Observed & Projected Climate Change Impacts, Reasons for Concern, & Opportunities and Limits of Adaptation

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What is happening in the climate system?

What are the risks?

What can be done?
Key messages from IPCC AR5

→ Human influence on the climate system is clear
→ Continued emissions of greenhouse gases will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems
→ While climate change is a threat to sustainable development, there are many opportunities to integrate mitigation, adaptation, and the pursuit of other societal objectives
→ Humanity has the means to limit climate change and build a more sustainable and resilient future
Since 1950, extreme hot days and heavy precipitation have become more common. There is evidence that anthropogenic influences, including increasing atmospheric greenhouse gas concentrations, have changed these extremes.
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)
Risk = Hazard x Vulnerability x Exposure
(Katrina flood victim)
Potential Impacts of Climate Change

- Food and water shortages
- Increased poverty
- Increased displacement of people
- Coastal flooding
Widespread impacts attributed to climate change based on the available scientific literature since the AR4
ADAPTATION IS
ALREADY OCCURRING
Regional key risks and potential for risk reduction through adaptation

Representative key risks for each region for

- Physical Systems
  - Glaciers, snow, ice, and/or permafrost
  - Rivers, lakes, floods, and/or drought
  - Coastal erosion and/or sea level effects

- Biological Systems
  - Terrestrial ecosystems
  - Wildfire
  - Marine ecosystems

- Human & Managed Systems
  - Food production
  - Livelihoods, health, and/or economics

<table>
<thead>
<tr>
<th>Risk level</th>
<th>Present</th>
<th>Near term (2030–2040)</th>
<th>Long term 2°C (2080–2100)</th>
<th>4°C</th>
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<tbody>
<tr>
<td></td>
<td>Very low</td>
<td>Medium</td>
<td>Very high</td>
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Risk level with high adaptation

Potential for additional adaptation to reduce risk

Risk level with current adaptation
Regional key risks and potential for risk reduction

Physical Systems
- Glaciers, snow, ice, and/or permafrost
- Rivers, lakes, floods, and/or drought
- Coastal erosion and/or sea level effects

Biological Systems
- Terrestrial ecosystems
- Wildfire
- Marine ecosystems

Human & Managed Systems
- Food production
- Livelihoods, health, and/or economics

Representative key risks for each region for

Polar Regions (Arctic and Antarctic)
- Risks for ecosystems
- Risks for health and well-being
- Unprecedented challenges, especially from rate of change

North America
- Increased damages from wildfires
- Increased damages from river and coastal floods
- Heat-related human mortality

Europe
- Increased damages from river and coastal floods
- Increased water restrictions
- Increased damages from extreme heat events and wildfires

Asia
- Increased flood damage to infrastructure, livelihoods, and settlements
- Heat-related human mortality
- Increased drought-related water and food shortage

The Ocean
- Distributional shift and reduced fisheries catch potential at low latitudes
- Increased mass coral bleaching and mortality
- Coastal inundation and habitat loss

Central and South America
- Reduced water availability and increased flooding and landslides
- Reduced food production and quality
- Spread of vector-borne diseases

Africa
- Compounded stress on water resources
- Reduced crop productivity and livelihood and food security
- Vector- and water-borne diseases

Small islands
- Loss of livelihoods, settlements, infrastructure, ecosystem services, and economic stability

Australasia
- Increased flood damage to infrastructure and settlements
- Increased risks to coastal infrastructure and low-lying ecosystems

IPCC, AR5, SPM, Figure SPM.8
Regional key risks and potential for risk reduction: Small Islands

Losses

Risk to coastal areas

IPCC, AR5, SYR, SPM 8
Adaptation issues and prospects: Risks to coastal areas

1. High ratio of coastal area to land mass will make adaptation a significant financial and resource challenge for islands.

2. Adaptation options include maintenance and restoration of coastal landforms and ecosystems, improved management of soils and freshwater resources, and appropriate building codes and settlement patterns.
Flood risk adaptation in Bangladesh (example): cyclone shelters, awareness raising, forecasting and warning

Sources: IPCC SREX (Special Report on extreme events…) and IPCC AR5, H Brammer, Clim Risk Management 2014 p.51-62

photo: Dr Thorsten Klose/German Red Cross (2010), evaluation of the Community Based Disaster Preparedness Programme run by the Red Cross in 1996-2002
Regional key risks and risk reduction through adaptation: Africa

Water

Food security

Diseases
Adaptation issues and prospects: Water

1. Reducing non-climate stressors on water resources

Demand management and conservation are methods that target efficiency. Conservation begins by reducing high losses from water supply distribution systems. Demand management has gone largely unaddressed since most water utilities still focus on infrastructure development rather than on conservation.

http://www.greenfacts.org/en/water-resources/l-3/6-sustainable-management.htm#2p0

IPCC, AR5, WG II, SPM, p. 21
RISKS OF CLIMATE CHANGE INCREASE WITH CONTINUED HIGH EMISSIONS
The Reasons For Concern
• Sustainable development and equity provide a basis for assessing climate policies and highlight the need for addressing the risks of climate change.

• Issues of equity, justice, and fairness arise with respect to mitigation and adaptation.
The Choices Humanity Makes Will Create Different Outcomes & increase prospects for effective adaptation

With substantial mitigation

Without additional mitigation

Change in average surface temperature (1986–2005 to 2081–2100)

AR5 WGI SPM
Only together...
Useful links:

- [www.ipcc.ch](http://www.ipcc.ch): IPCC (reports and videos)
- [www.climate.be/vanyp](http://www.climate.be/vanyp): my slides my platform as candidate IPCC Chair
- **On Twitter:** @JPvanYpersele and @IPCC_CH