

 Global Climate Change Alliance  
 Support Facility
 

## Module 3

### Understanding the basics of climate change science

Training workshops on  
mainstreaming climate change

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## Is climate change real?



- IPCC 4<sup>th</sup> Assessment Report:
  - “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level”.
- Observed trends:
  - Recent years warmest on record
  - Accelerating increase in global surface temperature and ocean temperature
  - Accelerating rise in sea level

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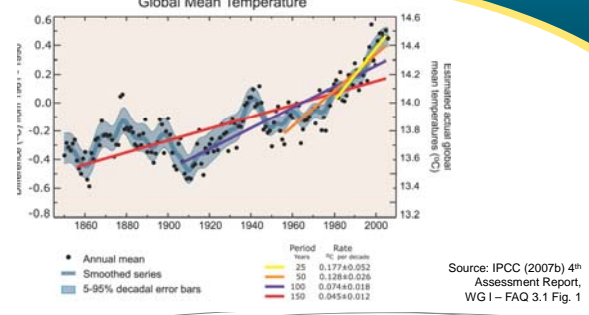
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## Some observations: trends in global mean temperature





Period (years)	Rate (°C per decade)
25	0.177 ± 0.052
50	0.128 ± 0.036
100	0.074 ± 0.018
150	0.045 ± 0.012

Source: IPCC (2007b) 4<sup>th</sup> Assessment Report, WG I – FAQ 3.1 Fig. 1

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## What are the causes of climate change?



- *Natural variation* is an inherent feature of the climate (e.g. driven by solar cycles, earth orbit, volcanoes)
- But *anthropogenic emissions of long-lived greenhouse gases* in the atmosphere are a major cause of the changes now being observed

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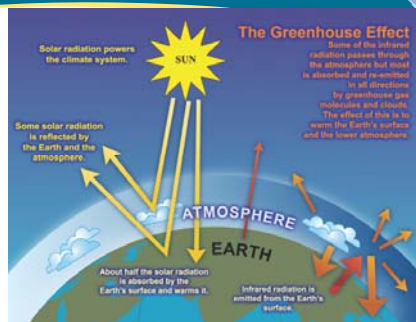
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## The greenhouse effect



Source: WWF/IPCC

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## What are the main greenhouse gases?



- By decreasing order of abundance:
  - water vapour (H<sub>2</sub>O)
  - carbon dioxide (CO<sub>2</sub>)
  - methane (CH<sub>4</sub>)
  - nitrous oxide (N<sub>2</sub>O)
  - ozone (O<sub>3</sub>)
  - chlorofluorocarbons (CFC)
  - other halogenated compounds (i.e. gases containing fluorine, chlorine, bromine or iodine) (e.g. hydrofluorocarbons – HFC, sulphur hexafluoride – SF<sub>6</sub>)

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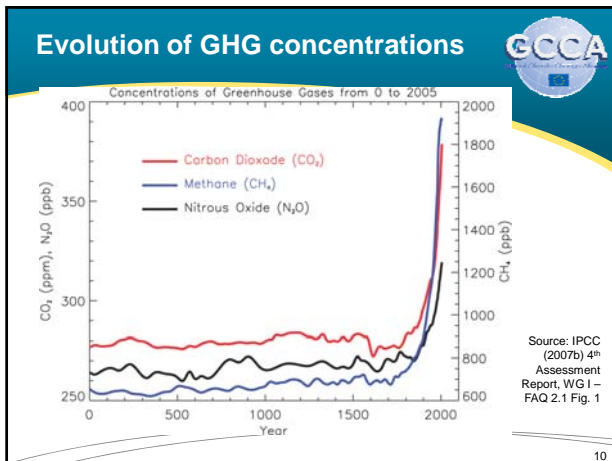
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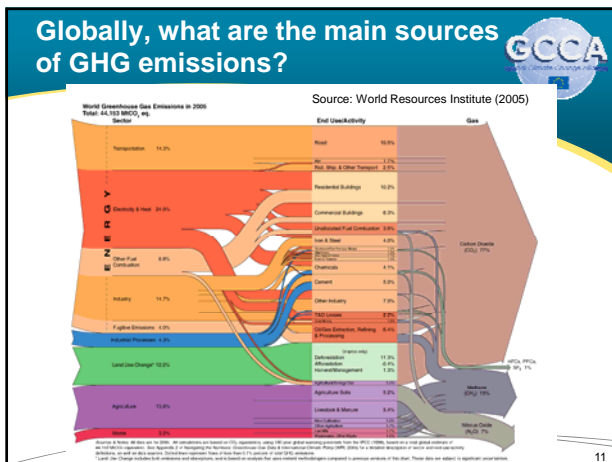
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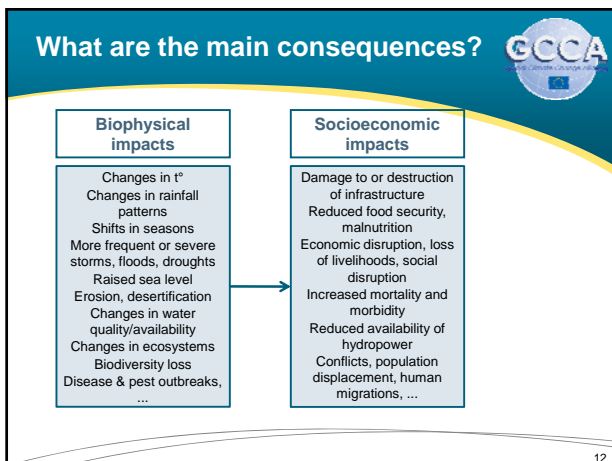
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### Projections for sub-Saharan Africa (average conditions)



- Temperature increase
  - Entire continent
  - Median projected increase +3-4°C by end of century
- Decrease in rainfall
  - West coast of Africa as far south as 15°N
  - Southern Africa
- Increase in rainfall
  - Northern parts of East Africa
- Uncertain projections for rainfall
  - Sahel, Guinean coast, southern Sahara
- Sea level rise
  - Low-lying islands and coastal zones, delta areas

Source: World Bank (2009), Table 3-4, p. 34 – based on IPCC (2007) 13

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### Projections for sub-Saharan Africa (extreme conditions and events)



- Increase in intense precipitation events
  - Entire continent
- Cyclones
  - Uncertain – changes in magnitude and frequency, and shifts in cyclone tracks possible

Source: World Bank (2009), Table 3-4, p. 34 – based on IPCC (2007) 14

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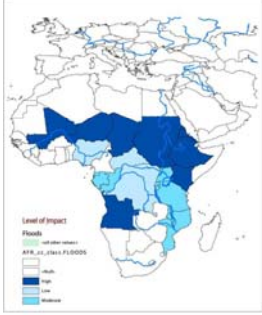
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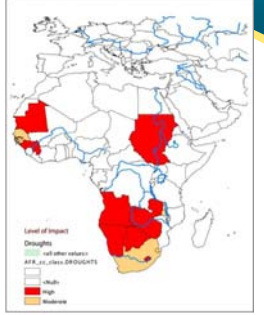
### Country exposure to climate change risks (1)



#### Floods



#### Droughts



Source: World Bank (2009), Figure 4-1, p. 39 15

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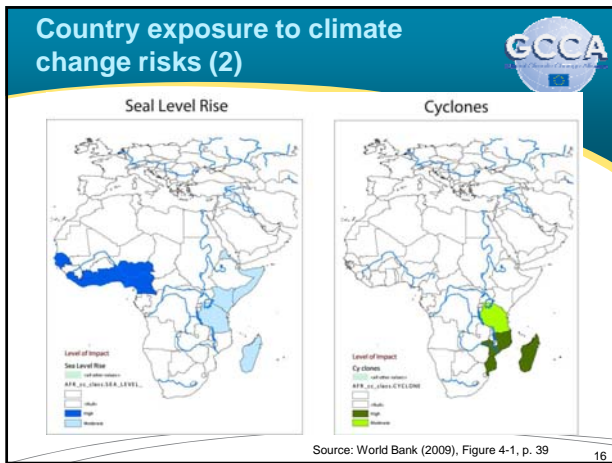
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### Key reference

Describes aspects of climate change science where there is :

- Wide agreement
- Some consensus but continuing debate
- Insufficient/Incomplete understanding

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