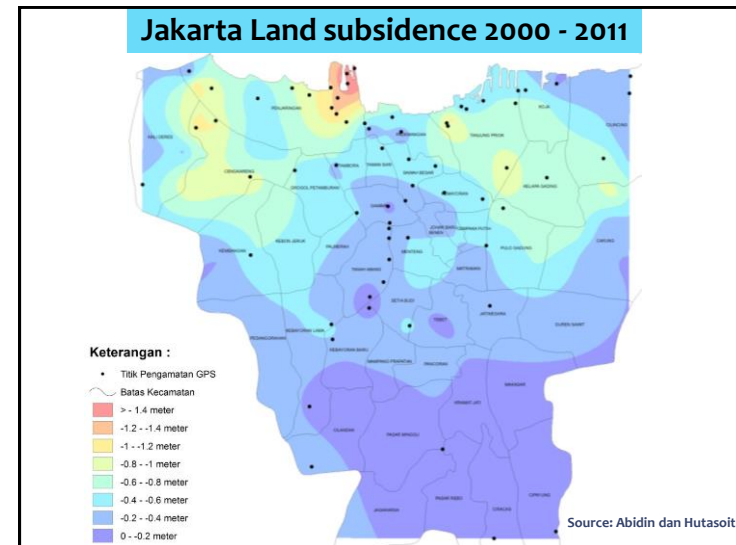
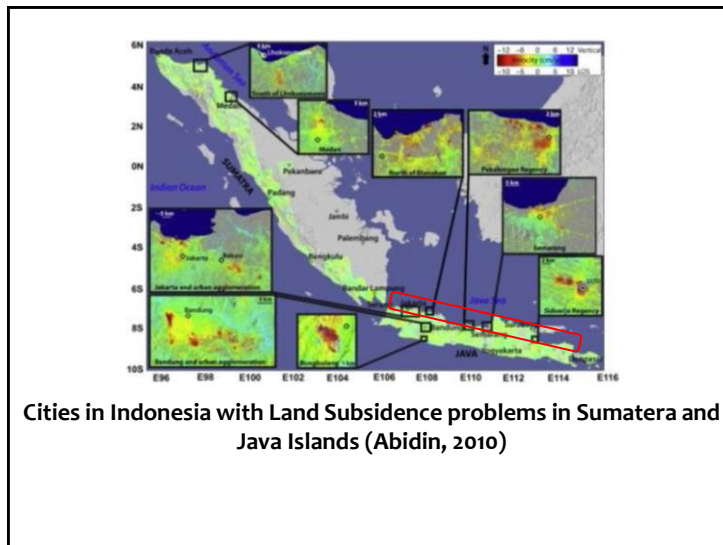
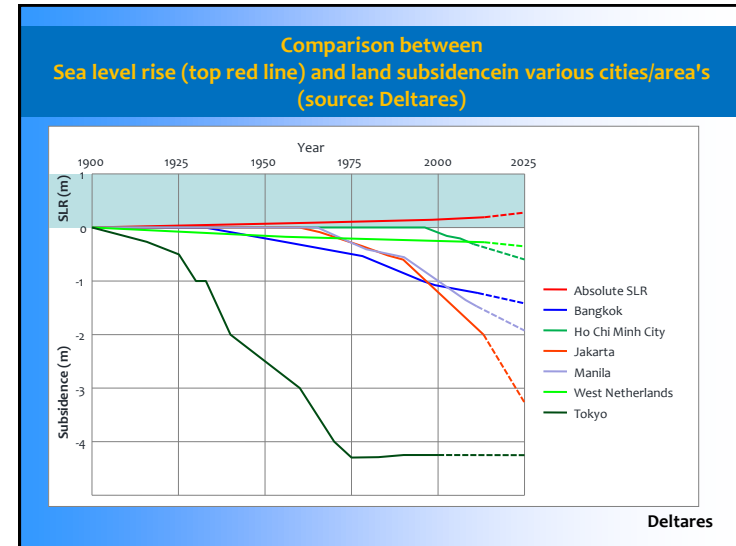
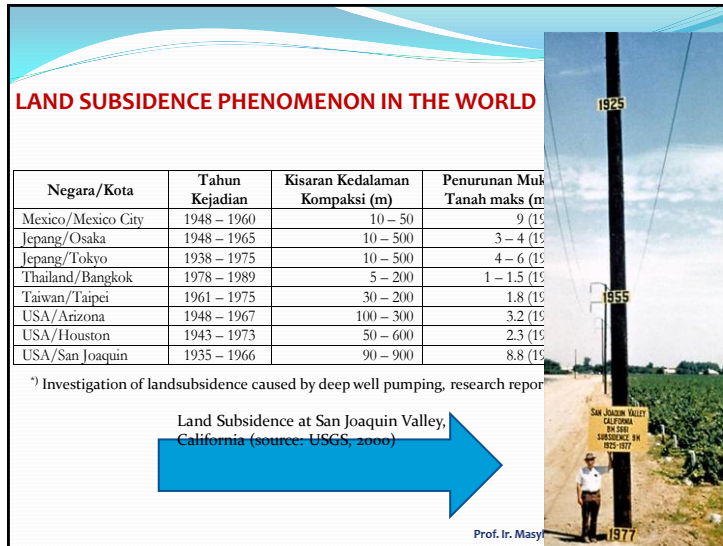
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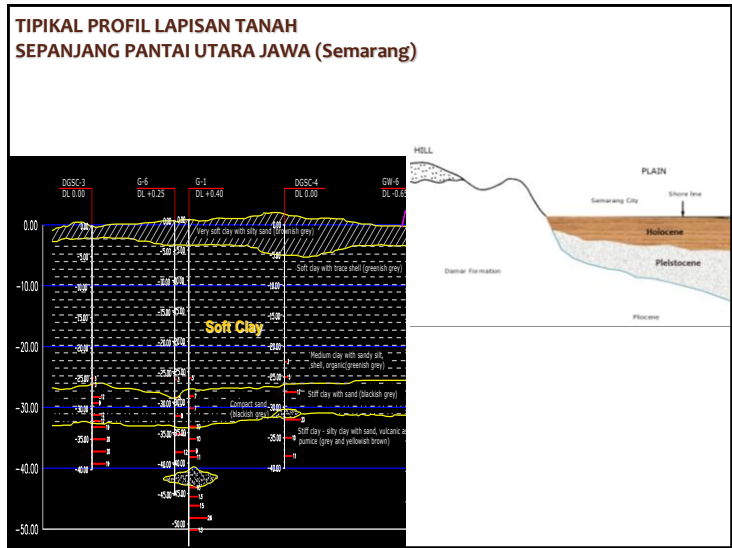
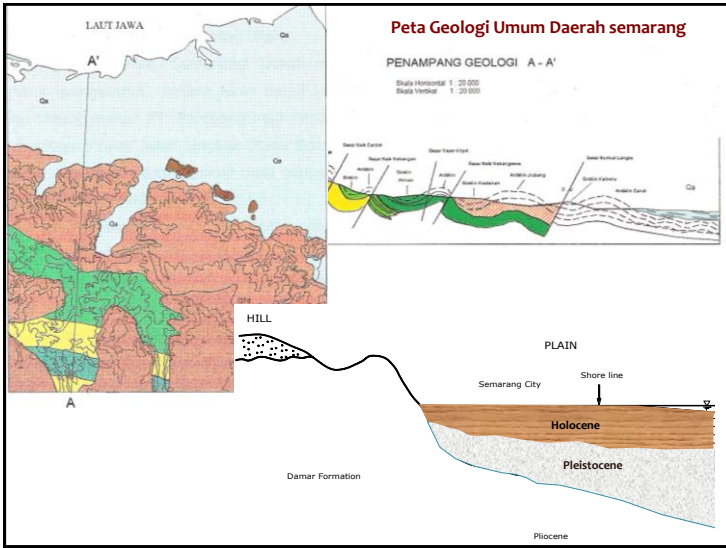
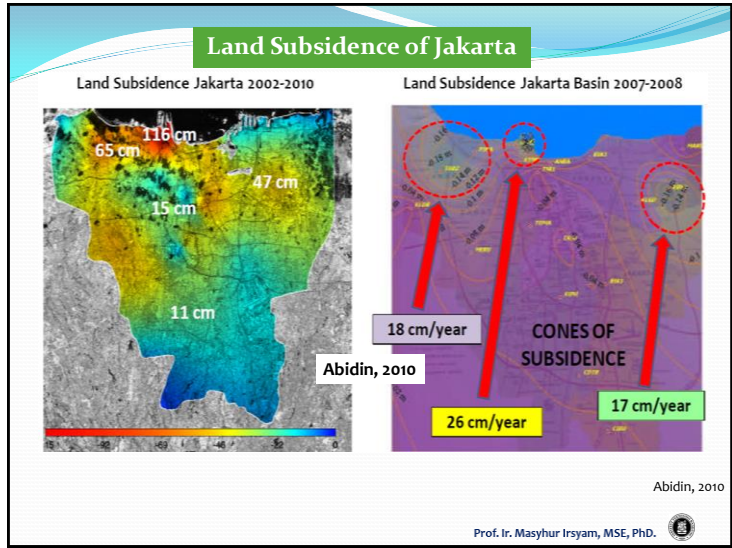
1. Land Subsidence along North Seaside of Java
2. Causes of Land Subsidence
3. The Impact of Prediction of Land Subsidence
4. Required Urgent Information

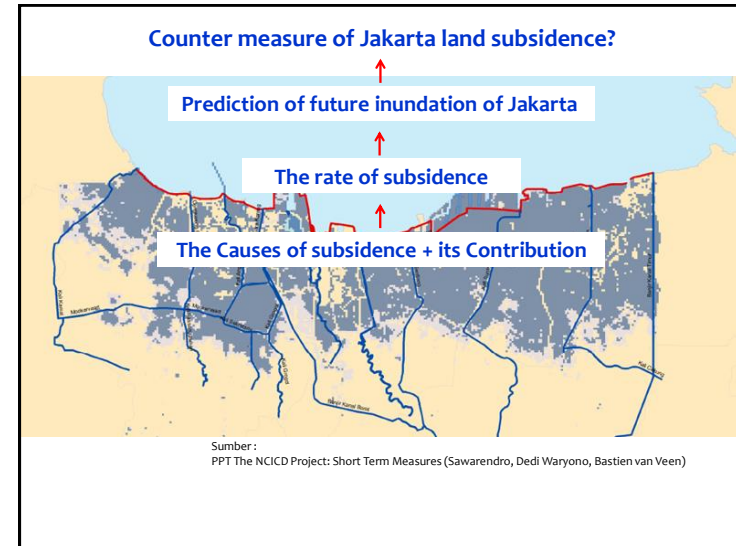
What is Land subsidence?

- Land subsidence is a gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials. (def. by USGS)
- Subsidence is a problem everywhere. This phenomena occur in many big cities in the world such as: San Joaquin Valley (California, USA), Mexico City (Mexico), Tokyo (Japan), Bangkok (Thailand), Jakarta (Indonesia) etc.









Content:

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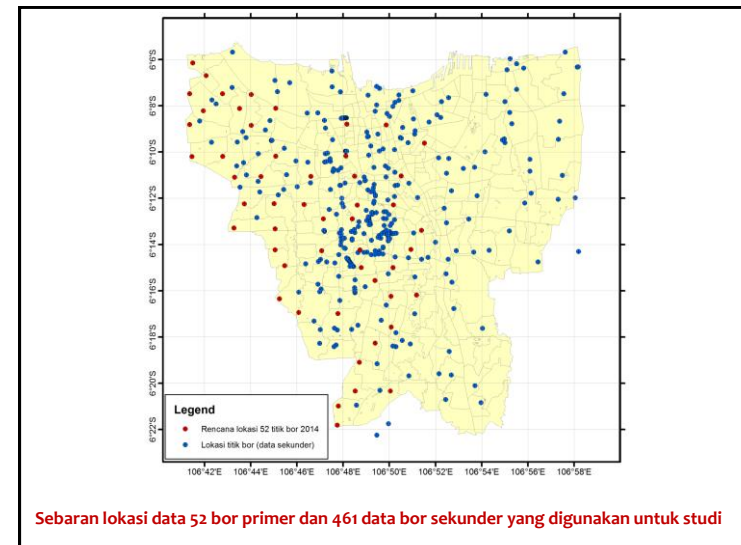
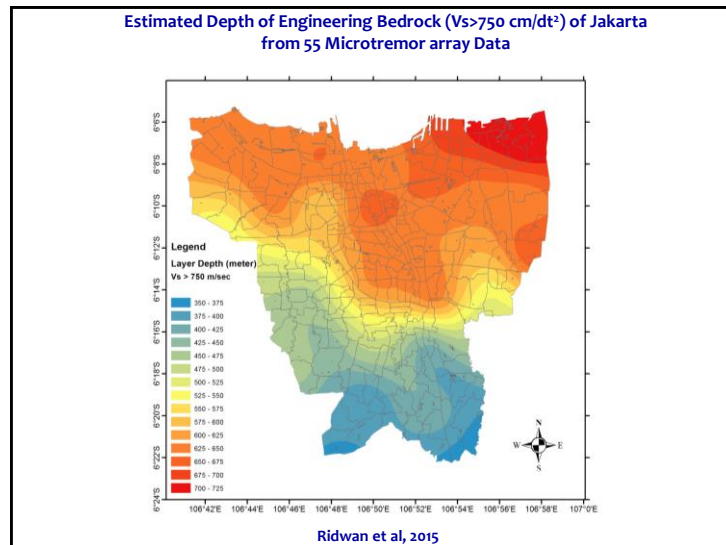
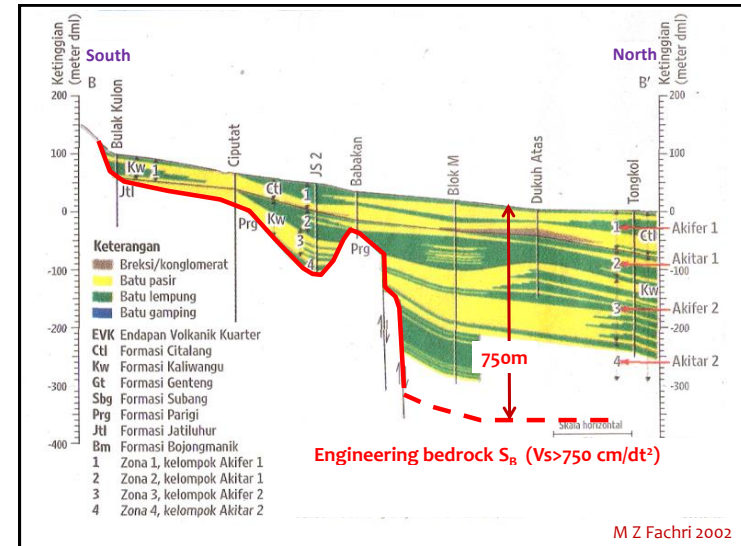
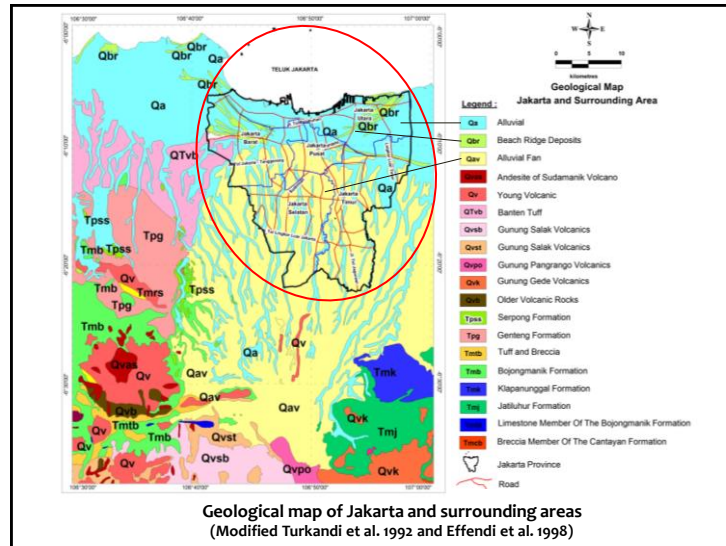
Prediscted Causes of Land Subsidence

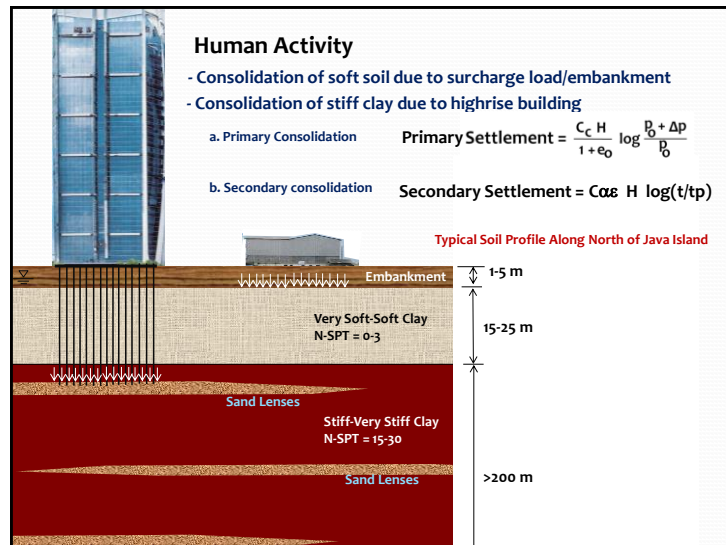
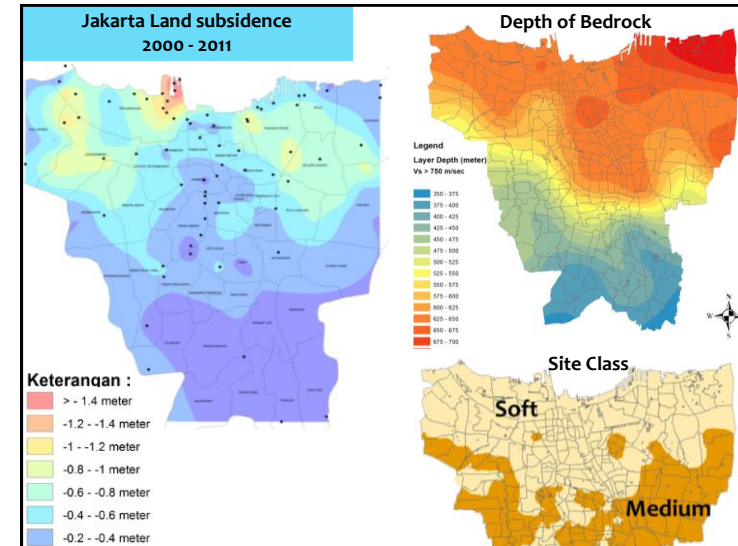
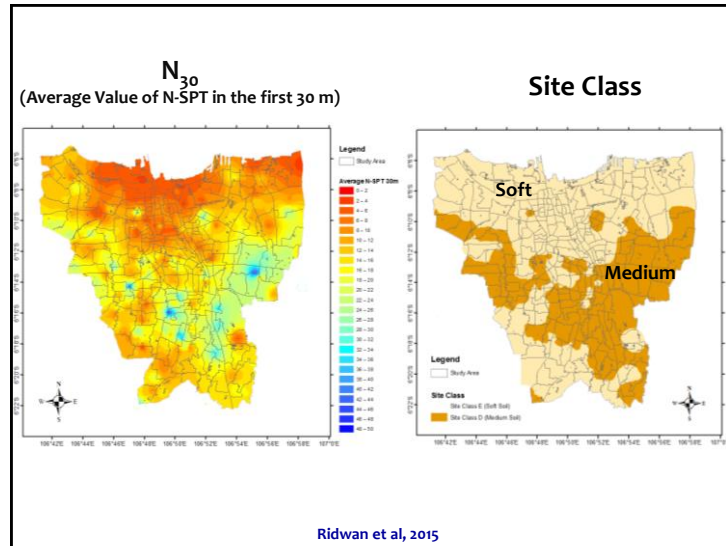
By Human Activity:

1. Soft soil (15-25m) consolidation due to surcharge load from Fill / Embankment / Reclamation
2. Deeper clay consolidation due to surcharge load from high rise buildings
3. Extraction of groundwater excessively

By Nature:

1. Natural compaction of soil, due to underconsolidated soil layer (Hutasoit, 2012)
Possibly due to secondary consolidation from overburden pressure
2. Settlement due to tectonic activity (geologists)
3. Sea water rise due to Global Warming (effect to inundation)





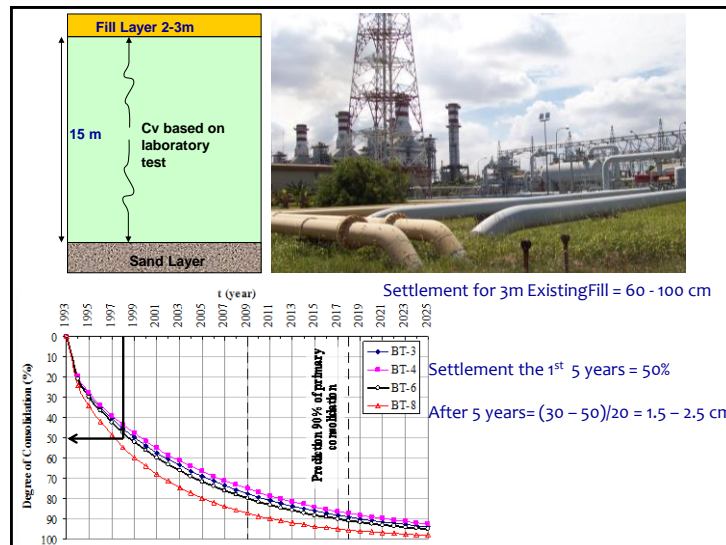
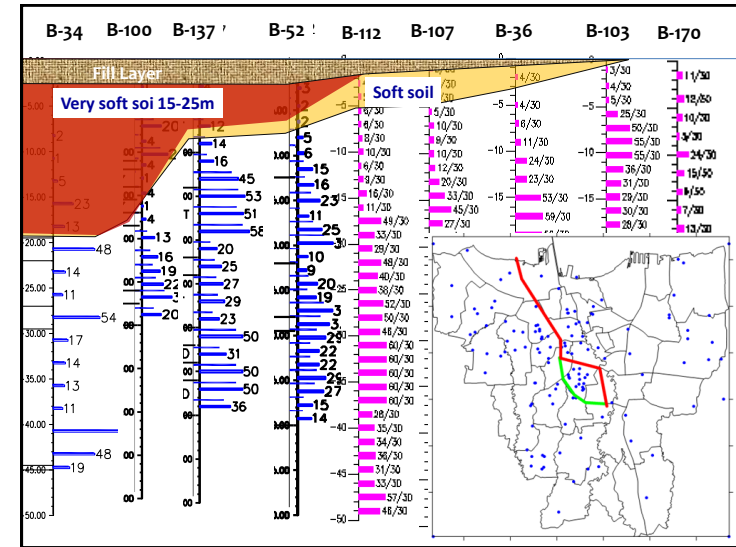
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Predicted Causes of Land Subsidence

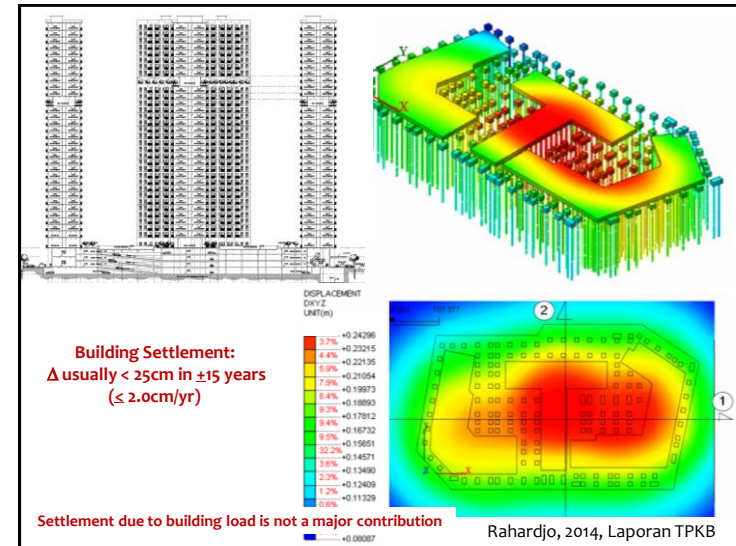
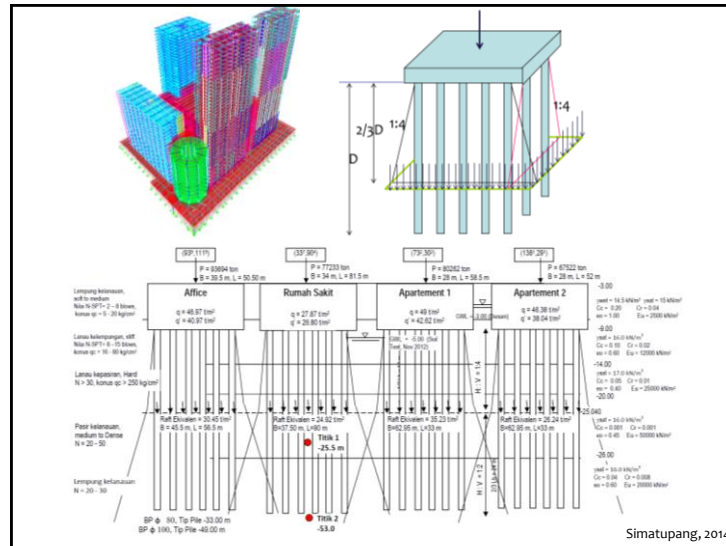
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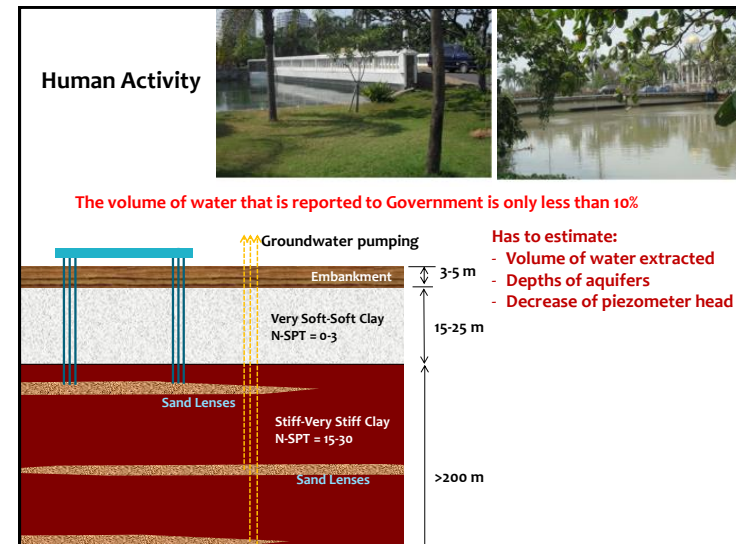
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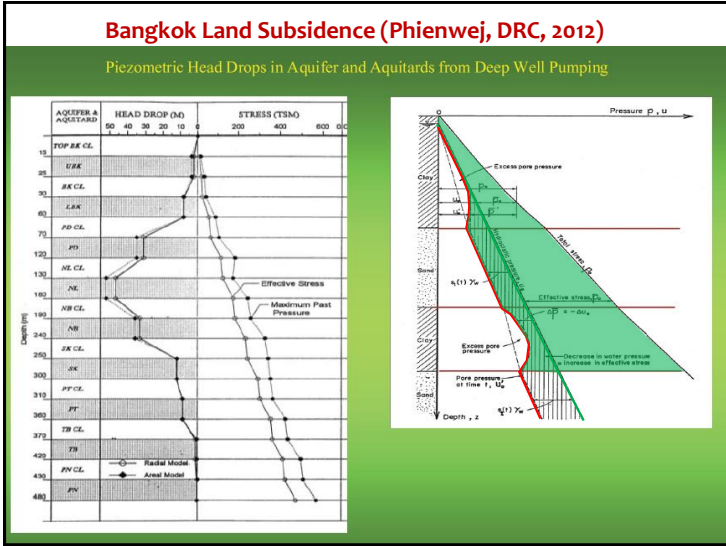
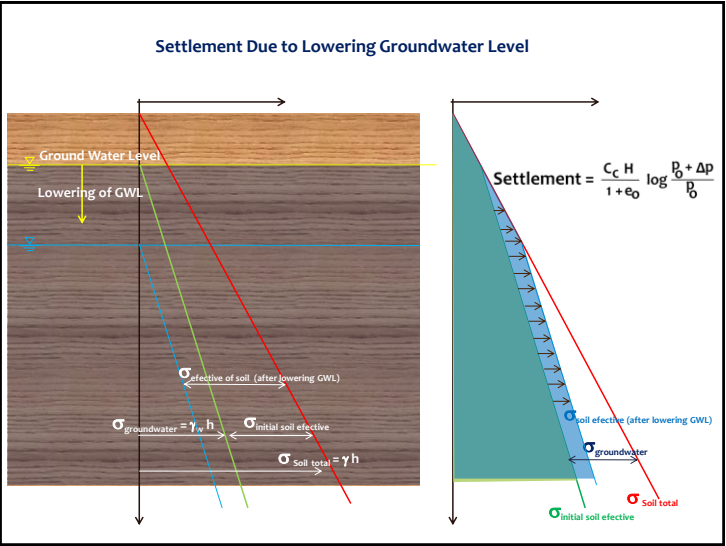
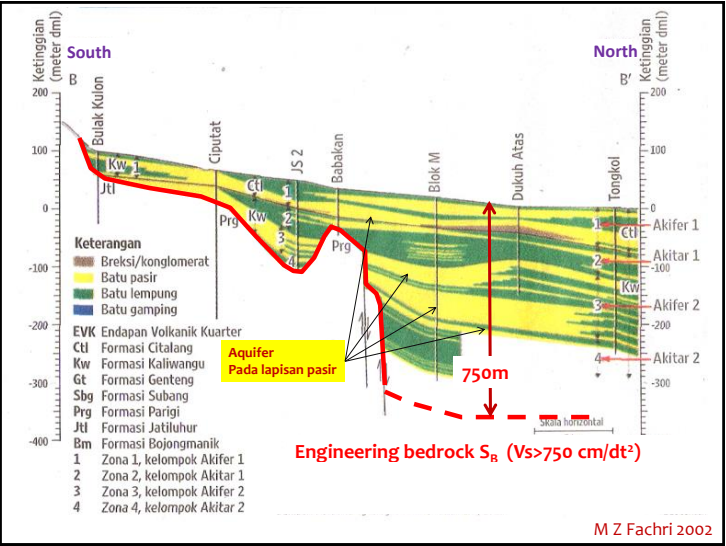
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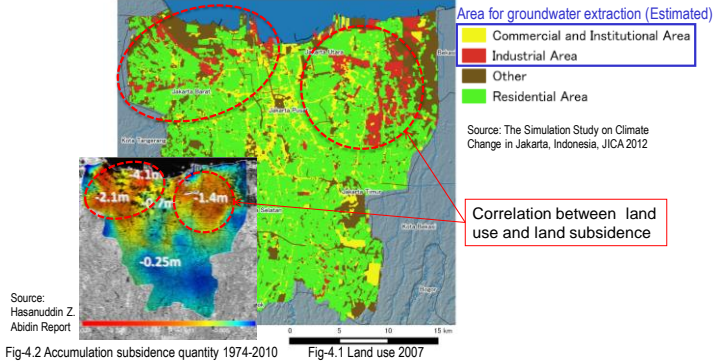




4. Results

HITACHI
Inspire the Next

Choosing area for groundwater extraction by land use
-Distributing the extracted groundwater to industrial and commercial area.



We assume that major groundwater extractions were occurred in commercial and industrial areas mainly. The map shows land subsidence occurs in these areas.

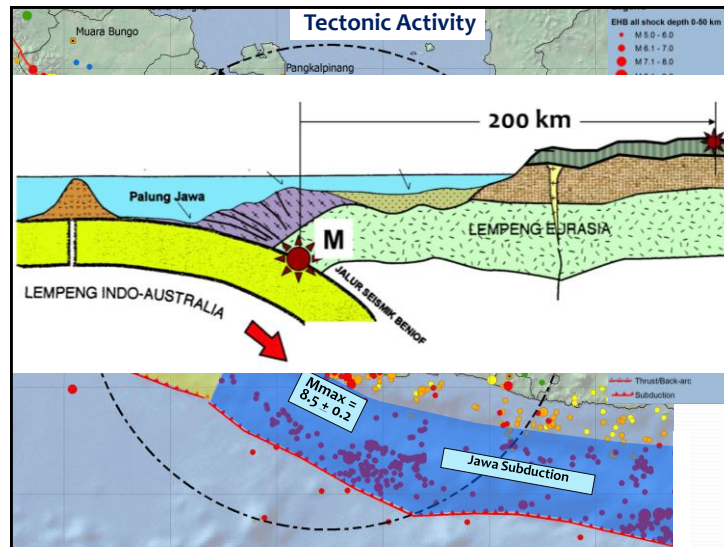
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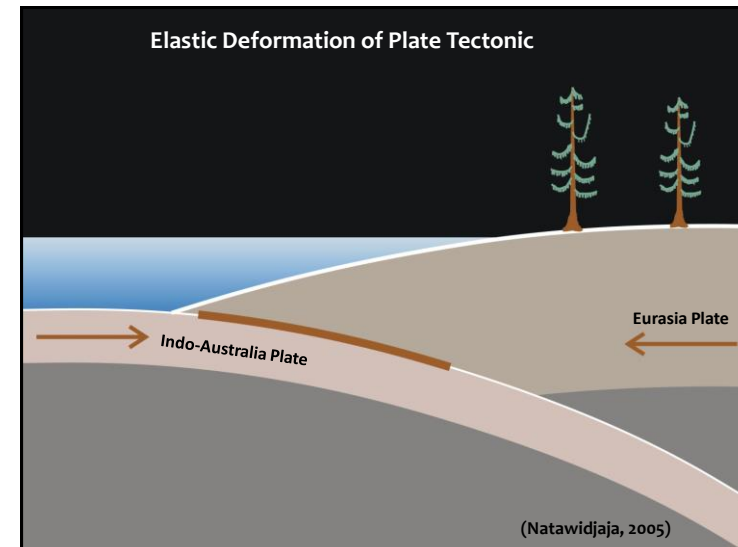
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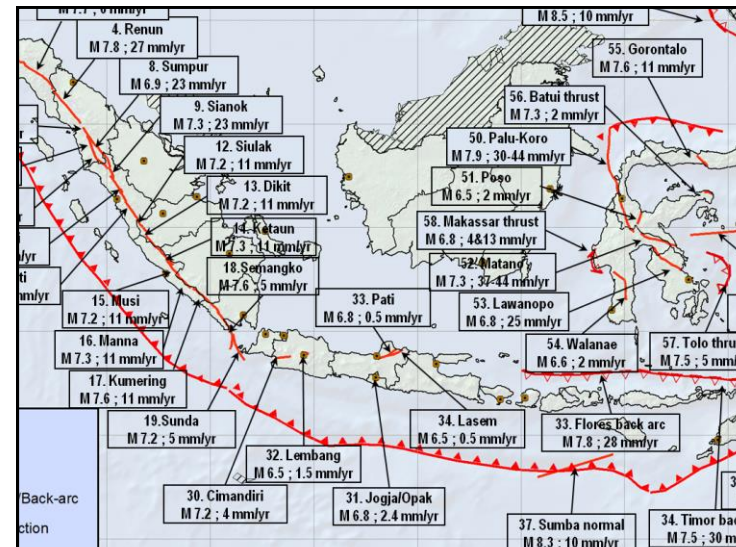
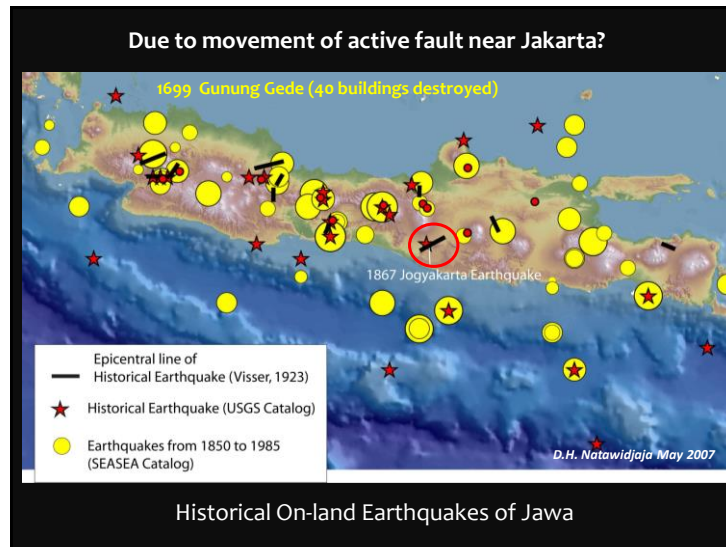
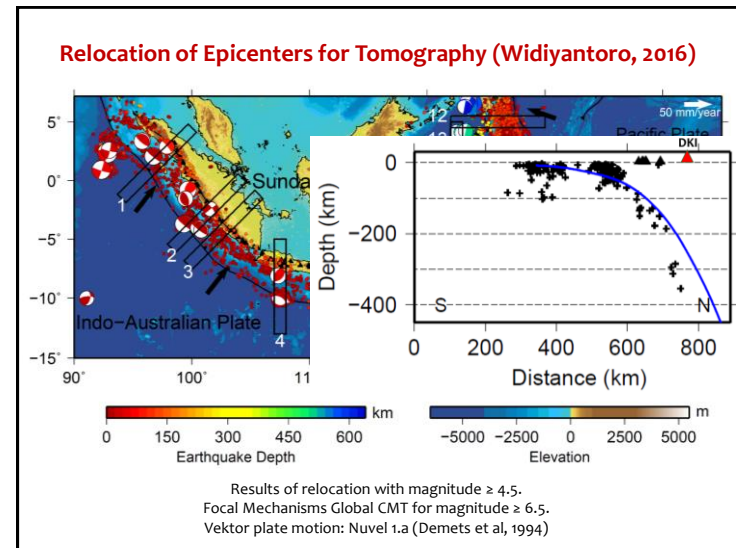
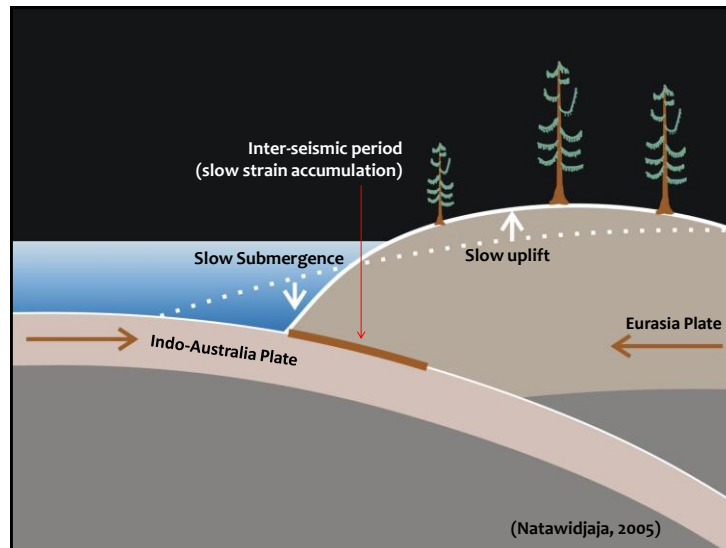
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Elastic Deformation of Plate Tectonic





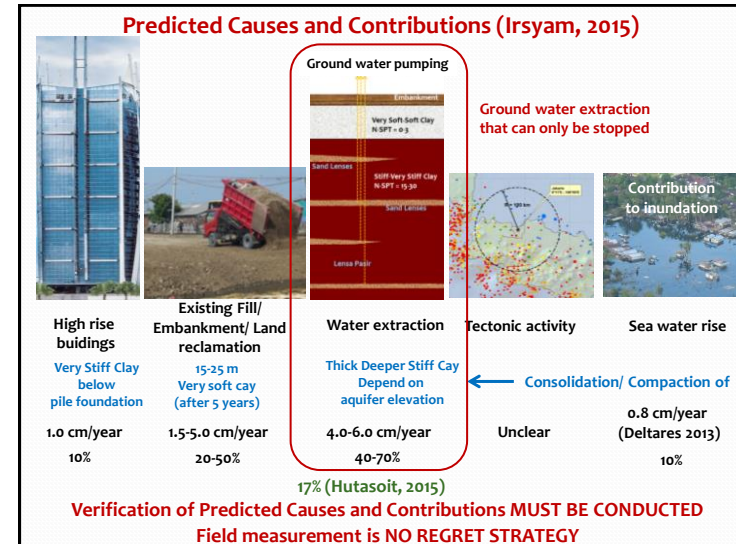
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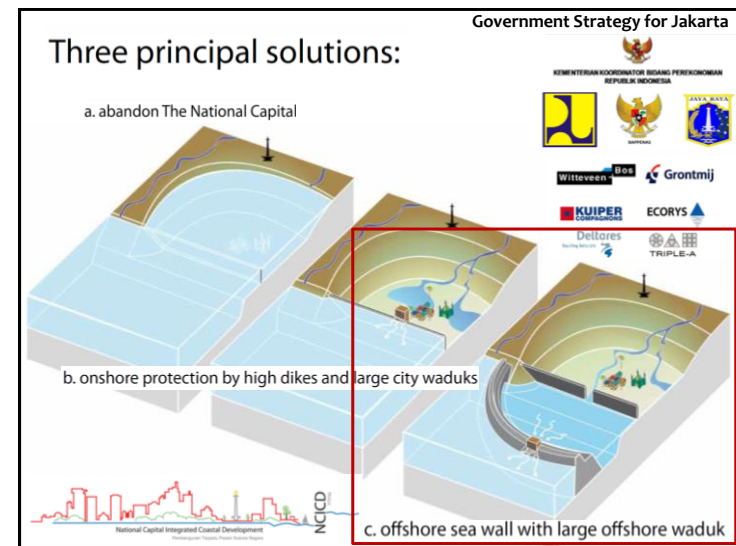
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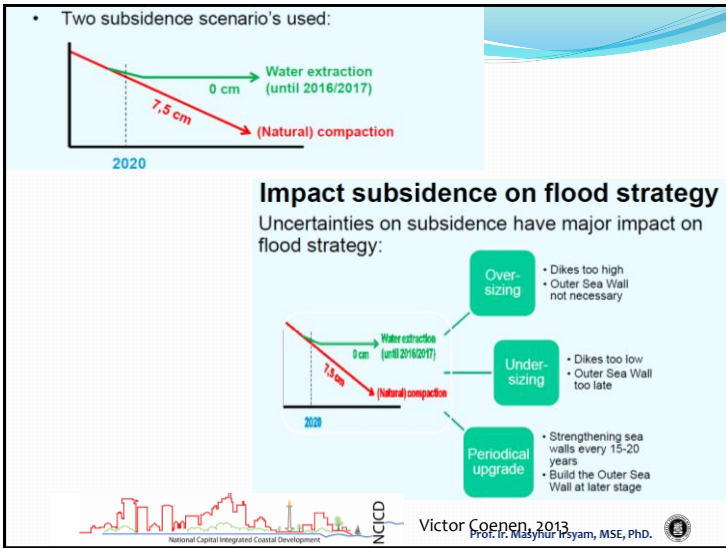
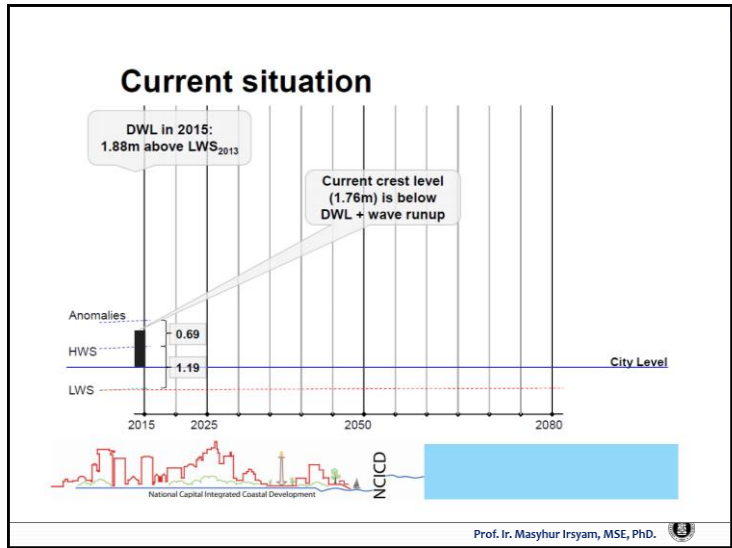
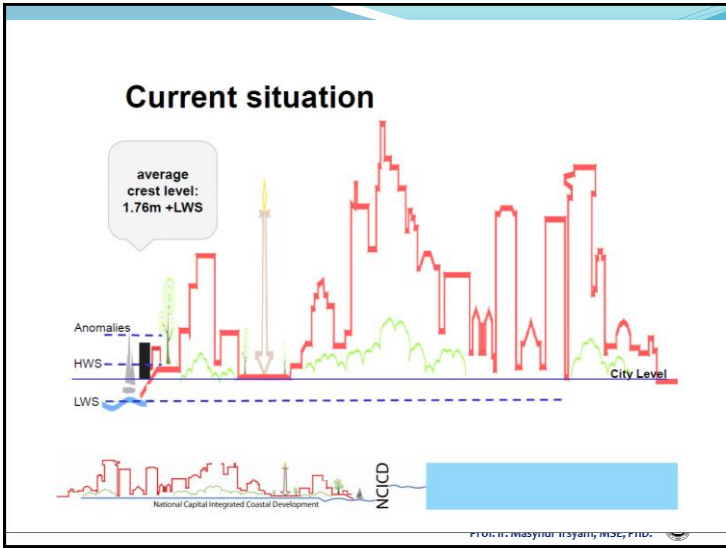
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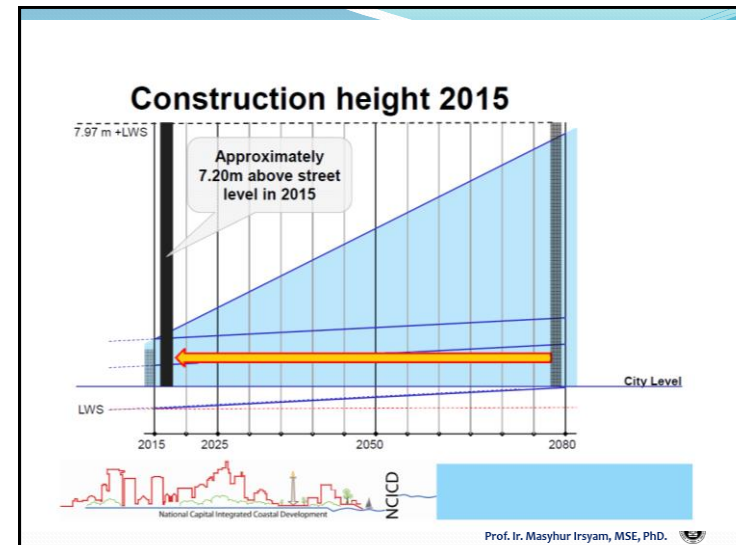
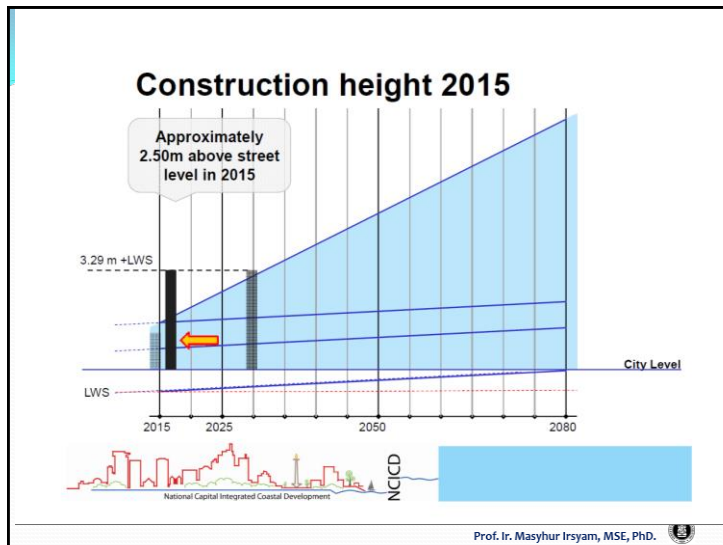
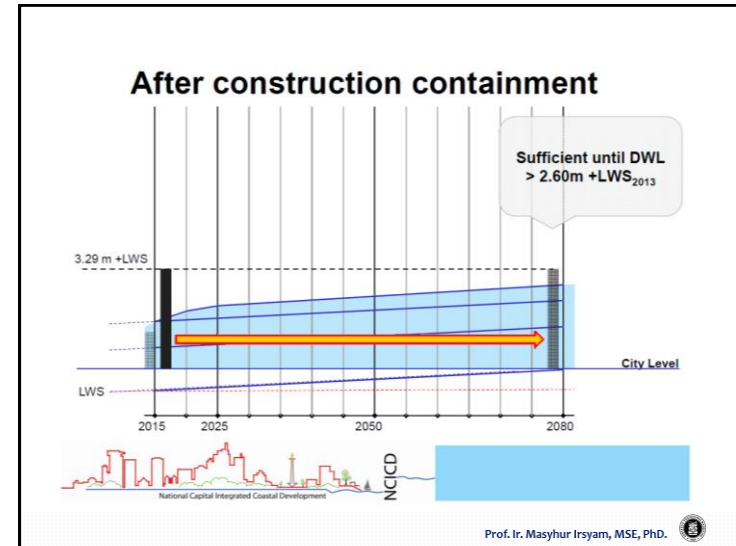
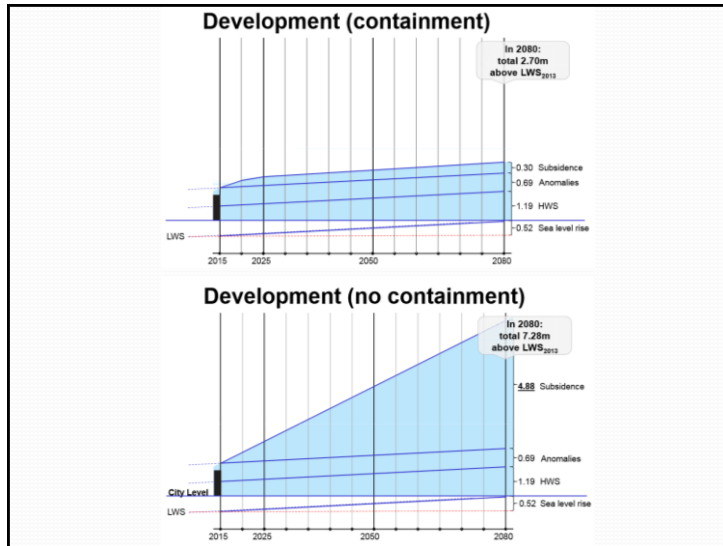


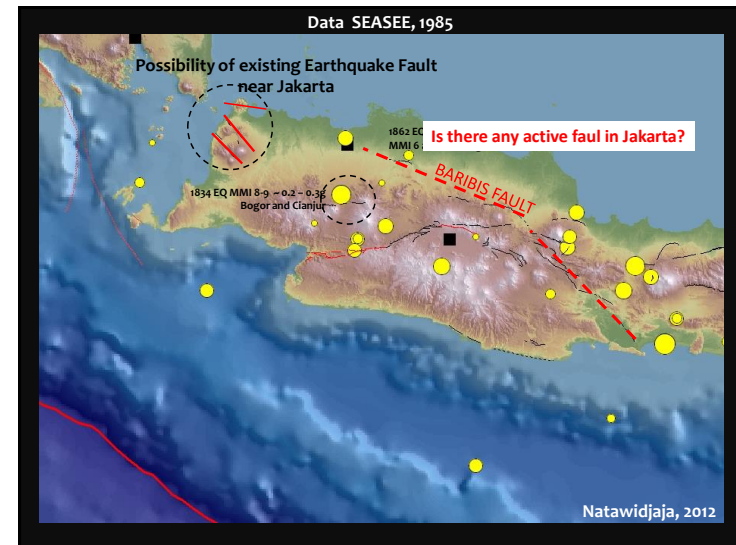
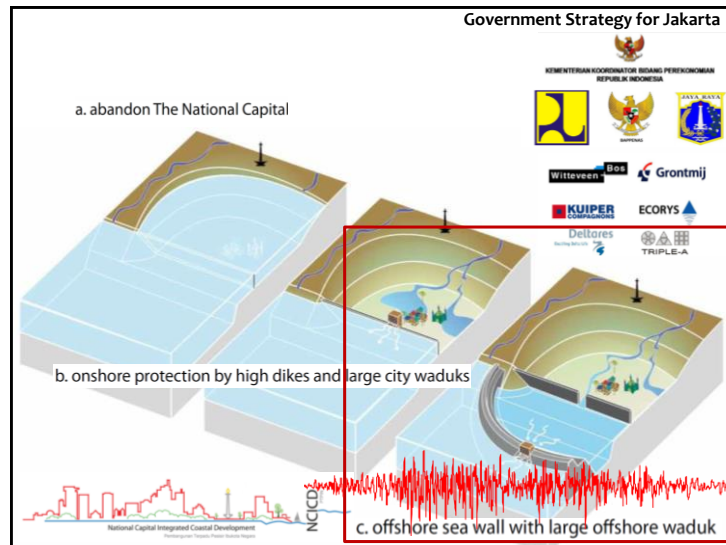
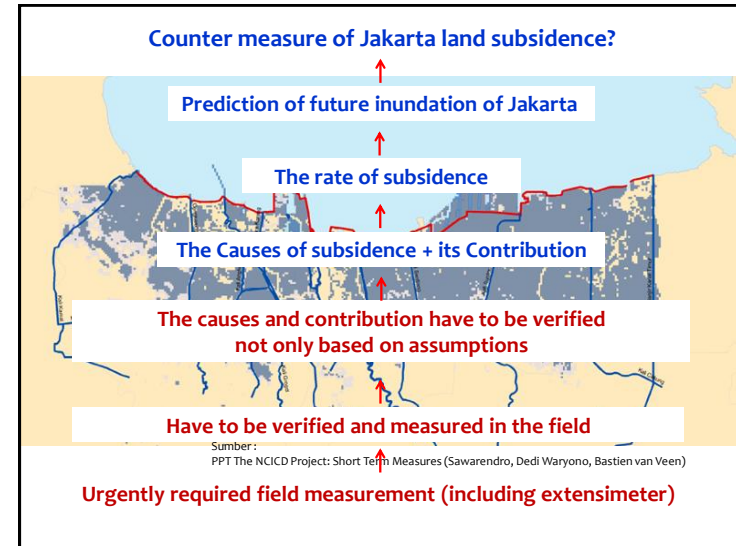
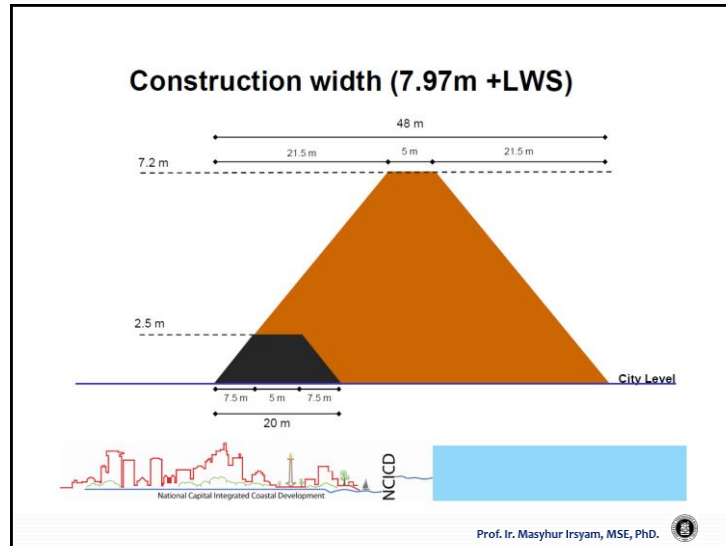
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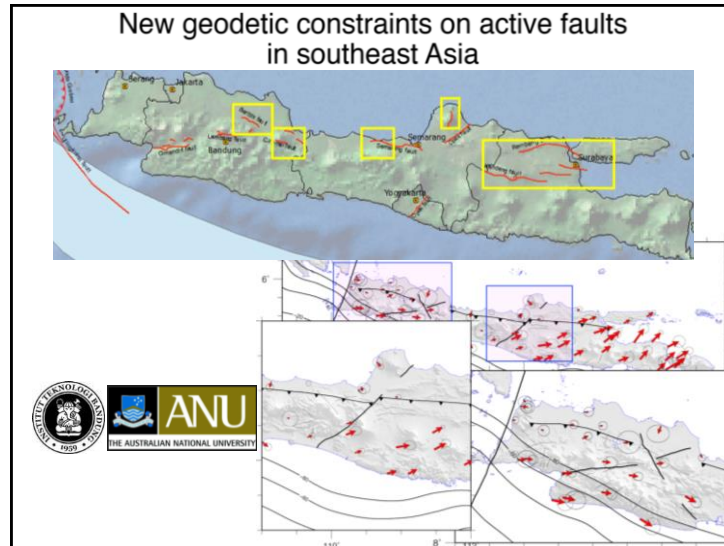
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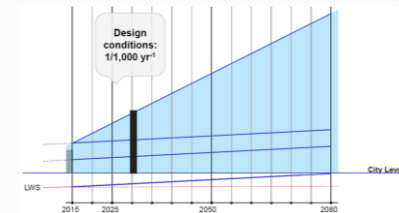
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Fundamental Issues for NCICD (from Geotechnical Engineering perspective)

- What are the causes and their contributions of subsidence?
- Why the rate of subsidence increase?
- What is the rate of subsidence appropriate for design?
- What to do to decrease or stop the subsidence?
- Is there any active fault crossing Jakarta?

Sebaiknya dijawab dahulu pertanyaan2 ini sebelum dilakukan perencanaan/ pelaksanaan lanjut



- Giant Sea Wall is designed to accommodate land subsidence in 65 years
- This wall is calculated based on assumption that the rate of settlement is 7.5cm/year
This assumption has to be verified
- In addition,
Construction of giant sea wall does not solve the land subsidence phenomena, only buys time
→ cause of problem itself has also to be solved



Urgent Actions:

- Continuous monitoring ground surface settlement by using advance methods
- Monitoring subsurface and distribution of settlement below ground surface by installing extensometer and piezometer
- Assessing the amount of water that is pumped and location of aquifers
- Obtaining soil properties by performing deep boring
- Estimating rate of settlement based on geologic and geotechnic investigation verified by result of surface and subsurface monitorings.

Recommended appropriate measures

Policy:

- Providing clean water supply for Jakarta and stopping the deep groundwater abstraction
- The Government should take the lead and stop the deep groundwater abstraction (replace by PDAM) in all Government and Public buildings.
- Charge for using groundwater and check amount of the groundwater usage
- Establishing a taskforce concentrate to handle subsidence of Jakarta