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Economic Magnitude and Consequences of the Climate Change

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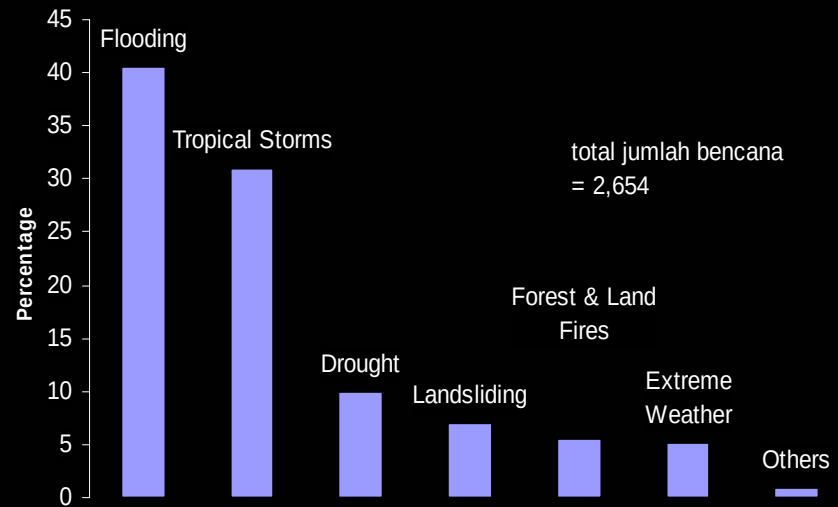
Climate change related threats to economies

- Climate change
  → threat to the economies, societies and the natural environment of the Asia-Pacific region.
  → threat to business assets and business continuity as the impacts are being felt
  → damage to assets from extreme weather, loss of agricultural outputs due to droughts, flooding, trans-boundary haze and unseasonal weather and disruption to business from infrastructure damage or disruption.

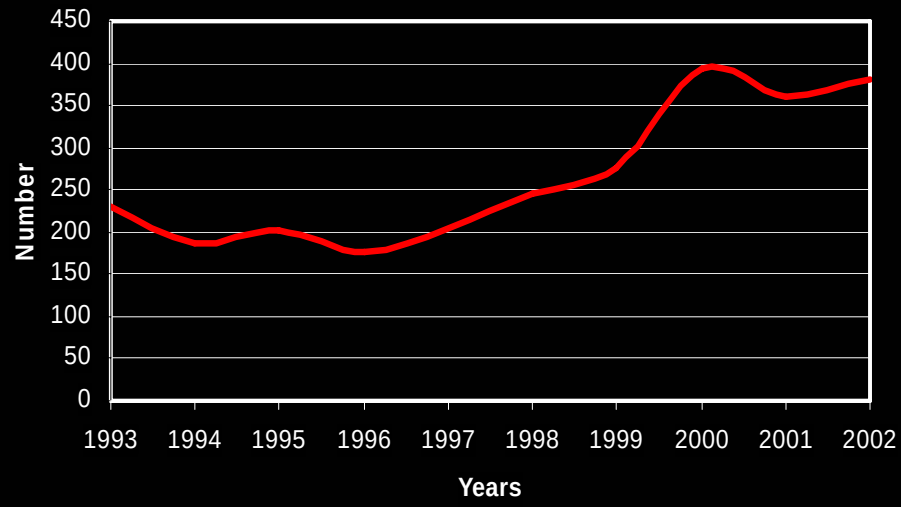
- In Indonesia, impacts already evident and will likely worsen → have disrupted and will continue to threaten the country's economy in the future.

Impacts : water & food availability

- Decreased rainfall during critical times →
  - high drought risk,
  - uncertain water availability,
  - uncertain ability to produce agricultural goods,
  - economic instability,
  - more undernourished people,
  - hindering progress against poverty and food insecurity (Wang et al., 2006)



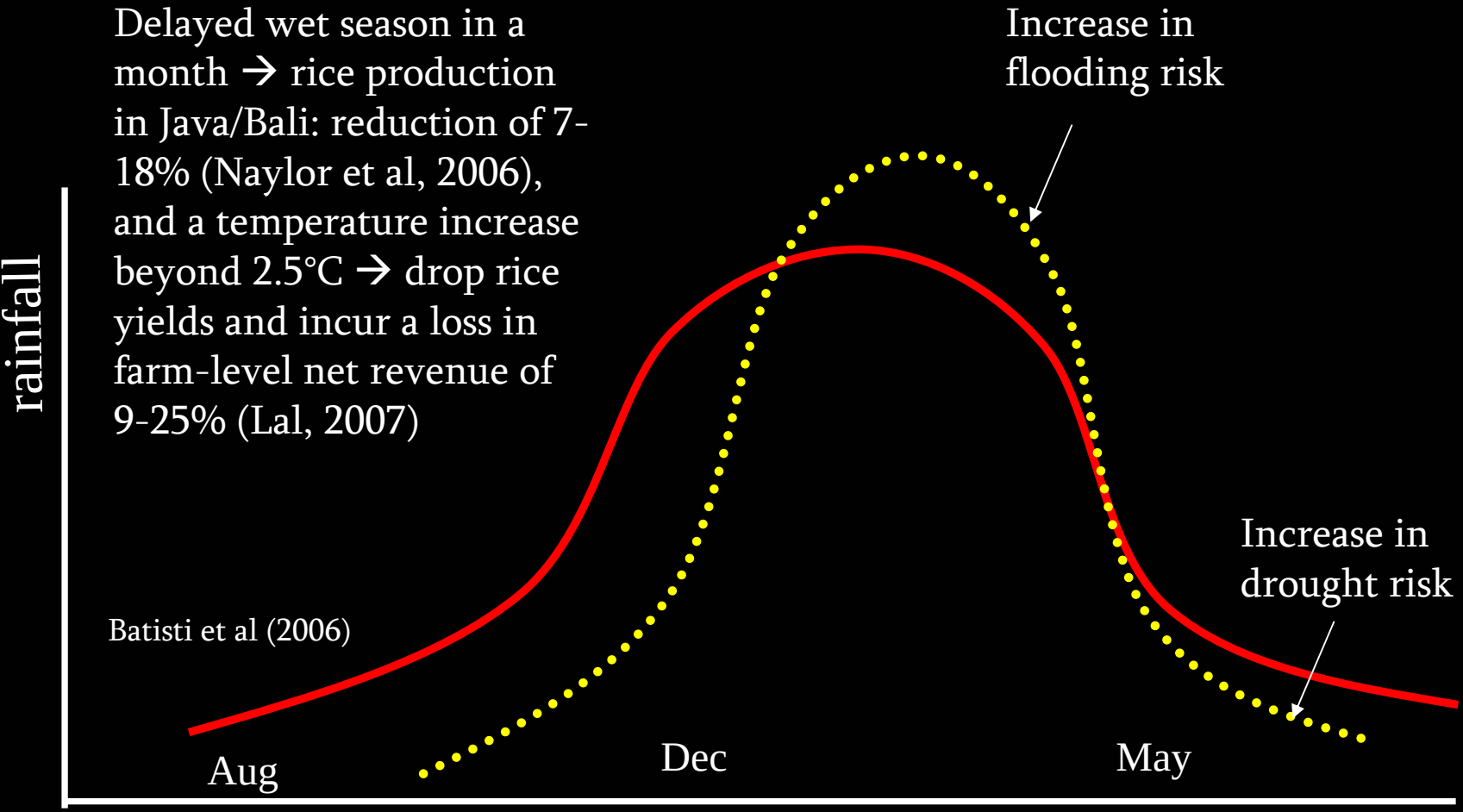
- Increased rainfall in wet times → high flood risk,
  - e.g. the Jakarta flood on 2 February 2007 inundated 70,000 houses, displaced 420,440 people, killed 69 people, losses of Rp 4.1 trillion (US$ 450 million) (WHO, 2007, Bappenas, 2007)



- Stronger, more frequent El Niño → more drying & flooding

Impacts: water & food availability

Delayed wet season in a month → rice production in Java/Bali: reduction of 7-18% (Naylor et al, 2006), and a temperature increase beyond 2.5°C → drop rice yields and incur a loss in farm-level net revenue of 9-25% (Lal, 2007)







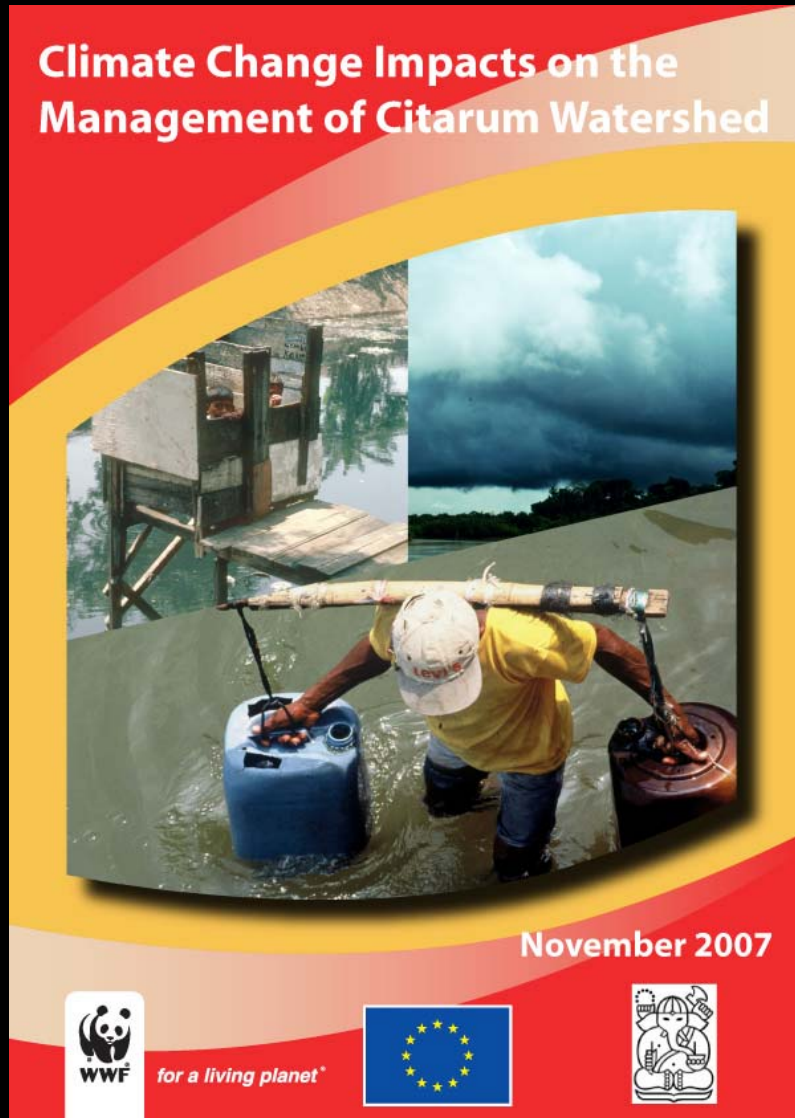


Impacts: Citarum watershed

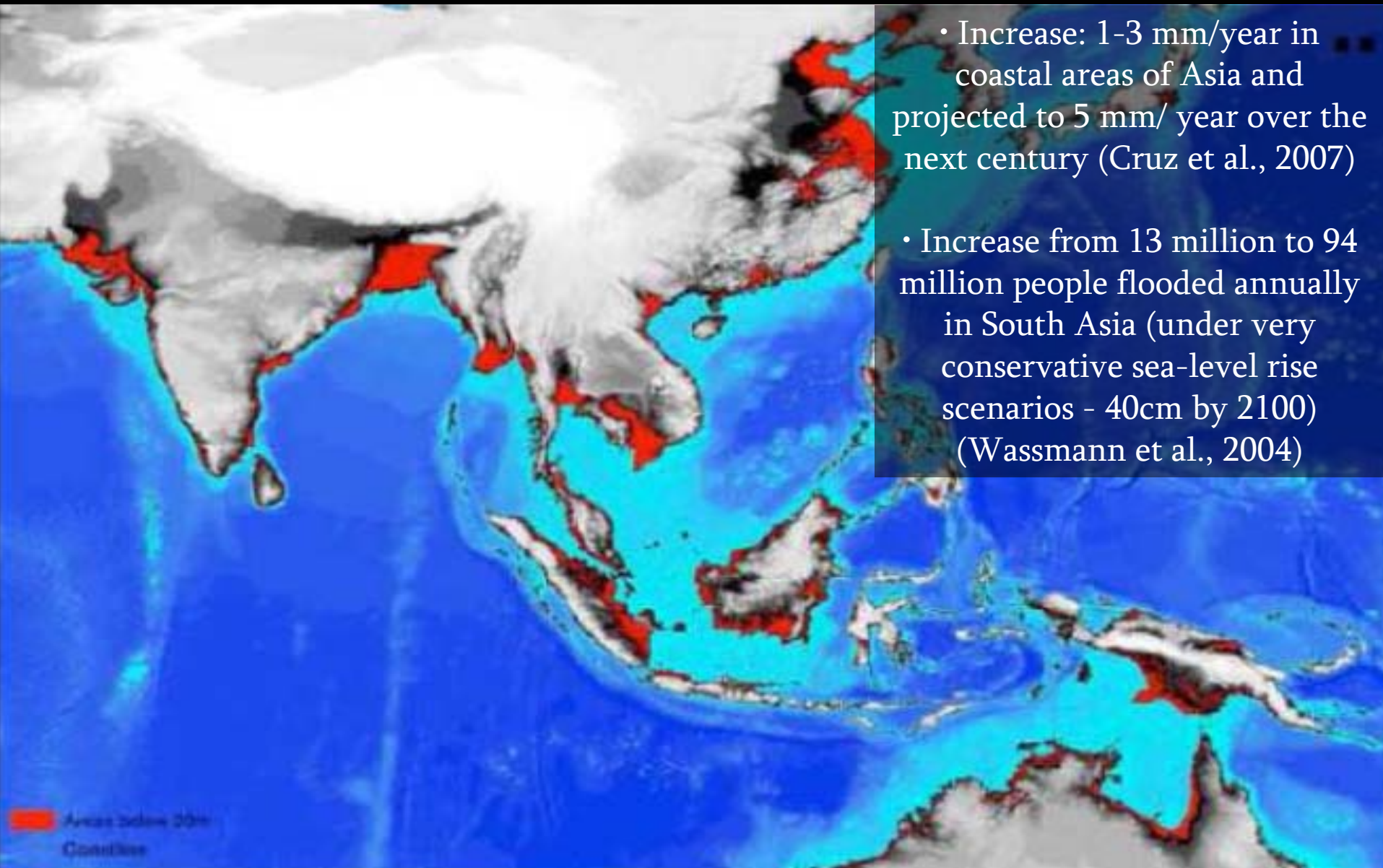
Annex: Climate Change Impacts on the Management of Citarum Watershed
(Muhammad, Susandi, Firdaus, 2007, ITB and WWF-Indonesia)

• There is a decrease of rainfall in dry season and significant increase in wet season.

• Direct run-off reaching up to 70% → increase in flooding risks.



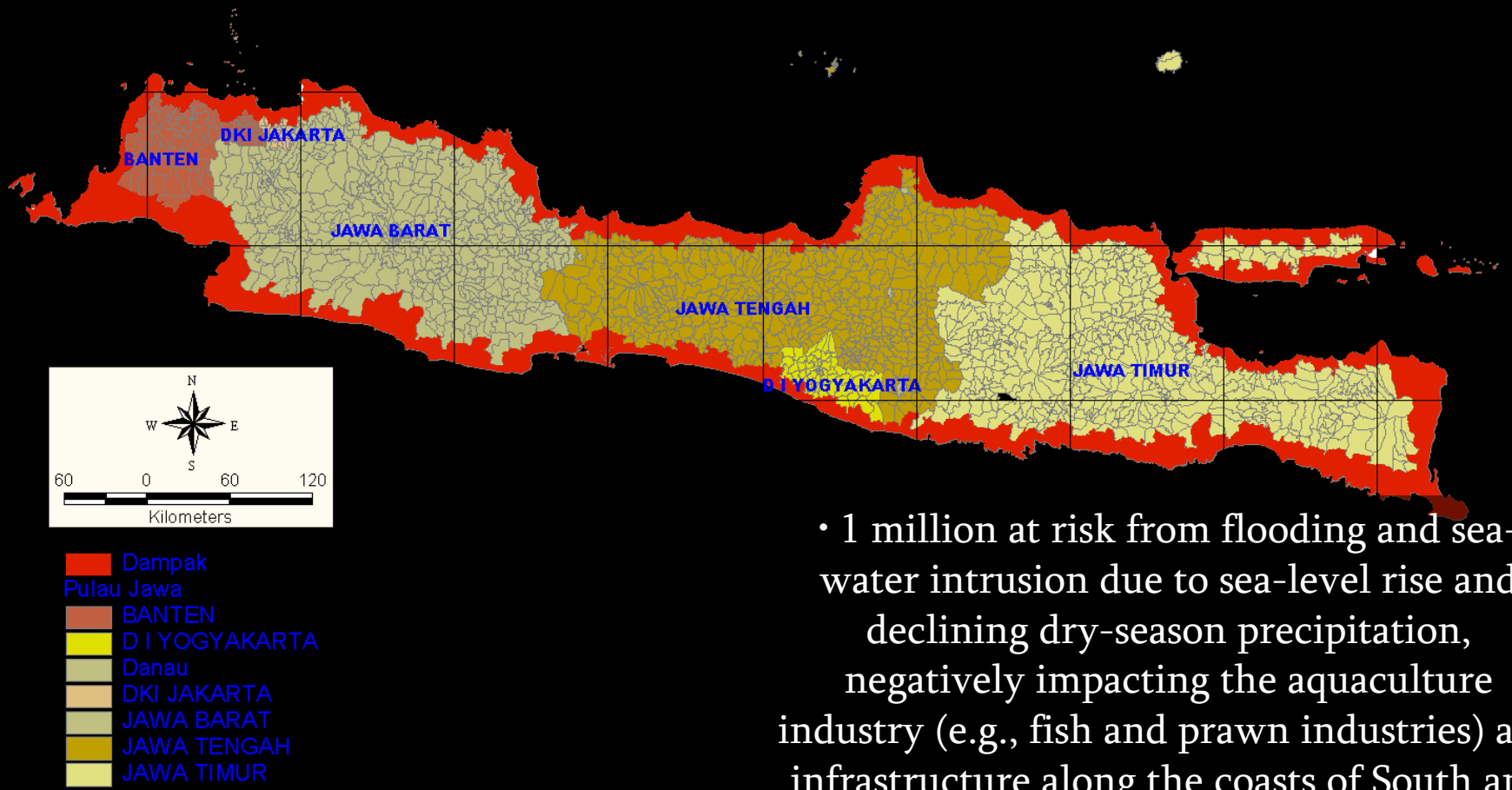
Impacts: sea level rise



- Increase: 1-3 mm/year in coastal areas of Asia and projected to 5 mm/ year over the next century (Cruz et al., 2007)

- Increase from 13 million to 94 million people flooded annually in South Asia (under very conservative sea-level rise scenarios - 40cm by 2100) (Wassmann et al., 2004)

Impacts: sea level rise



- 1 million at risk from flooding and sea-water intrusion due to sea-level rise and declining dry-season precipitation, negatively impacting the aquaculture industry (e.g., fish and prawn industries) and infrastructure along the coasts of South and South-East Asia, (Cruz et al., 2007)

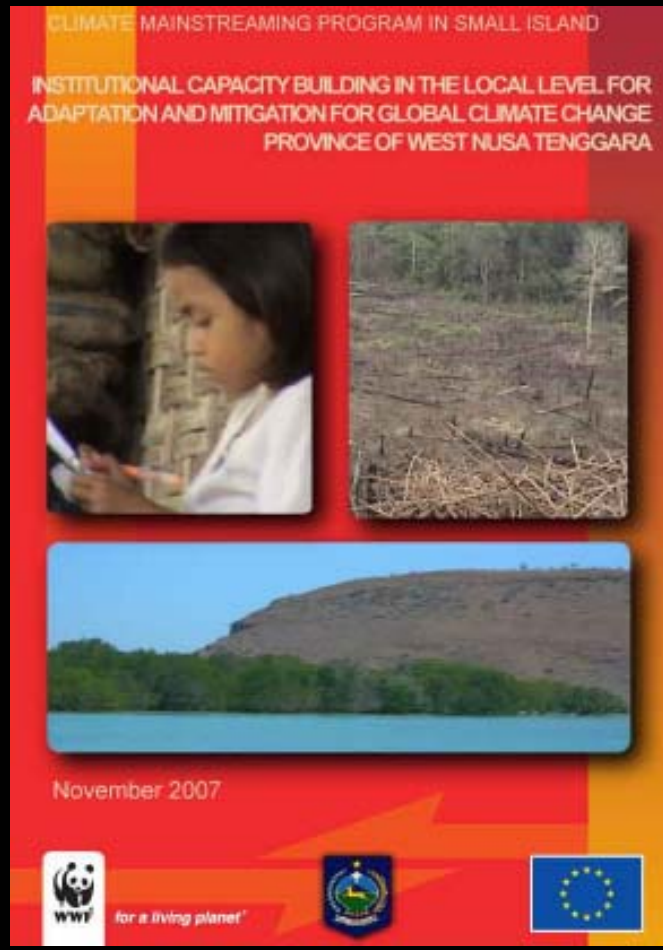
Impacts: sea level rise

Annex: Mainstreaming Climate Program into Small Island Development
(Syafruddin, Hakim, Muhammad, Anggraini, 2007, WWF-Indonesia)

- Small island is pressured both by the nature (water rise, extreme weathers) and human induced (inefficient usage of water, improper land use) → crisis of food, water shortage and eventually increase poverty.

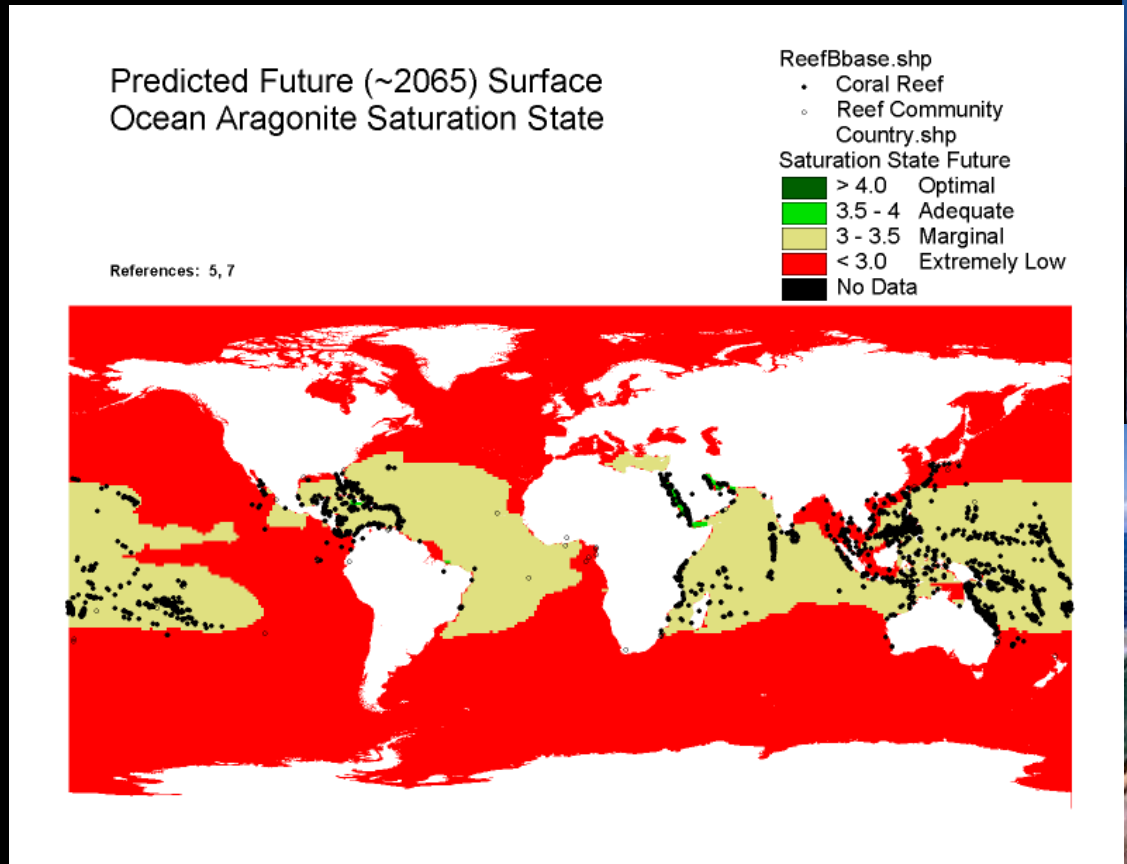
- Integration of climate into development program needed esp. focusing on governance, assistance and capacity building.

- There is a willingness from the governor level to address the issues in a comprehensive way.



Impacts: biodiversity & ecosystem services

- 8% loss of coral reefs in Asia (next 30 years) (Wilkinson, 2004); significant declines in fish larvae abundance (Cruz et al., 2007; Loukos et al., 2003); massive coral bleaching, changes in ocean circulation & salinity impacting Indonesia's marine turtle populations (WWF, 2007a)



Impacts: human health

• More frequent and severe heat waves, floods, extreme weather events, and prolonged droughts leading to increased injury, illness, and death

• Increased vector-borne infections (e.g., malaria and dengue (PEACE, 2007)), an expansion of water-borne diseases, such as diarrhea (Checkley et al., 2000, McMichael et al., 2003), an increase in infectious diseases, poor nutrition due to food production disruption, ill-health due to social dislocation and migration, and increased respiratory effects from worsening air pollution and burning

• More phytoplankton blooms, providing habitats for survival and spread of infectious bacterial diseases, such as, cholera (Pascual et al., 2002)







Risks for businesses

- Damage to assets as a result of extreme weather events;
- Disruption to business as a result of infrastructure damage and falls in productivity;
- Stranded assets – particularly of fossil-fuel power stations and other high-emission industrial infrastructure – as a result of tighter national and international emission caps, more expensive loans (because of the higher risk associated with high-emission assets), the introduction of border tax adjustment to impose a carbon price on goods and services produced in nations failing to make emission reductions (Financial Times, 2006);
- A rise in the price of agricultural products, as a result of water scarcity, loss of soil moisture, floods and storm surges and other physical impacts as well as competition for land for growing other crops for fuel (biofuels); and
- Disruption or destruction of the tourism sector as a result of the destruction of coral reefs, forests and other national tourism assets.







Economic costs

• Damages: 1-1.5% of GDP/ yr developed countries, and 2-9% developing countries if temp: 1.5-4.0°C (Perman et al., 1999). Stern: climate change cost the world 5% of GDP each year; if dramatic the cost more than 20% of GDP (2006).

• To ensure < 2°C, GHG concentrations = 400 ppm CO_2-e. → global emissions reduced by 40% below 1990 levels by 2050 and at least 80% below 1990 levels by 2100.

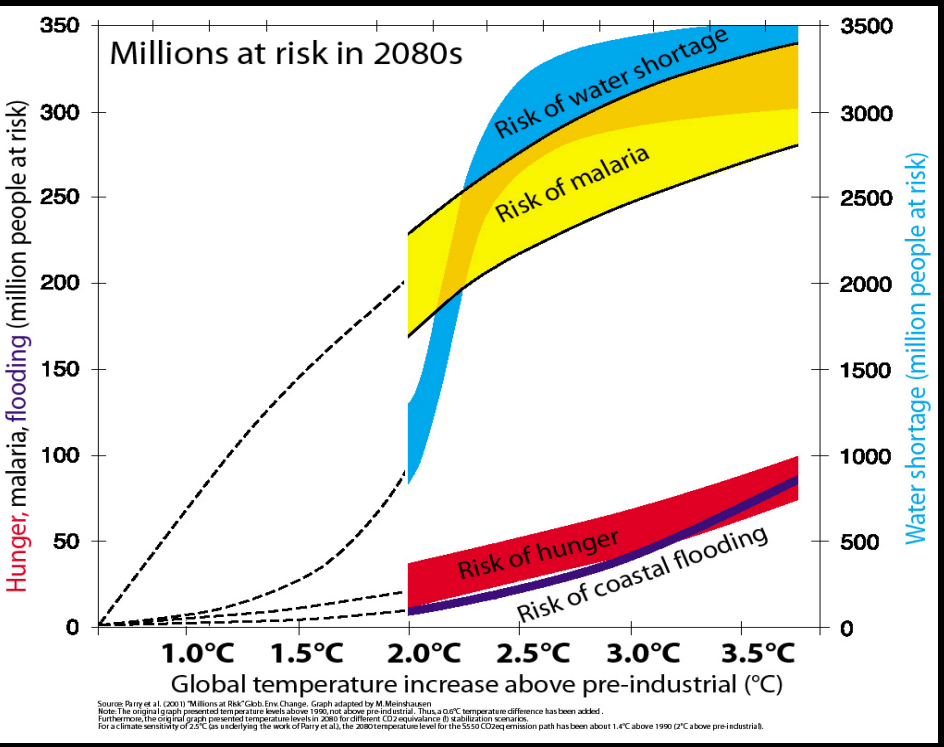


Figure 2. Global temperature increase above pre-industrial (°C) (*Source: Perry et al., 2001, "Millions at Risk" Global Environmental Challenge*)

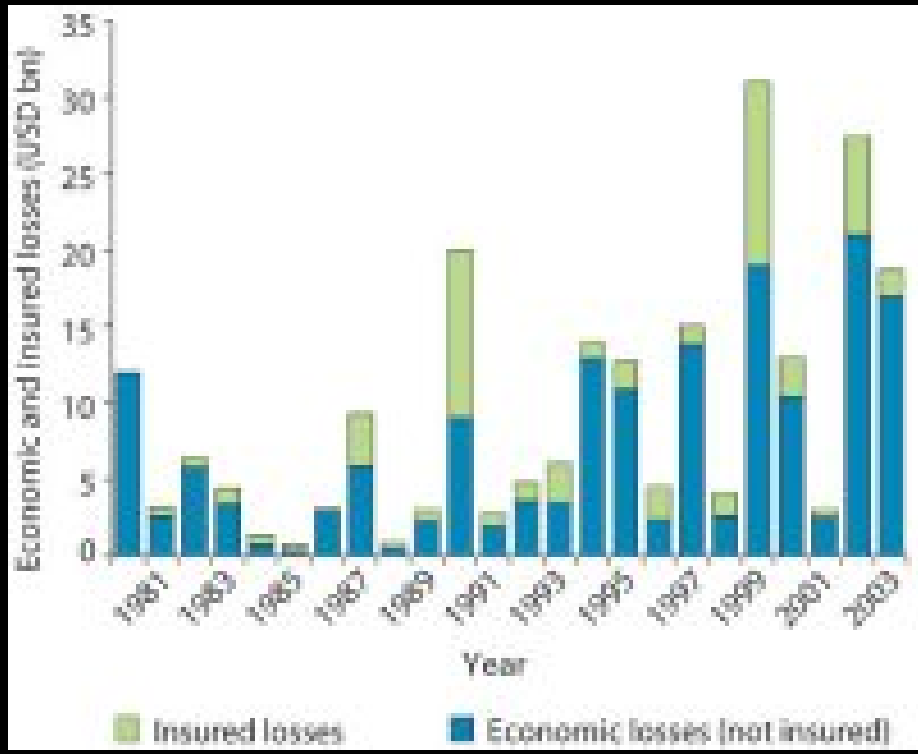
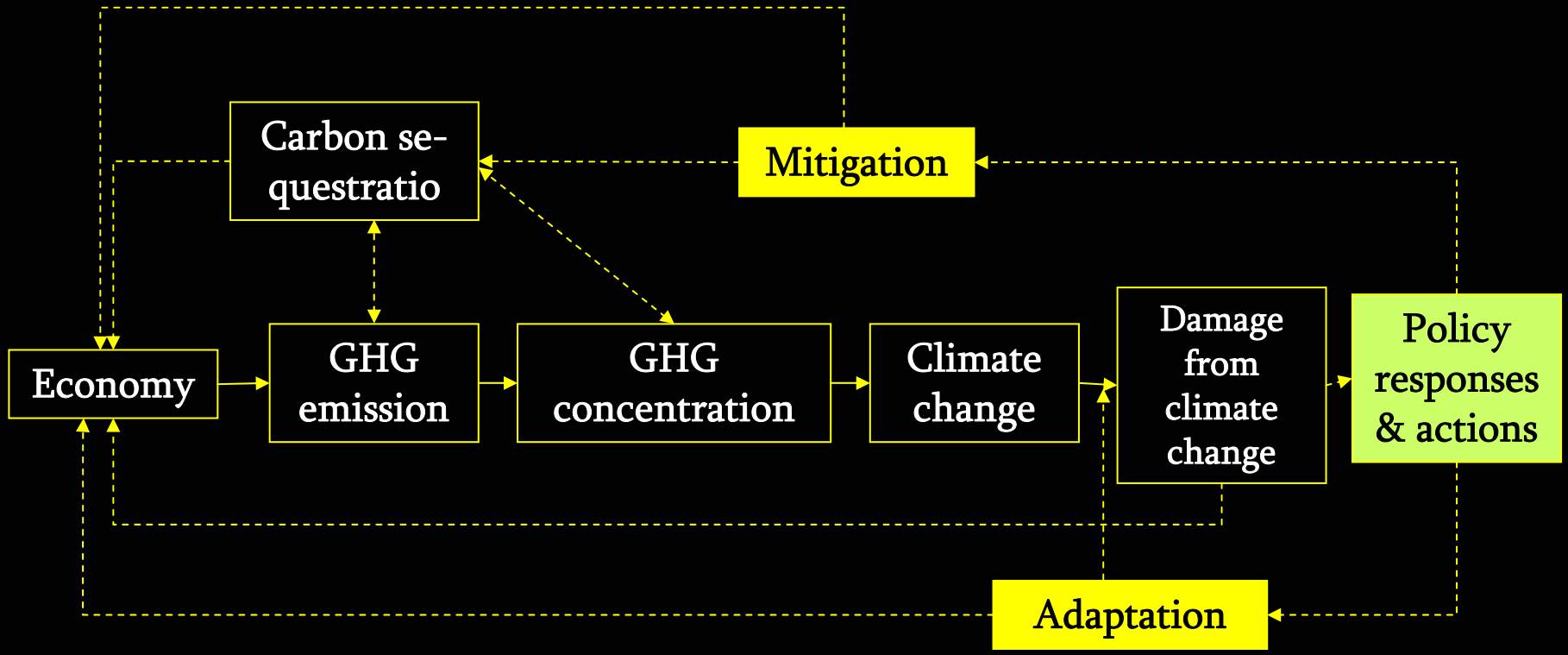


Figure 1. Economic and insured losses caused by weather and climate related disasters in Europe (*Source: NatCat Service, Munich Re, 2004*)

Climate and the economy



Greenhouse effects modelling

Source: developed from Perman, 1997

Opportunities for businesses

- Energy: increase national energy security and economic efficiency (e.g. large-scale energy efficiency measures across the power, heat and transport sectors; and by promoting renewable energy);
- Agriculture and forestry: adopt climate change-resilient crops, low emission agricultural practices, promote responsible forest landscape restoration and REDD;
- Building industry: construction of low energy use/ highly energy efficient new buildings, and large-scale retrofitting of existing buildings to reduce energy consumption;
- Carbon markets: reduce the cost of deep emission cuts and provide funds for new low emission business opportunities; and
- Research and development: identify new low emission technologies and improve the efficiency of existing technologies and production systems.







Mainstreaming the emission reduction

- Ensure that all new buildings, industrial plants, etc. are highly energy efficient;
- Maximise the amount of low and zero emission energy sources;
- Ensure that any new coal-fired power stations, cement and lime kilns, etc. → low/zero emissions by using carbon capture and storage (CCS) or other techs
- Ensure de-commissioning of inefficient plants and processes;
- Stop large-scale deforestation;
- Facilitate the transfer of money, intellectual property or plant and equipment from industrialised to industrialising countries for most energy efficient and low emission pathway to development; and
- Avoid unsustainable solutions such as nuclear energy (to avoid the proliferation of nuclear weapons, the problems associated with the disposal of waste and the sever consequences of accidents), large-scale deforestation for biomass crops and very high environmental impact hydro-electric development.







Opportunities in Indonesia

Forestry sector: REDD and other forest-carbon related incentives
Energy:
• Investing in energy efficiency
• Investing in in-country renewable energy sources (geothermal, micro-hydro, biomass, solar etc.
• Geothermal: “ring of fires”, only 3% out of overall potential being utilised → pricing of energy may need to get corrected
• Investing in transfer of technology ensuring the adoption of low carbon emission development pathways (US$13 trillion by 2050 – or US$300 billion per year – sufficient to enable developing countries to choose a low emission pathway)







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