



**Met Office**

# Impacts of climate change on economic sectors in South Asia

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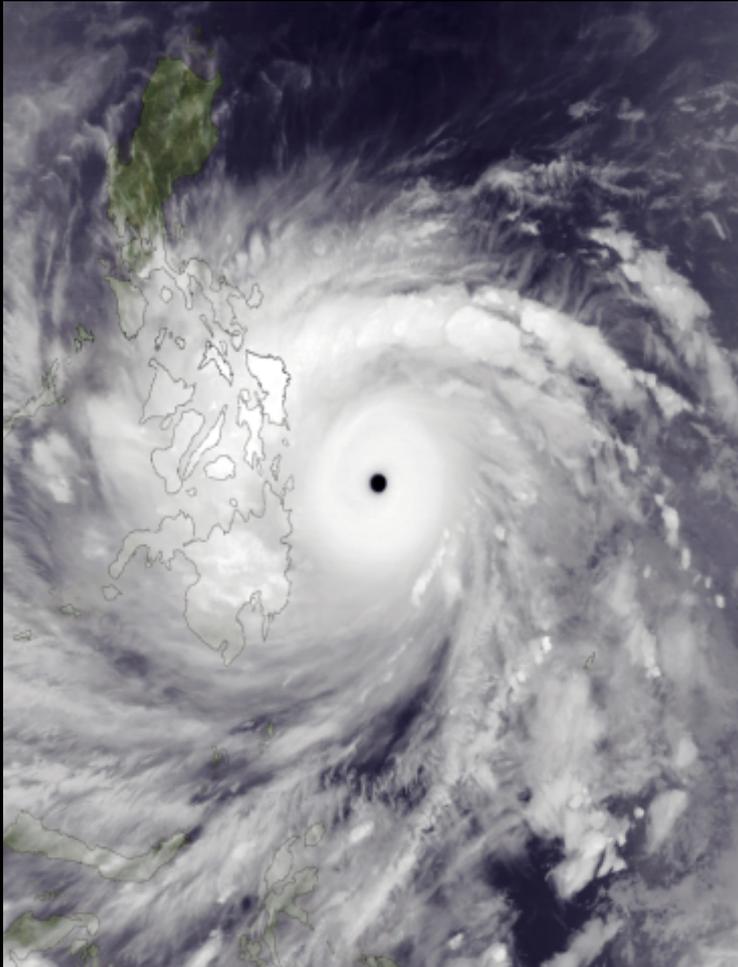
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# Economic sectors and their climate sensitivities

- Many economic sectors, or inputs to economic activity, are dependent on or sensitive to weather and climate
- Many agricultural systems are highly sensitive to temperatures and water availability
- Water availability is also important for human health (as are heat-related stressors) as well as in specific sectors such as power generation and industry
- Extreme weather events such as heavy rainfall or those associated with multiple hazards like typhoons can have many negative economic impacts through affecting people, infrastructure and property

# Typhoon Haiyan (Yolanda) November 2013



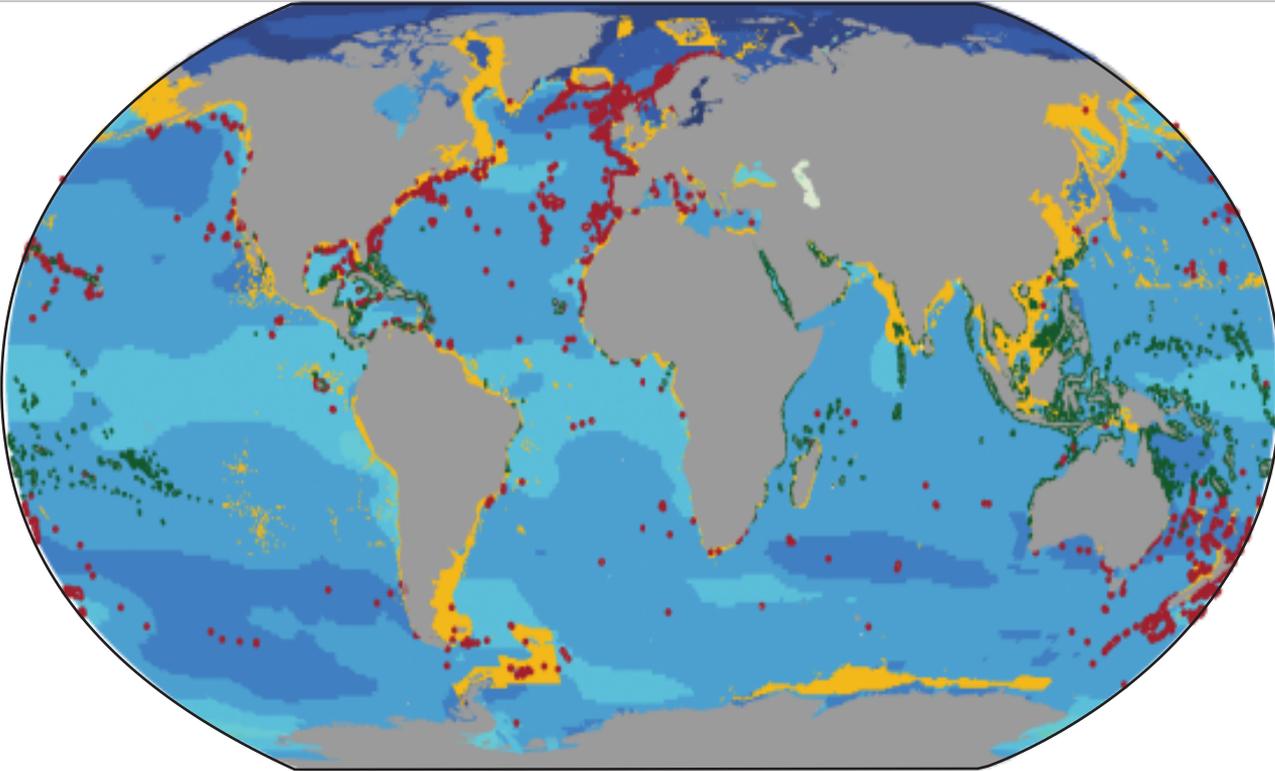
- Most severe land-falling typhoon on record
- Winds reaching 197mph
- 5-6m storm surge
- Over 6300 people killed
- Over four million people displaced
- \$2Bn in damages including
  - \$500Mn across economic sectors
  - \$225Mn in agriculture alone
  - \$200M infrastructure



# Climate change related hazards and their impacts

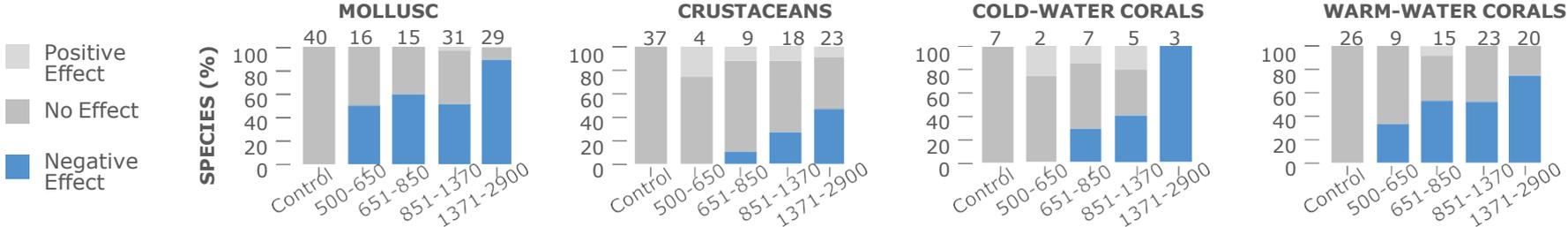
- Other climate change phenomena can have wide-spread consequences
- Sea-level rise generates multiple threats, often in conjunction with other hazards which can threaten whole communities or just specific economic sectors:
  - Sea-level rise acts to multiply the threats from storm surges affecting food systems, coastal or island infrastructure or whole communities/nations
  - Enhanced salt-water intrusion from sea-level rise and lower dry-season river flows can compromise coastal agricultural land
- Ocean acidification and warming-related coral impacts are negatively affecting ocean ecosystems, fisheries

# Specific example: Projected impacts of climate change and ocean acidification on marine ecosystems



- Mollusc and Crustacean Fisheries Present-day annual catch rate  $\geq 0.005$  tonnes  $\text{km}^2$
- Cold-Water Corals
- Warm-Water Corals

CHANGE IN pH (2081-2100 COMPARED TO 1986-2005, RCP 8.5)





# Climate change as a threat multiplier

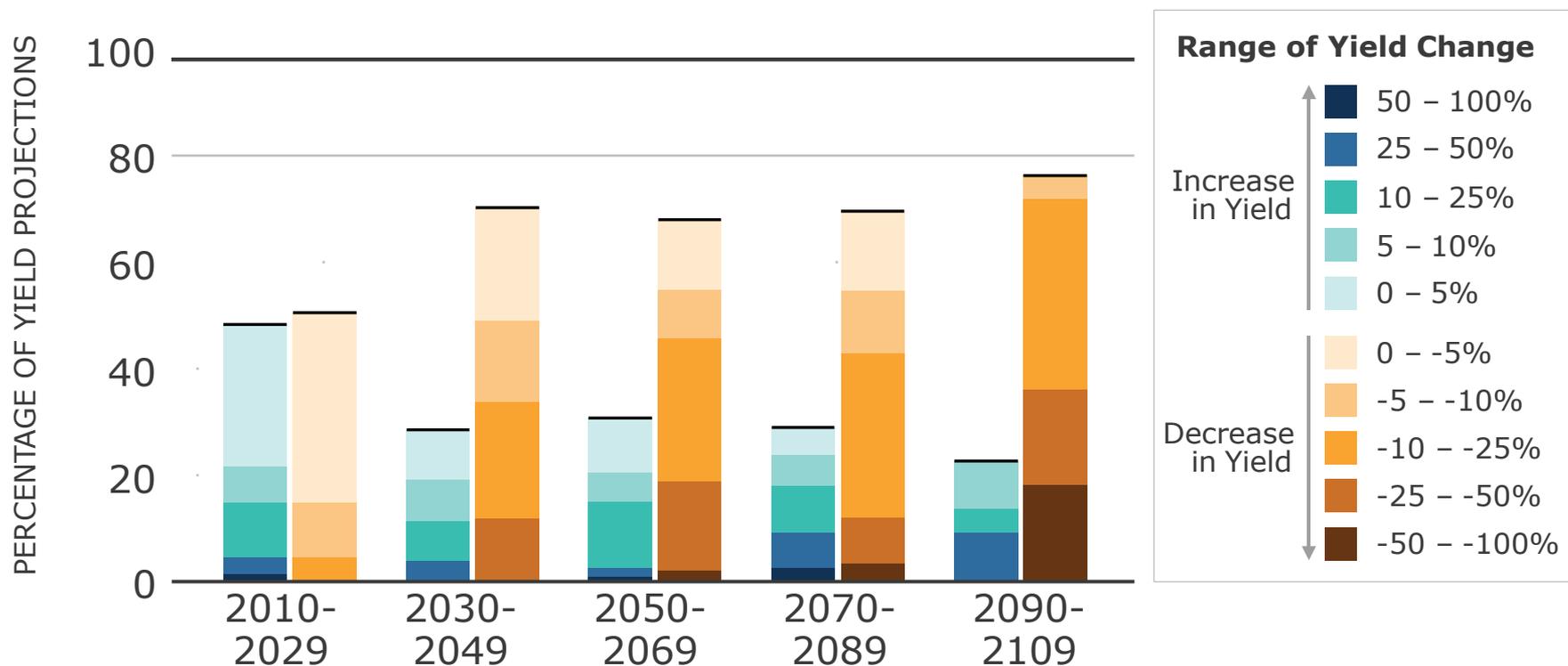
- Many human systems are rapidly changing and facing complex multiple stressors or hazards
- Cities, often coastal, are an important example of these given their large (and growing) populations
  - Rapidly developing informal settlements are often poorly adapted to past/current climate vulnerabilities so have little capacity to cope if they change
  - Subsidence from increased ground-water demand directly enhances the threat from sea-level rise which in turn threatens to salinate the supplies
- Given the range of climate and other vulnerabilities detailed assessment is sector/activity/place-specific so difficult to compile general statements



# Specific example: Agriculture

- Increases in temperature and reduced growing season length threaten to reduce rice and wheat yields in India
- Temperature increases may boost yields in higher altitude regions
- Negative impacts of climate changes outweigh positive impacts to greater degrees as the change increases
- Inundation and salt-water intrusion threaten rice farming and yields in coastal regions

# Summary of projected changes in crop yield in different studies



For the major crops (wheat, rice, and maize) in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late-20th-century levels, although individual locations may benefit



# Summary

Impacts of climate change on economic sectors can occur through direct effects of hazards on the economic activity in question

Specific aspects of climate change can have multiple consequences:

- Sea-level rise can affect individual sectors or infrastructure required by multiple sectors or even whole communities
- Changes in rainfall seasonality could lead to increased flooding in the wet season but overall increased water scarcity

Climate change can have an important additional effect in sectors impacted by other stressors



# Conclusions

Individual dimensions of climate change can have impacts ranging from specific sectors to across sectors to across communities and even nations

Specific aspects of climate change can have multiple consequences

Climate change can have an important multiplier effect

Detailed assessments need to account for specific activities and their locations as well as accounting for other vulnerabilities and socio-economic factors