WGII: IMPACTS, ADAPTATION AND VULNERABILITY

Istanbul – Turkey

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Climate Change is a Large Issue

Majority of the sciences and engineering disciplines are involved.

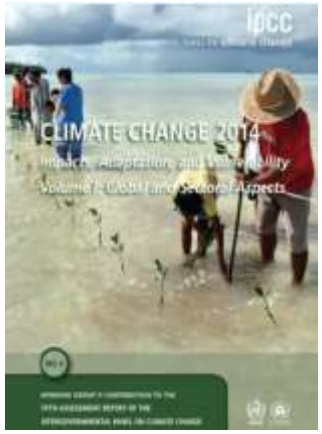
Social sciences are interested.

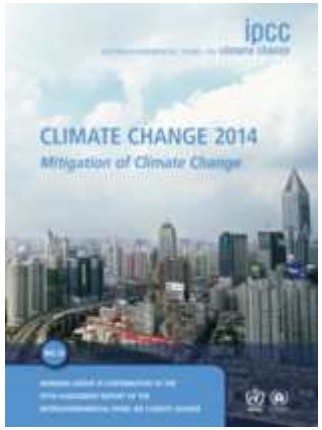
Business/Industry has a stake.

Involves citizens, politicians, public policy experts, and advocates.

Every sector of the economy affected.

All aspects of our lives touched: environment, jobs, health, politics, national security, arts, religion, etc.





What is happening in the climate system?

What are the risks?

What can be done?

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About WGII AR5

- The report evaluates how patterns of **risk** and potential **benefits** are shifting due to climate change, and considers how **impacts** and risks related to climate change can be reduced and managed through **adaptation** and mitigation

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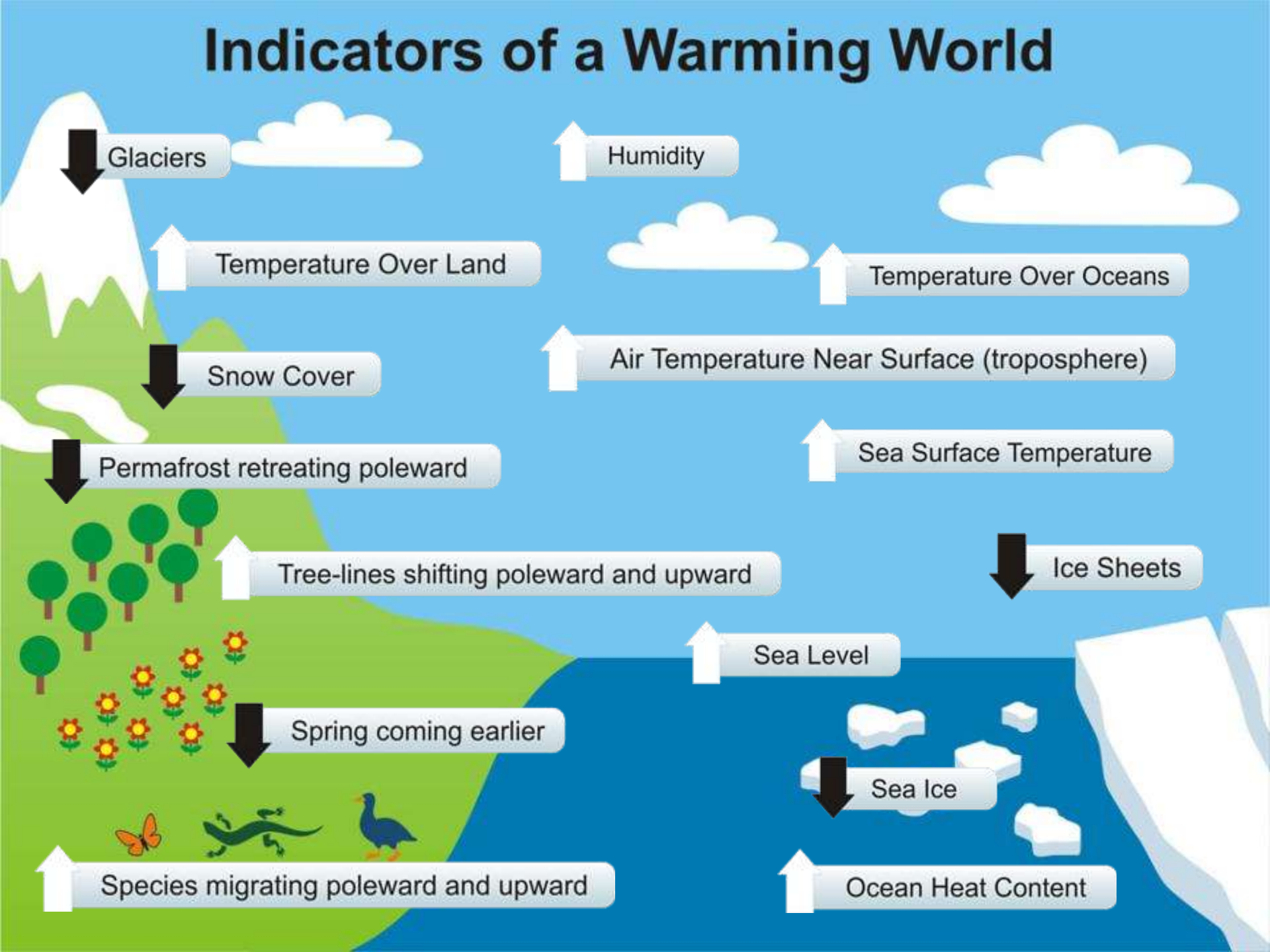
Indicators of a Warming World



Impacts are already underway

- Tropics to the poles
- On all continents and in the ocean
- Affecting rich and poor countries (but the poor are more vulnerable everywhere)




HUMAN INFLUENCE: Some changes in extreme weather and climate events observed since ~1950 are linked to human activity

In a number of regions, impacts are already underway:

- decrease in cold temperature extremes
- increase in warm temperature extremes
- increase in extreme high sea levels
- increase in the number of heavy precipitation events

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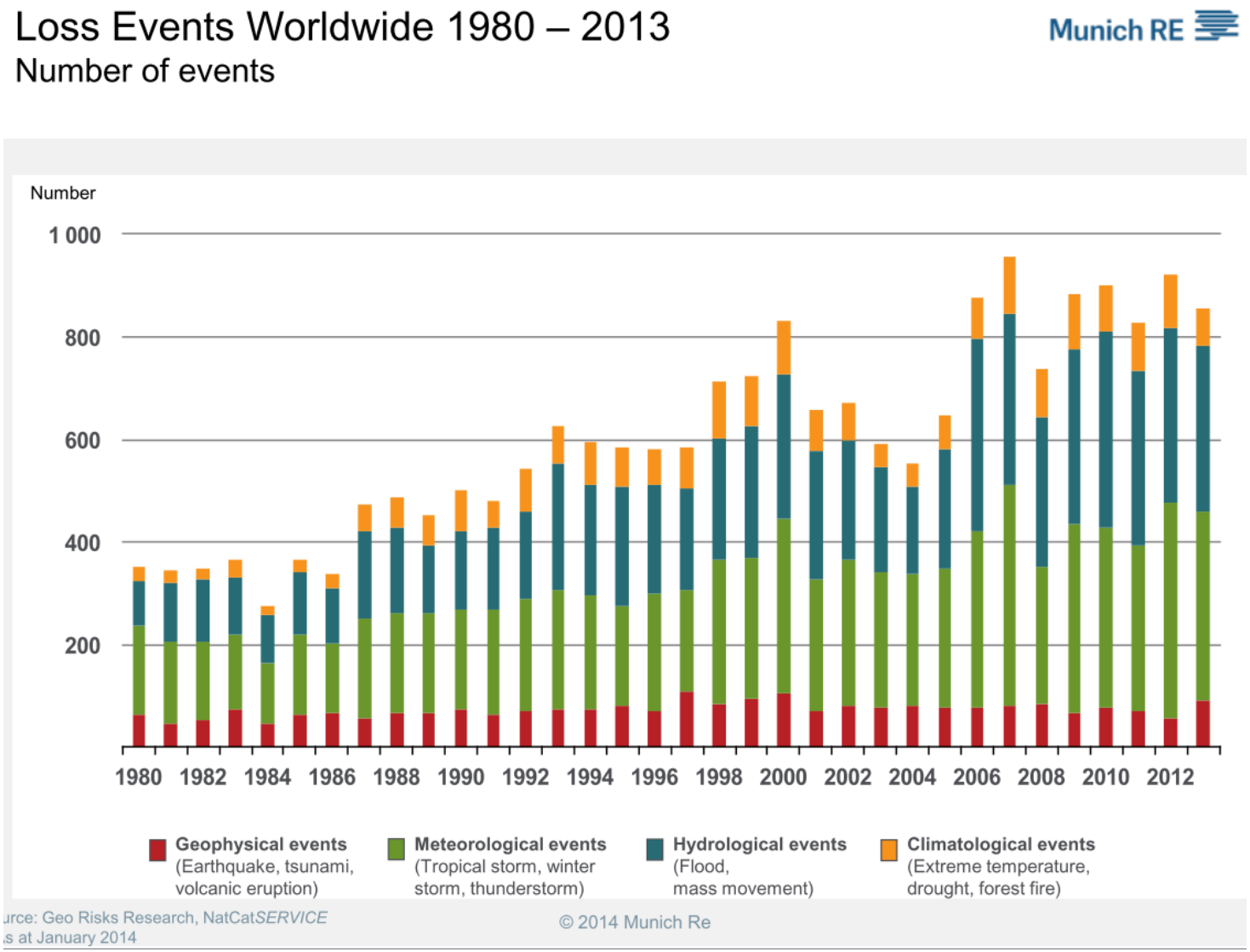
Global natural disasters 1980 – 2013

Geophysical, meteorological, hydrological events



Projected climate changes

Continued emissions of greenhouse gases will cause further warming and changes in the climate system

Oceans will continue to warm during the 21st century

Global mean sea level will continue to rise during the 21st century

It is very likely that the Arctic sea ice cover will continue to shrink and thin as global mean surface temperature rises

Global glacier volume will further decrease

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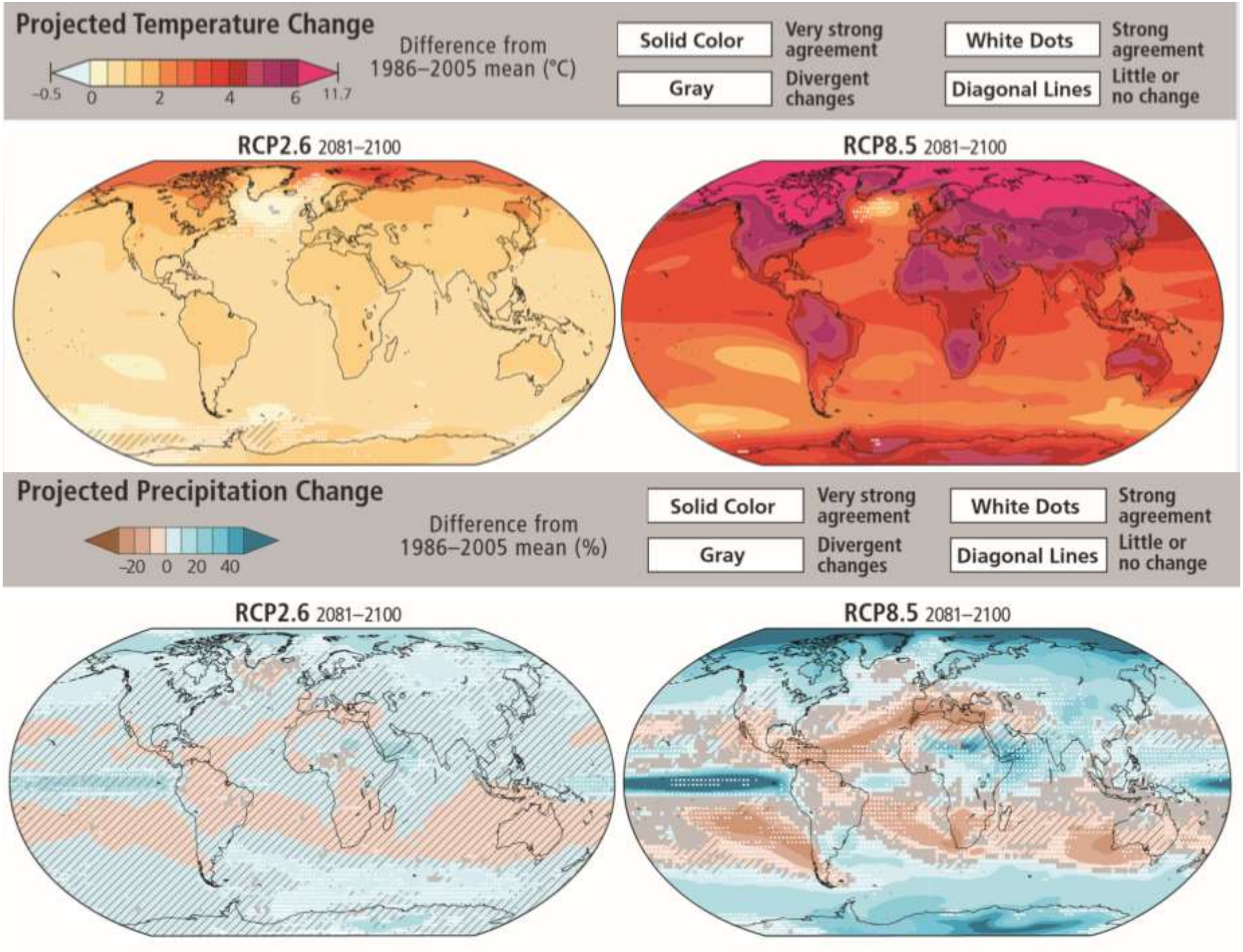
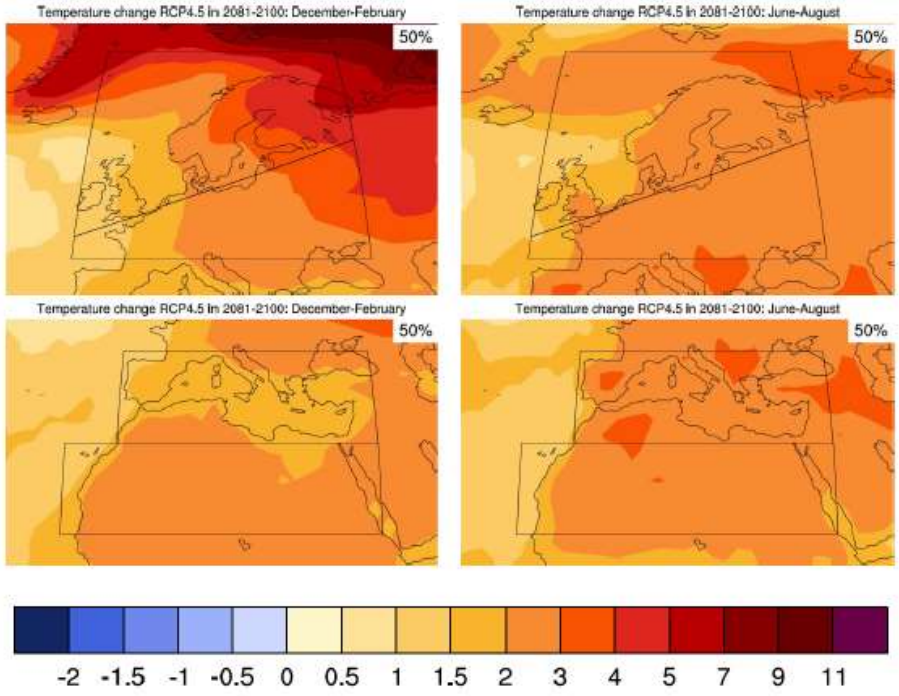

Projected Temperature Change
Difference from 1986–2005 mean (°C)
−0.5 0 2 4 6 11.7
Solid Color
Very strong agreement
White Dots
Strong agreement
Gray
Divergent changes
Diagonal Lines
Little or no change
RCP2.6 2081–2100
RCP8.5 2081–2100
Projected Precipitation Change
Difference from 1986–2005 mean (%)
−20 0 20 40
Solid Color
Very strong agreement
White Dots
Strong agreement
Gray
Divergent changes
Diagonal Lines
Little or no change
RCP2.6 2081–2100
RCP8.5 2081–2100

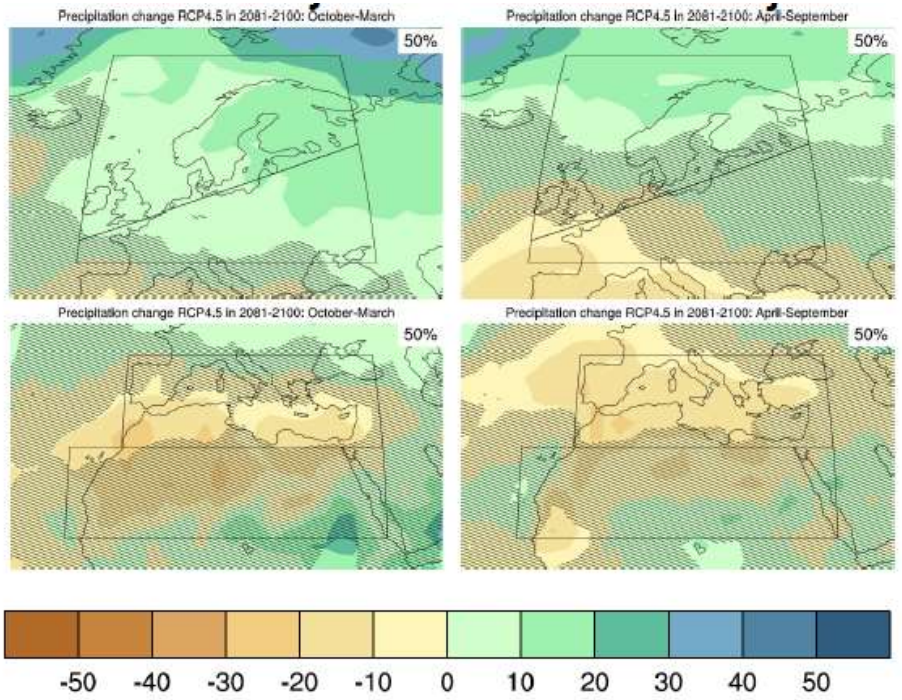
Projections Europe (RCP4.5)
2081-2100 versus 1986-2005

Temperature (°C)



winter summer

Precipitation (%)



winter half summer half

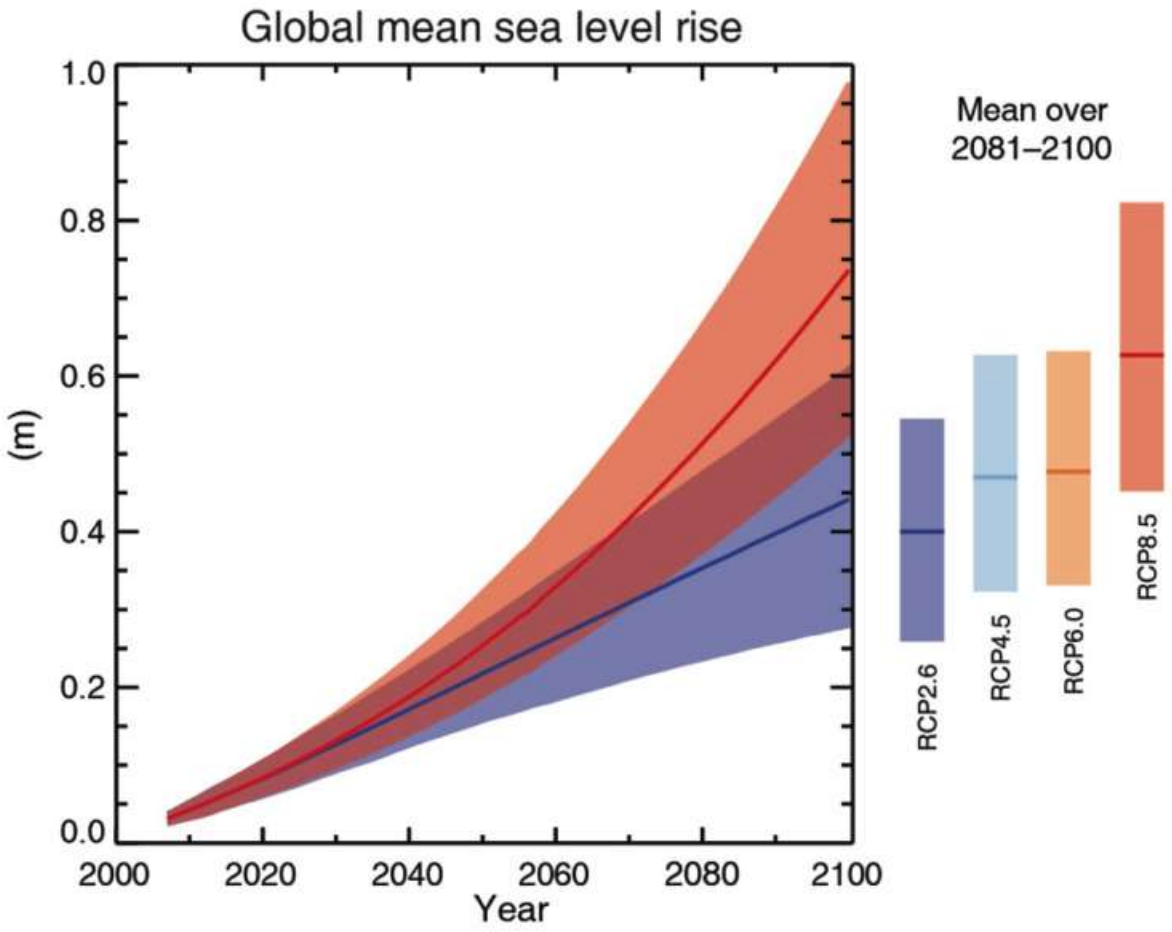


Fig. SPM.9

RCP2.6 (2081-2100), *likely* range: 26 to 55 cm

RCP8.5 (2081-2100), *likely* range: 45 to 82 cm

Potential Impacts of Climate Change

Food and water shortages

Increased displacement of people

Increased poverty

Coastal flooding

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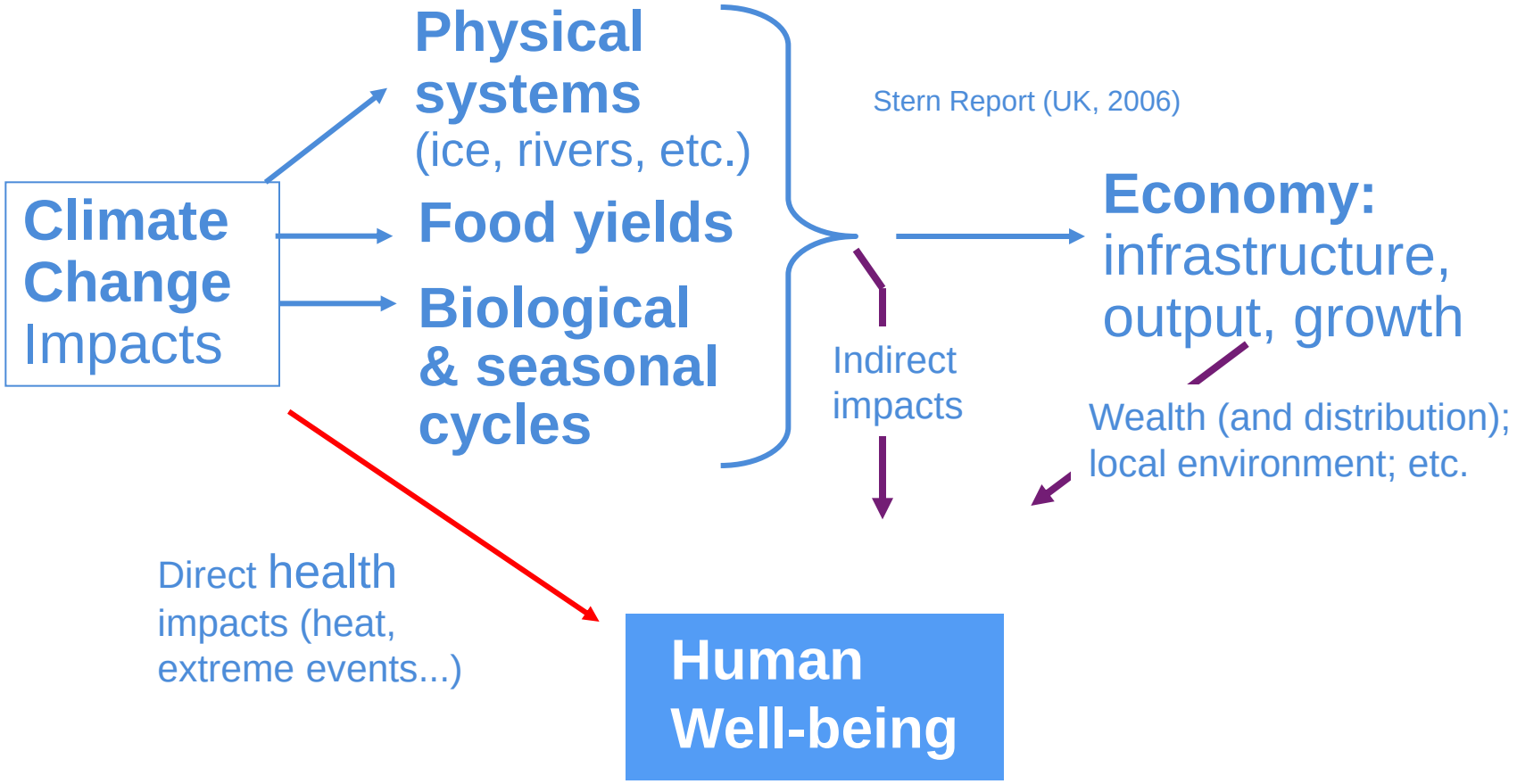
Climate Change impacts



Impacts on natural ecosystems

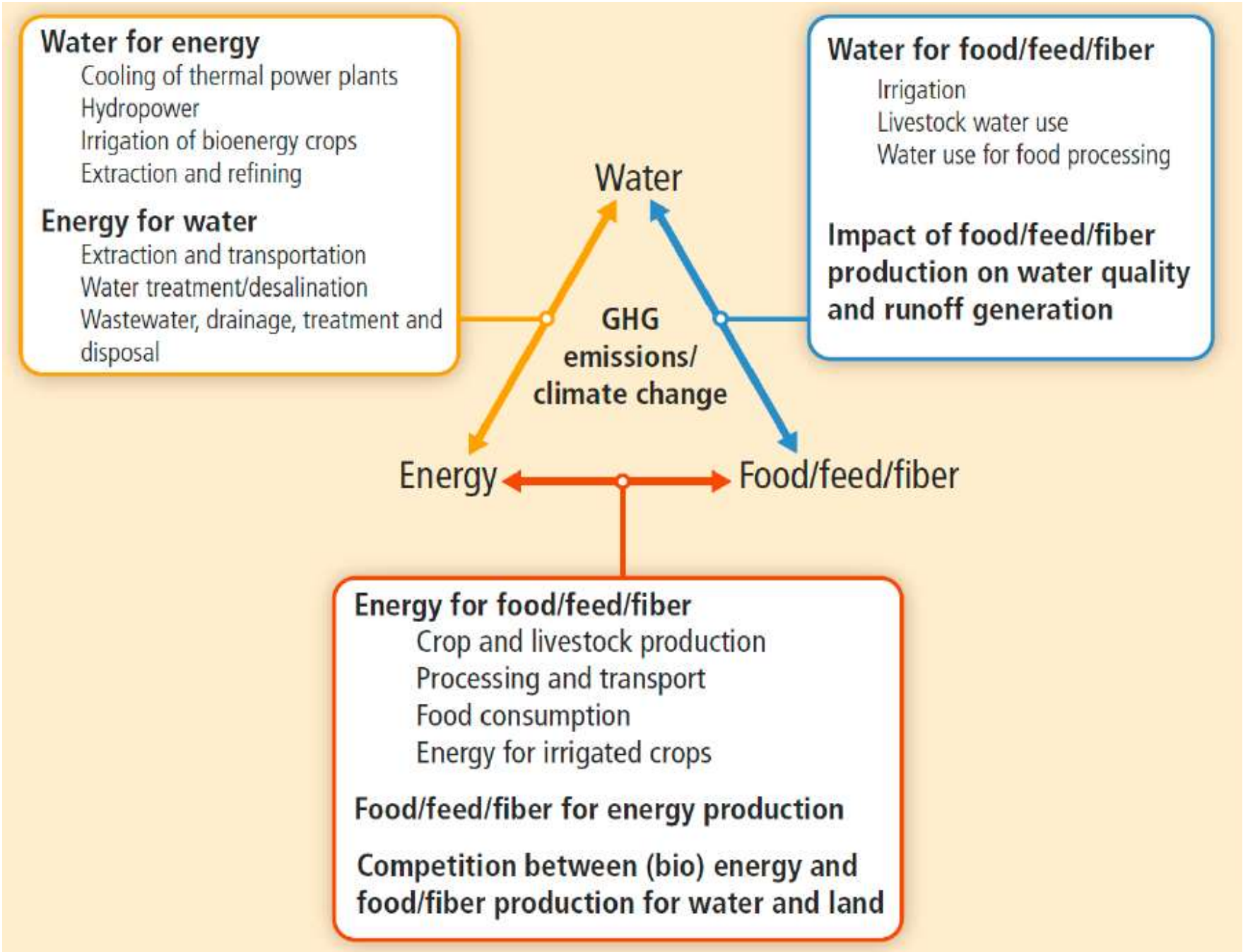
- shift of **vegetation zones** (belts) in a horizontal and vertical direction
- displacement and changes in the **habitats** of individual species of **flora** and **fauna, extinction** of individual species
- changes in the qualitative and quantitative mixture of **biocenosis**
- **fragmentation** of habitats
- changes to **ecosystem functioning**

Impacts of sea level rise

- Increased river and storm flooding
- Accelerated coastal erosion – impacts on tourism
- Seawater intrusion into coastal ground water – salinization of fresh water
- Encroachment of seawater into wetlands and estuaries – destruction of habitats
- Impacts on coastal installations.

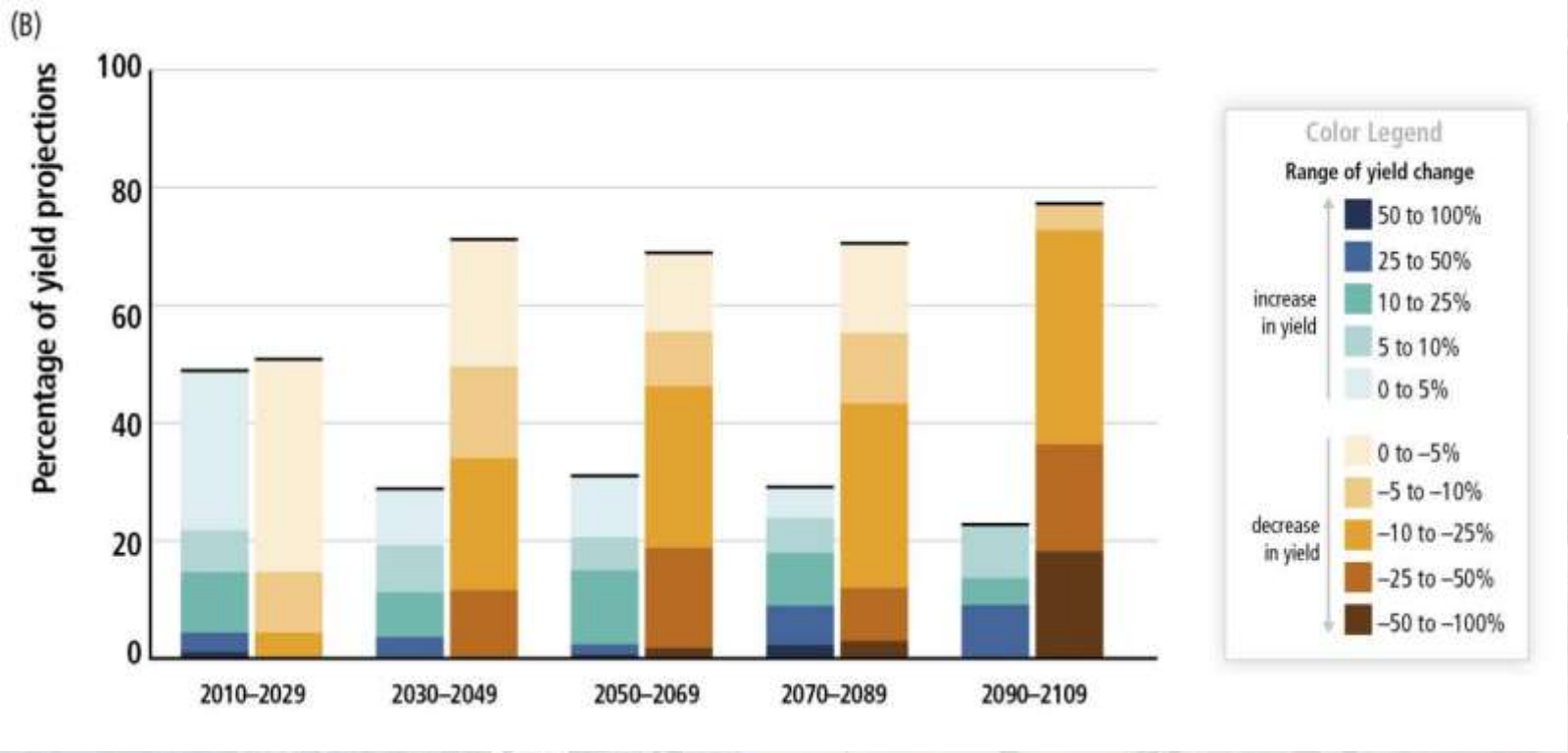
Impacts on marine systems

- changes in phytoplankton communities
- increased harmfull algal blooms (impacts on tourism)
- spread of invasive species (impacts on biodiversity)
- changes in population dynamics of commercial important species (impact on fisheries)
- impact on biodiversity (loss 15-37% of Mediterranean species by 2050)


Water for energy
Cooling of thermal power plants
Hydropower
Irrigation of bioenergy crops
Extraction and refining
Energy for water
Extraction and transportation
Water treatment/desalination
Wastewater, drainage, treatment and disposal
Water for food/feed/fiber
Irrigation
Livestock water use
Water use for food processing
Impact of food/feed/fiber production on water quality and runoff generation
Water
GHG emissions/ climate change
Energy
Food/feed/fiber
Energy for food/feed/fiber
Crop and livestock production
Processing and transport
Food consumption
Energy for irrigated crops
Food/feed/fiber for energy production
Competition between (bio) energy and food/fiber production for water and land

Climate Change Poses Risk for Food Production

Percentage of yield projections



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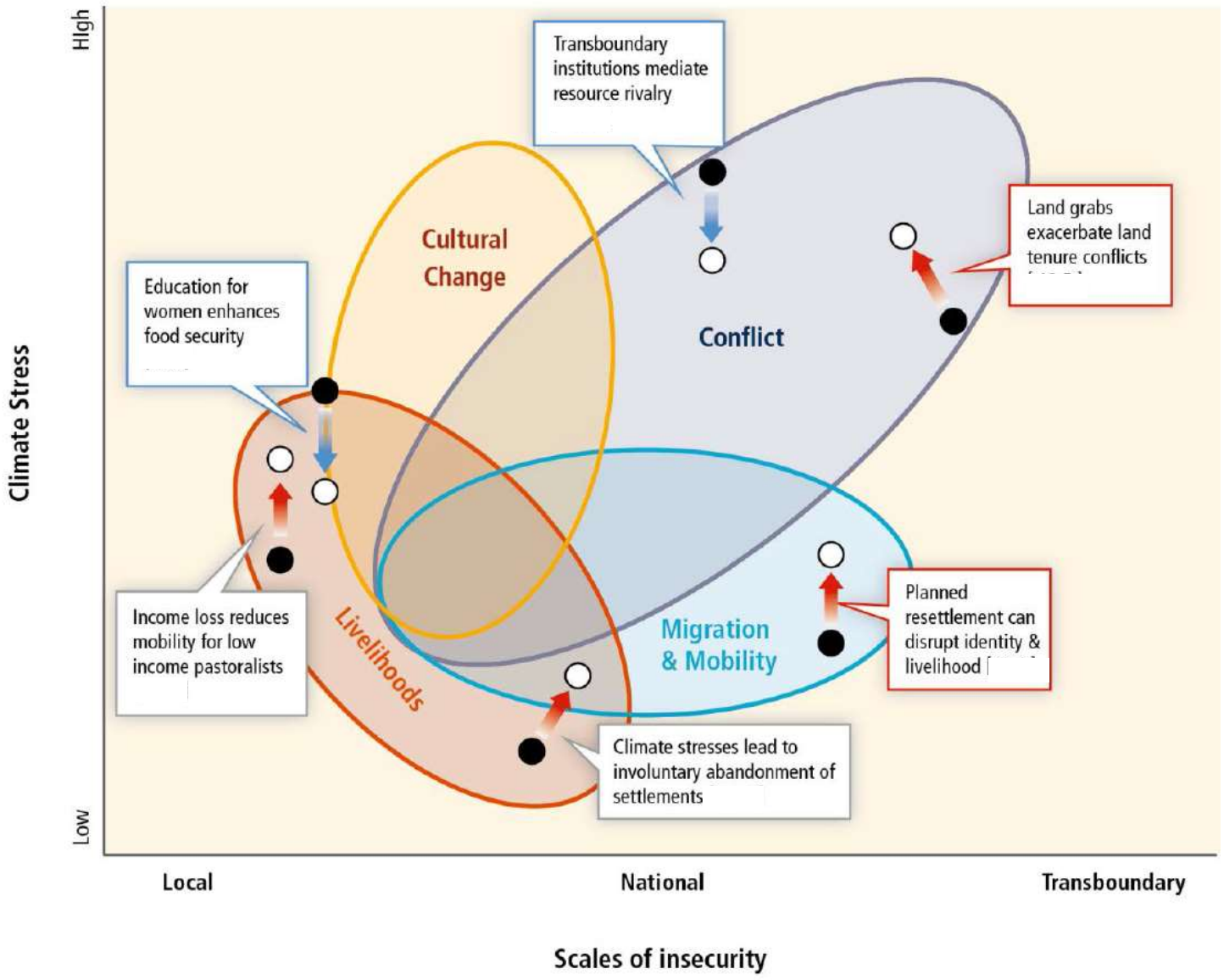
Climate change: A Multiplier for Instability



Facing the dangers from climate change…

…there are only three options:

Mitigation, meaning measures to reduce the pace & magnitude of the changes in global climate being caused by human activities.

Adaptation, meaning measures to reduce the adverse impacts on human well-being resulting from the changes in climate that do occur.

Suffering the adverse impacts that are not avoided by either mitigation or adaptation.

Adaptation options exist in all sectors

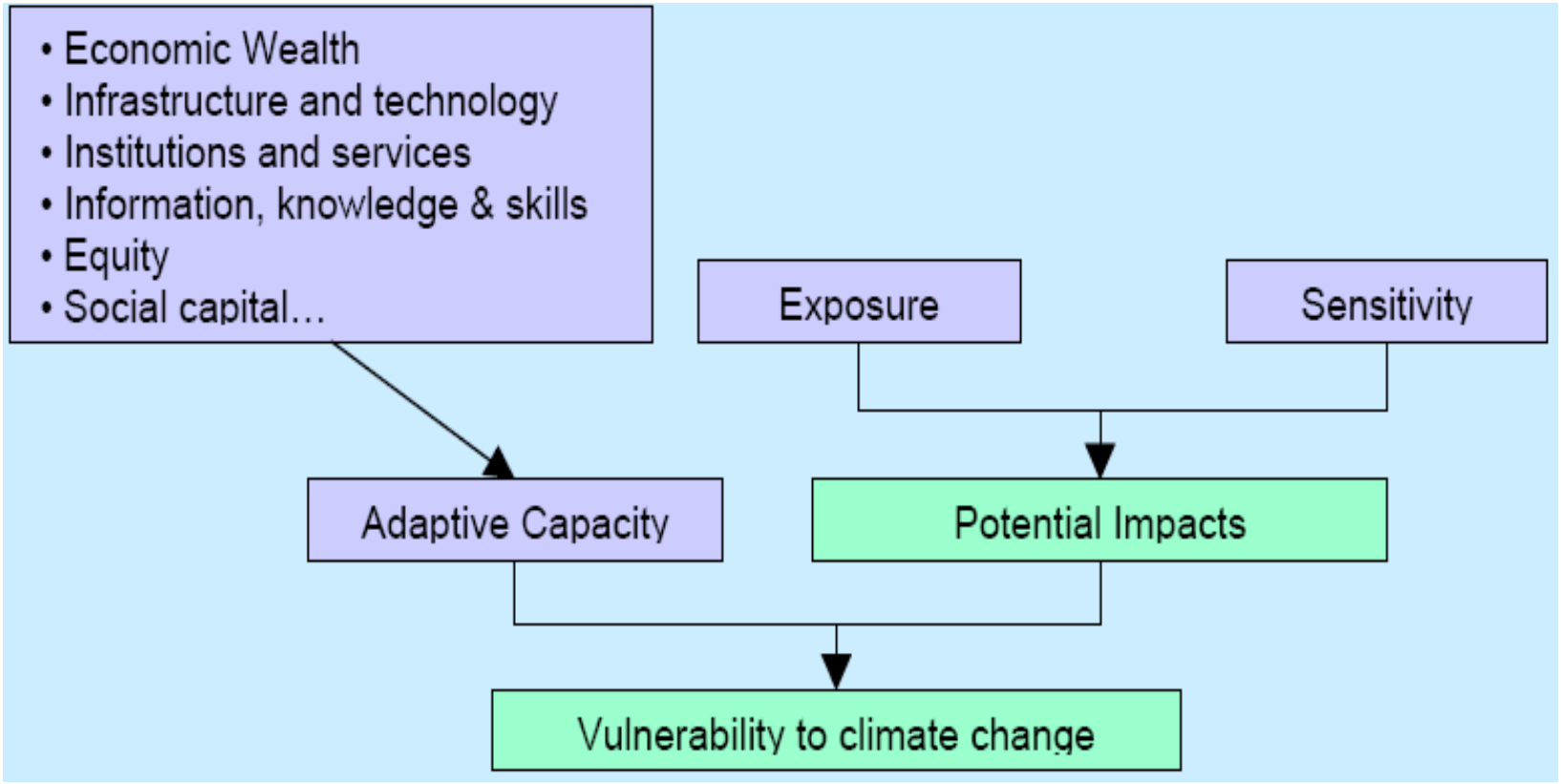
Category	Examples
Human development	Improved access to education, nutrition, health facilities, energy, safe housing & social support structures; Reduced gender inequality & marginalization in other forms.
Disaster risk management	Early warning systems; Hazard & vulnerability mapping; Diversifying water resources; Improved drainage; Flood & cyclone shelters; Building codes & practices; Transport & road infrastructure improvements
Ecosystem management	Maintaining wetlands & urban green spaces; Coastal afforestation; Watershed & reservoir management; Reduction of other stressors on ecosystems & of habitat fragmentation; Maintenance of genetic diversity;

Adaptation options exist in all sectors

Category	Examples
Institutional	**Economic options**: Financial incentives; Insurance; Pricing water to encourage universal provision and careful use; Microfinance; Public-private partnerships. **Laws & regulations**: Land zoning laws; Building standards & practices; Water regulations & agreements; Laws to support disaster risk reduction; Laws to encourage insurance purchasing; Fishing quotas; Patent pools & technology transfer. **National & government policies & programs**: National & regional adaptation plans, Economic diversification; Urban upgrading programs; Municipal water management programs; Disaster planning & preparedness; Integrated water management; Ecosystem-based management; Community-based adaptation.

Adaptation is now inevitable...

The only question is "*will it be by plan or by chaos*"?




ADAPTATION IS
ALREADY OCCURRING
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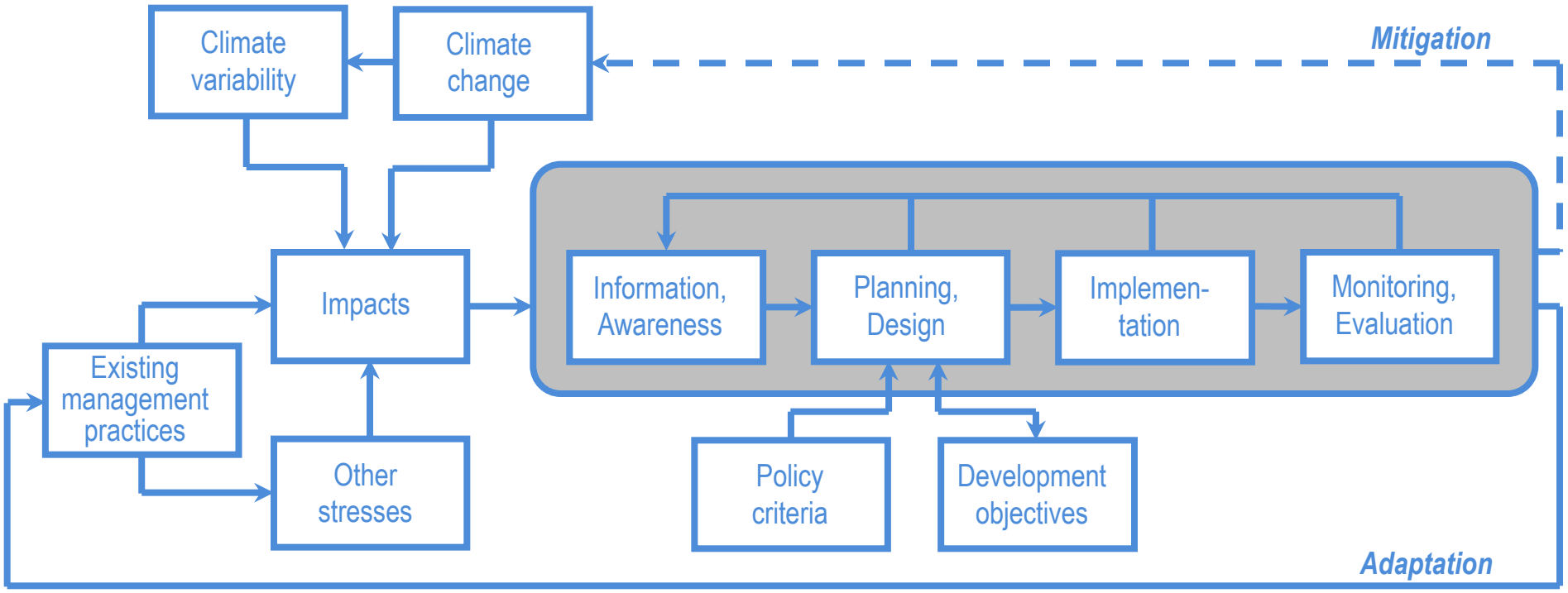
http://climate-adapt.eea.europa.eu/home

Sectoral Risks & Potential for Adaptation: Urban Areas

- Heat stress, extreme precipitation, flooding, landslides, air pollution, drought, and water scarcity pose risks in urban areas.
- Risks are amplified for those lacking essential infrastructure and services or living in poor-quality housing and exposed areas.
- Reducing basic service deficits, improving housing, and building resilient infrastructure systems could significantly reduce vulnerability and exposure in urban areas.
- Urban adaptation benefits from effective multi-level urban risk governance, alignment of policies and incentives, strengthened local government and community adaptation capacity, synergies with the private sector, and appropriate financing and institutional development

The process of adaptation



Conclusions

- IPCC WGII has made a sober assessment of the impacts of climate change. They are significant, vary by region and country and pose important threats to our future.
- The report concludes that while impacts in the next 30 years or so are not dependent on mitigation, after that time they depend a lot on what emissions scenario we face.
- On adaptation it is more optimistic for several areas. We can adapt to a significant extent if we take the right actions.
- The key is to focus on developing adaptation strategies that are inclusive, flexible, that look at the wider picture and that are based on a realistic estimate of the benefits.