Jakarta Climate Adaptation Tools (JCAT)

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General problem

Floods Jakarta 2013: Direct damages USD3bn

Background

- To contribute to scientific knowledge and the development of methods and tools to assess flood risk in Jakarta and Indonesia

JCAT: main goals

- To develop and improve methods and tools for assisting in decision-making on flood risk adaptation
- To contribute knowledge and capacity building
- To disseminate results to stakeholders in Jakarta, and more broadly to scientists and practitioners worldwide

JCAT: main goals

- To develop and improve methods and tools for assisting in decision-making on flood risk adaptation

1. Overview of tools
2. National scale flood risk assessment tool

Overview of tools

a) Damagescanner-Jakarta

b) Economic assessment and optimistation tools

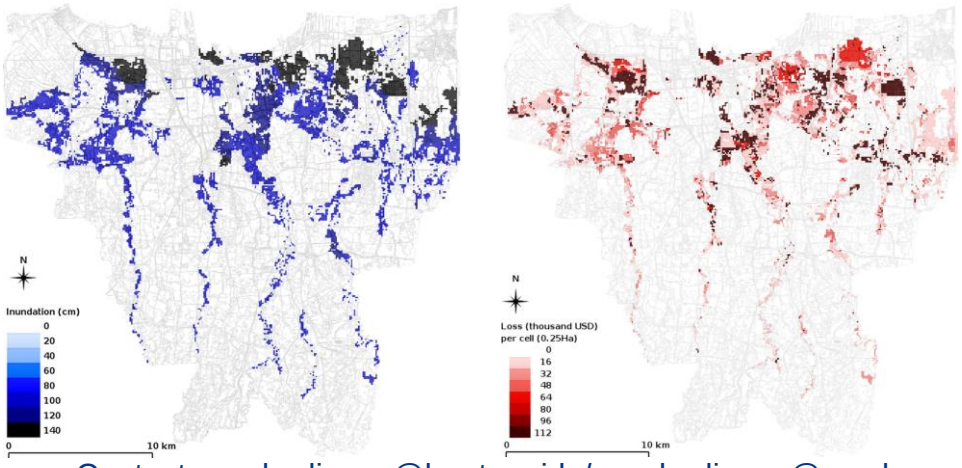
c) Coastal flood exposure tool

d) SDAS: erosion and sediment yield model

e) National scale flood risk assessment tool

Damagescanner-Jakarta

River flood risk assessment tool for Jakarta



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Economic assessment and optimisation tools

Assess costs and benefits of different adaptation options

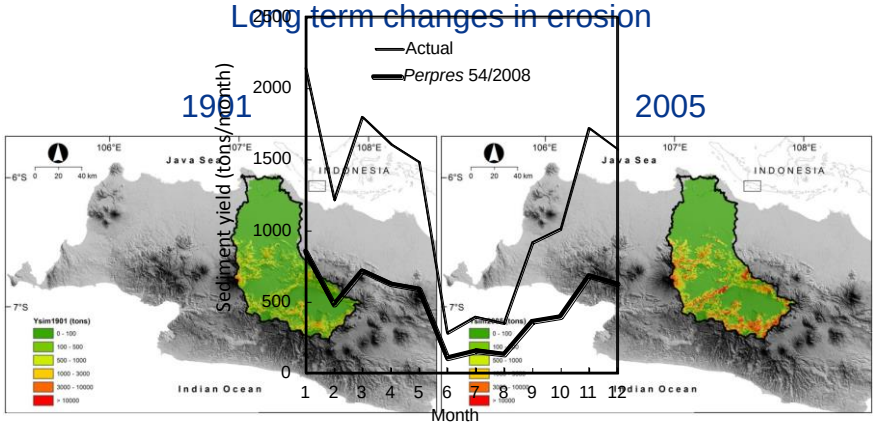
Contact: pini.wijayanti@wur.nl

SDAS

Sediment and erosion models

Effects of policy measures

Long term changes in erosion



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National scale flood risk assessment tool

National scale flood risk assessment tool

Knowledge for Climate

DeltAlliance

RISES-AM- EU Research Project

Sanne Muis, Burak Güneralp , Brenden Jongman and Philip Ward

Future trends in flood risk in Indonesia
A probabilistic approach

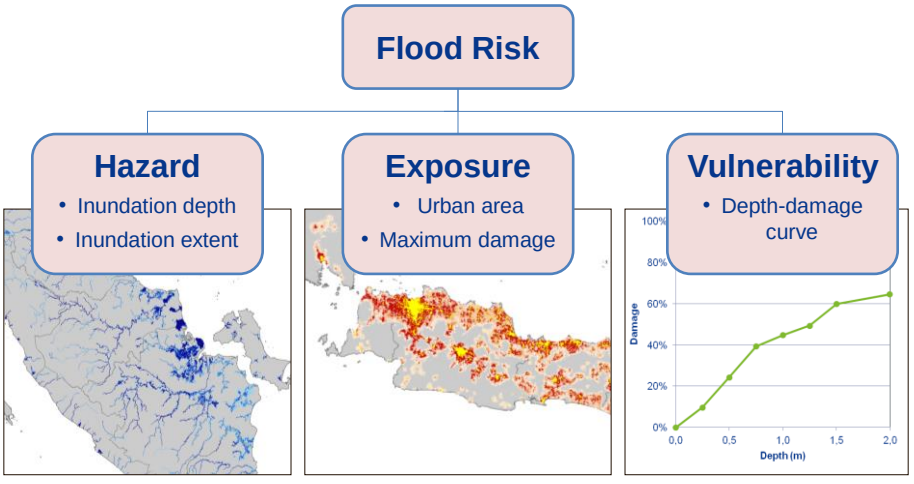
General problem

Flood North Sumatra 2013:
18,000 people displaced

Objectives

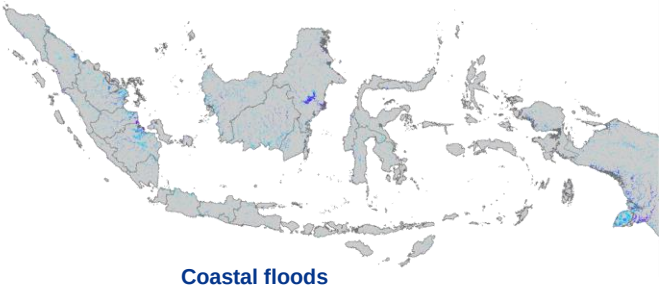
- Develop national scale flood risk assessment tool for Indonesia
- Combine information from global models with more local knowledge
- Probabilistic estimates of risk

Methods: General framework



Methods: Hazard

Hazard
- Current conditions
- Climate change



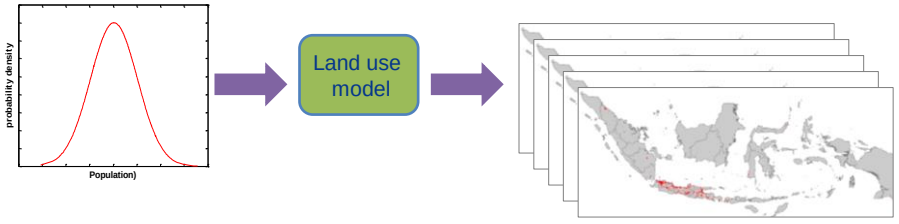
River floods
- Modelled with **GLOFRIS**
  (Winsemius et al., 2013; Ward et al., 2013)
- RPs = 2,5,10,25,50,100,250,500,1000 yrs
- CC projections
  - ISIMIP: 5 GCMs and 4 RCPs

Coastal floods
- Based on **DIVA** database
  (Hinkel and Klein, 2009)
- RPs = 1, 10, 100, 1000 yrs
- CC scenarios
  - Three sea level rise scenarios based on IPCC AR5
  - Low (0.09m); medium (0.12m); high (0.17m)

Methods: Exposure

Exposure
- Urban area

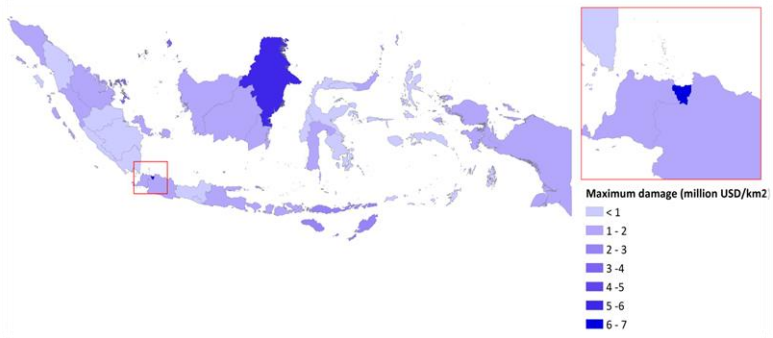
- Probabilistic projections of urban expansion for the years 2015, 2020, 2025 and 2030 (ca. 2000 = baseline)
  - Based on probabilistic population projections
  - For each time-step 1000 iterations
    Seto et al. (2013)



Methods

Exposure
- Maximum damage

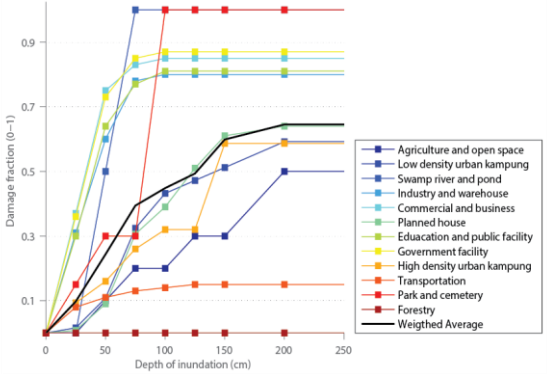
- Maximum damages
  - 6,7 million 2000USD/km2 for Jakarta *(Budiyono et al., 2014)*
  - Scaled per province based on regional GDP per capita



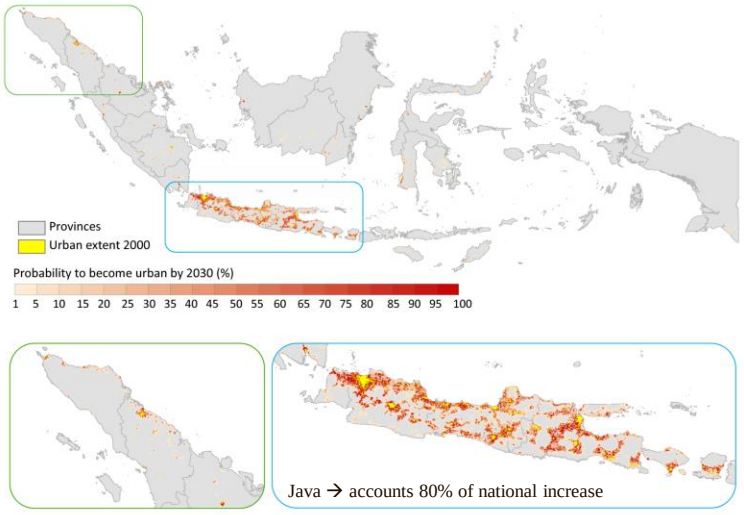
Methods

Vulnerability
- Stage-damage curve

- Based on depth-damage functions Jakarta *(Budiyono et al., 2014)*
  - From expert workshops

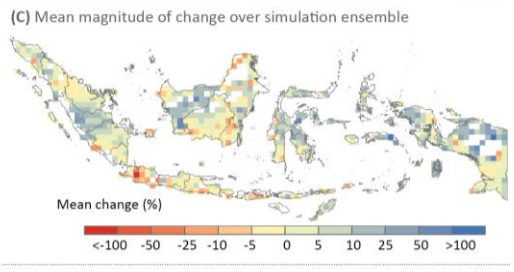


Results: Urban expansion (2000-2030)

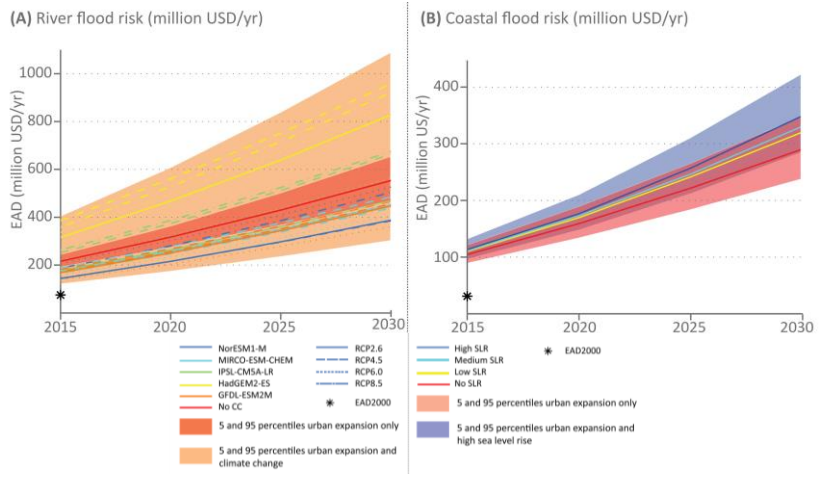


Results: Response of river floods to climate change

- Change in 1/100 year flood volume under climate change
- Results based on 5 GCMs and 4 RCPs

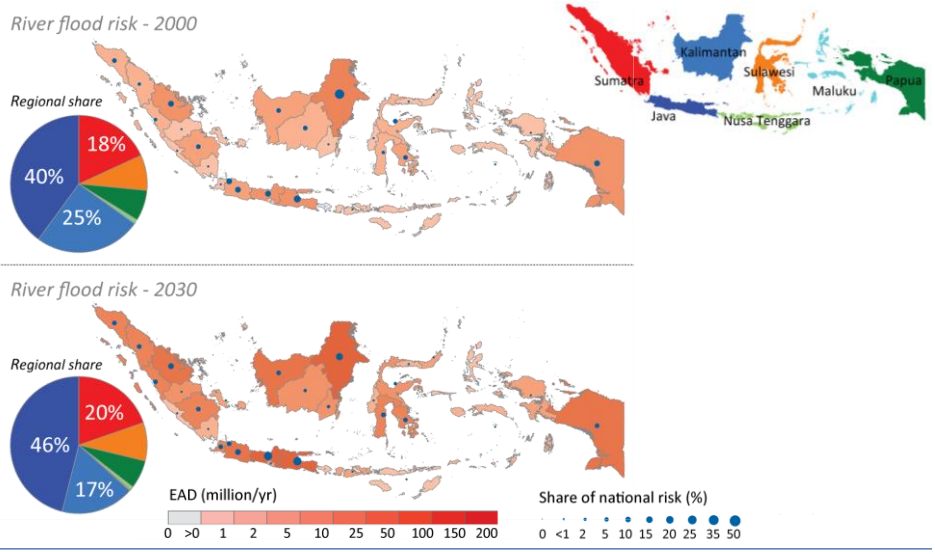


Results: Future urban damages

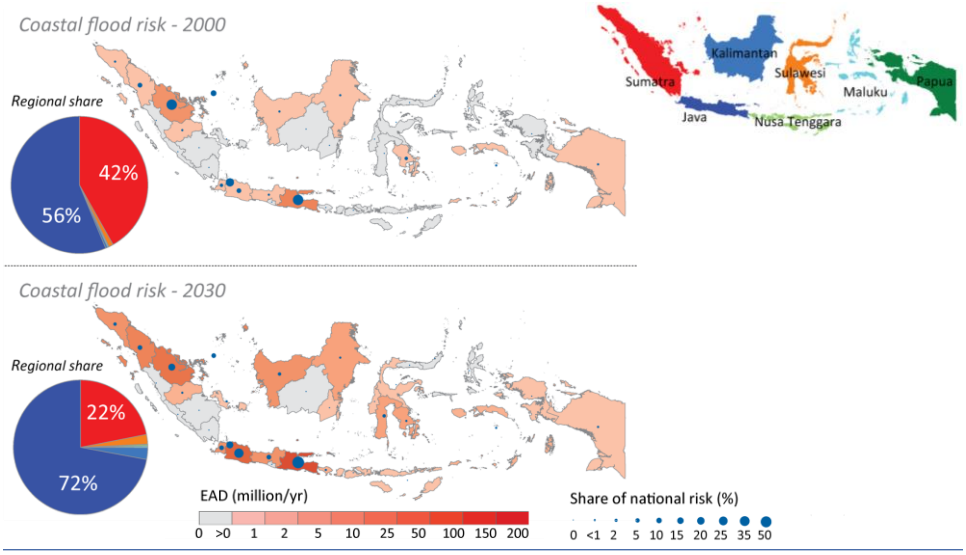


When assuming urban expansion only: by 2030, there will be a factor increase in risk larger than of 8 and 6 for coastal and river flood risk, respectively

Results: Current and future river flood risk

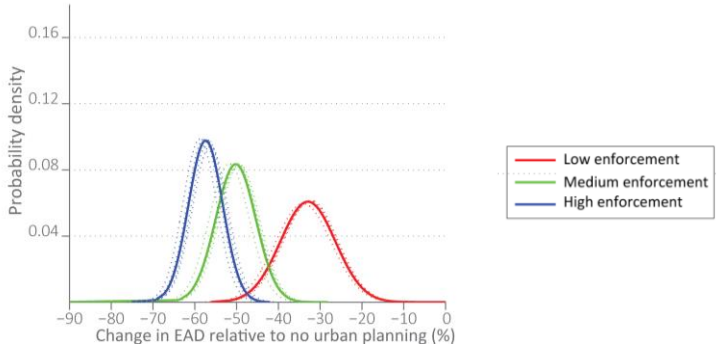


Results: Current and future coastal flood risk



Results: Effect of urban planning

Reduction in coastal flood risk



Effective strategy even under low levels of enforcement

Results: Effect of flood protection

	River floods	Coastal floods
Protection level	Reduction in EAD relative to no flood protection (%)	
1/10	53 (±0.28)	63 (±0.10)
1/50	86 (±0.14)	91 (±0.07)
1/100	93 (±0.08)	95 (±0.06)

Effective adaptation measure even for relatively low protection standards

Conclusions

- **National scale flood risk assessment**
  - Rapid urban expansion
    - Particularly on Java island
  - Results in strong increases in flood risk
    - Prime driver: urban expansion: even without SLR enormous increases in expected damage
    - Impacts of climate change on flood risk still highly uncertain
    - Adaptation strategies can effectively reduce risk
- **Jakarta Climate Adaptation Tools**
  - Set of tools available for use in Jakarta
  - Interaction with users and stakeholders

Thank you!

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