

# Climate change and adaptation

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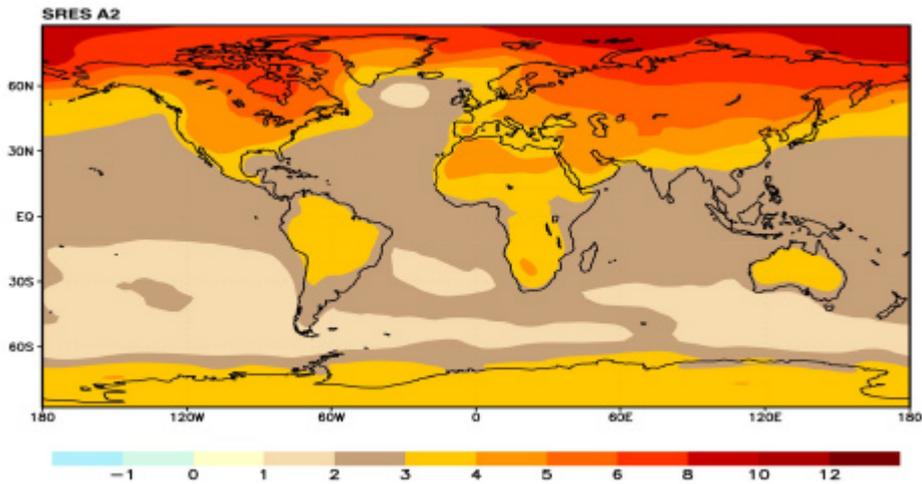
## Already observed impacts on ecosystems and human societies



- poleward and upward migration
- earlier spring migration, later departure
- earlier start to growing season, reproduction cycles
- changes in pest outbreaks
- increased incidence of coral bleaching
- high latitude systems most affected, reduction in Arctic Sea ice extent and thickness in summer
- Climate related disaster and associated impacts increasing

## Land areas are projected to warm more than the oceans with the greatest warming at high latitudes

Scenario projections - global mean surface temperatures - increase by 3.1 °C

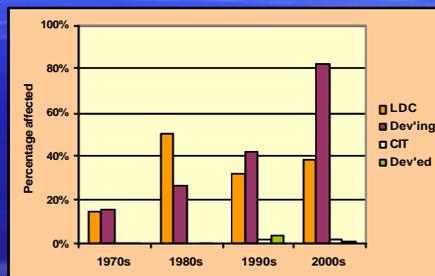
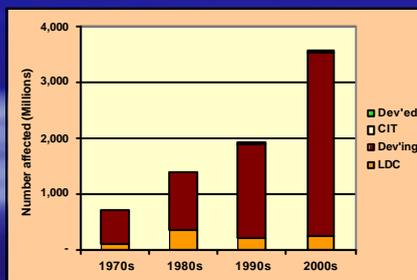


Extreme events are projected to increase

## The poor will face the greatest challenges from climate change

2 Billion people in developing countries affected by climate related disaster in the 1990s.

Double in the 2000s?



40 to 80% of the population in developing countries versus a few % in more developed countries

## Developing countries and poorest communities

- **low ability to cope with current climatic extremes, so a challenge for future**
- **Impacts are worse** and some already experienced now
- **Lower capacity to adapt** -lack of financial, institutional and technological capacity and access to knowledge
- **Disproportionately high impacts on the poorest** countries and people in any country
- **Human security** will be threatened

## Climate change impacts

**Water**

**Human health**

**Coastal and urban communities**

**Production systems: forestry, fisheries and agriculture**

**Energy supply**

**Biodiversity**

**Tourism**

The collage features several images: a flooded landscape for water; a group of people for human health; a coastal town for coastal and urban communities; a forest, a wood mill, and fish for production systems; a power plant for energy supply; a tree and a coral reef for biodiversity; and a waterfall for tourism.

## Climate change impacts on agriculture



- Decreased productivity in tropics and sub-tropics for almost any amount of warming
- increased productivity in mid-latitudes for temperature increase  $<2^{\circ}\text{C}$
- decreased productivity in mid latitudes for temperature increase of  $2-3^{\circ}\text{C}$



## Climate change impacts on water



- decreased water availability in many arid- and semi-arid regions; increases in south east Asia
- increased risk of floods, potential displacement of tens of millions
- changes in permafrost - adverse effect on infrastructure and livelihoods

## Climate change impacts on forestry

- increase forest productivity in temperate and boreal, ...  
but forest management more difficult (pest, fires)
- may be some increase in tropical forests but risks of fires and pests greater



## Climate change impacts on human health

- reduced winter mortality in mid- and high-latitudes
- increased incidence of mortality due to extreme climatic events
- potential for more malnutrition
- increase in number of people exposed to vector-borne and water-borne diseases, especially in tropics



## Climate change impacts on biodiversity

*Impacts on: individuals, populations, species (distributions), ecosystem composition and function*

**Directly** - through increases in temperature, changes in precipitation (and in the case of marine systems changes in sea level etc)

**Indirectly** - through climate changing the intensity and frequency of disturbances such as wildfires

## Climate change is but one of the pressures

*Pressures interact with each other and climate change*

*Examples:*

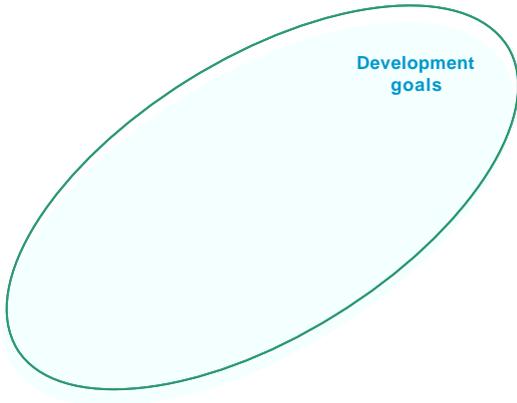
- Land use and land cover change: habitat loss and fragmentation or unification*
- Land and water degradation*
- introduction of exotic/invasive species*



## Need for adaptation

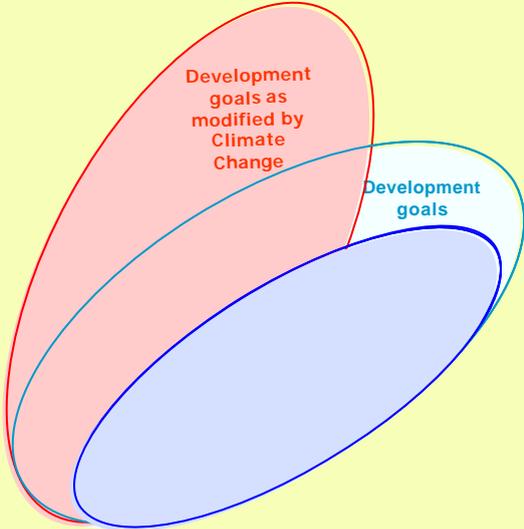
- Reality
  - Observed changes and impacts
  - multiple pressures
- Challenge for the future - increasing rate and magnitude of pressures
- Response: integrated approaches (policy development and implementation)
- Sustainable actions
- Cost of adaptation and who pays?

## Adaptation and development for any country

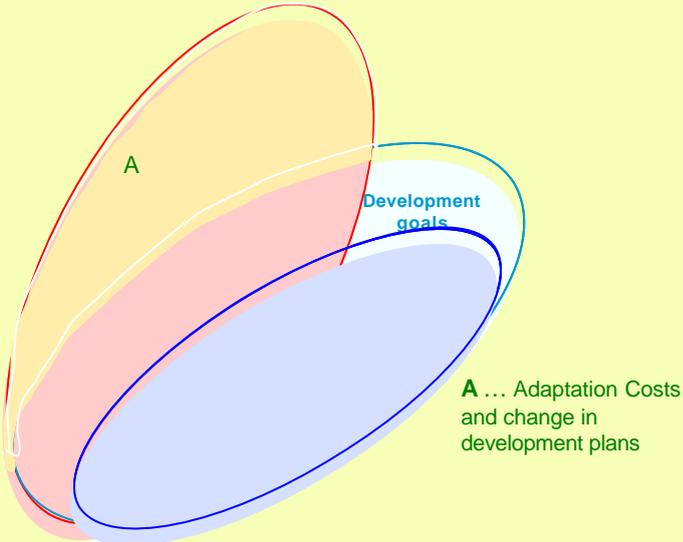


Development goals

Effects of climate change on development plans ...



Effects of climate change on development plans ...



## Adaptation - conclusions and challenges

- Will reduce impacts, but cannot prevent all damages
- Greater magnitude and rate of climate change would pose greater challenges for adaptation and increase cost of actions
  - Need mitigation - so more costly
- Adaptation will need to increase the resilience of biological and social systems - do we know how to do this?
- Adaptation - best to integrate in development pathways - can we and what are good approaches?

## And finally

- Clear need to adapt
  - Production or socioeconomic sector,
  - Conservation and sustainable use
- Lots of attention to adaptation
- Moving from talking to action
- Synergies between mitigation and adaptation