Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

# Thematic introduction:
# climate (change), adaptation and mitigation

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of the Federal Republic of Germany

# Overview

**Climate change terminology**

- Weather, climate, climate variability & climate change
- Greenhouse effect & emission pathways
- Climate change signals

**Adaptation to climate change**

- Definition and examples

**Mitigation**

- Definition and examples

# Basic definitions

## Weather

The state of the atmosphere at a given time with regard to temperature, rainfall, wind, etc.

## Climate

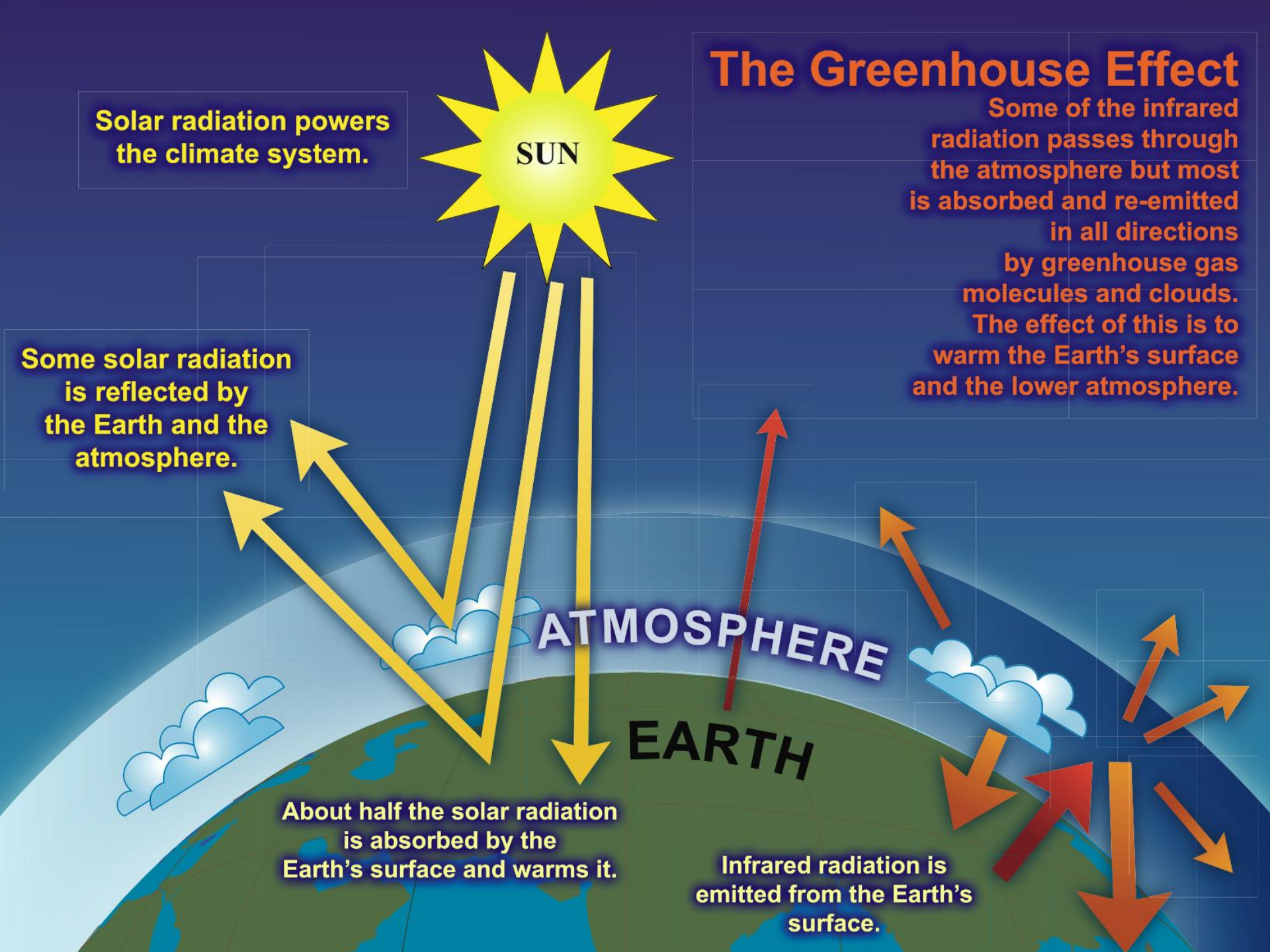
The weather averaged over a long period of time, typically 30 years or more

## Climate variability

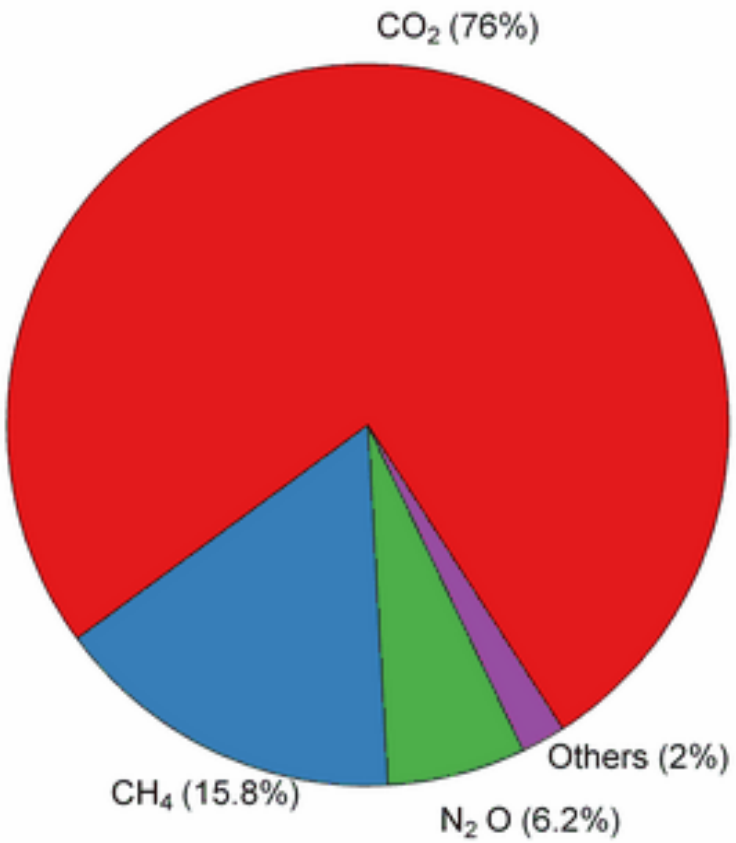
Variations in the mean state of the climate

## Climate Change

A change of the global climate


The Greenhouse Effect
Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.
Solar radiation powers the climate system.
SUN
Some solar radiation is reflected by the Earth and the atmosphere.
ATMOSPHERE
EARTH
About half the solar radiation is absorbed by the Earth's surface and warms it.
Infrared radiation is emitted from the Earth's surface.

# Global GHG composition, 2010




Others:

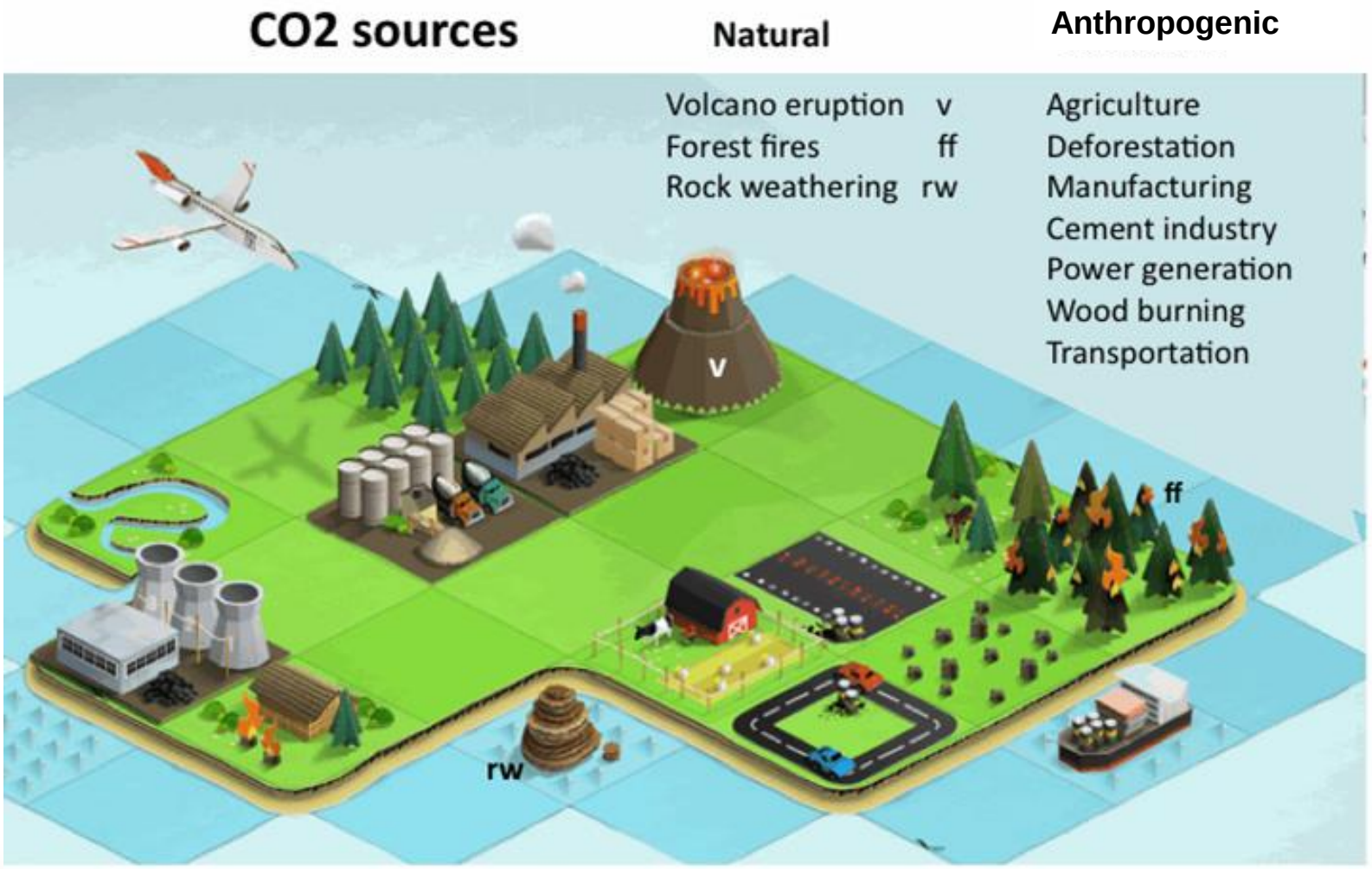
Hydrofluorocarbons (HFCs) = 1.5%

Perfluorocarbons (PFCs) = 0.2%

SF6 = 0.3%

Source: International Energy Agency, OECD, Paris, 2012

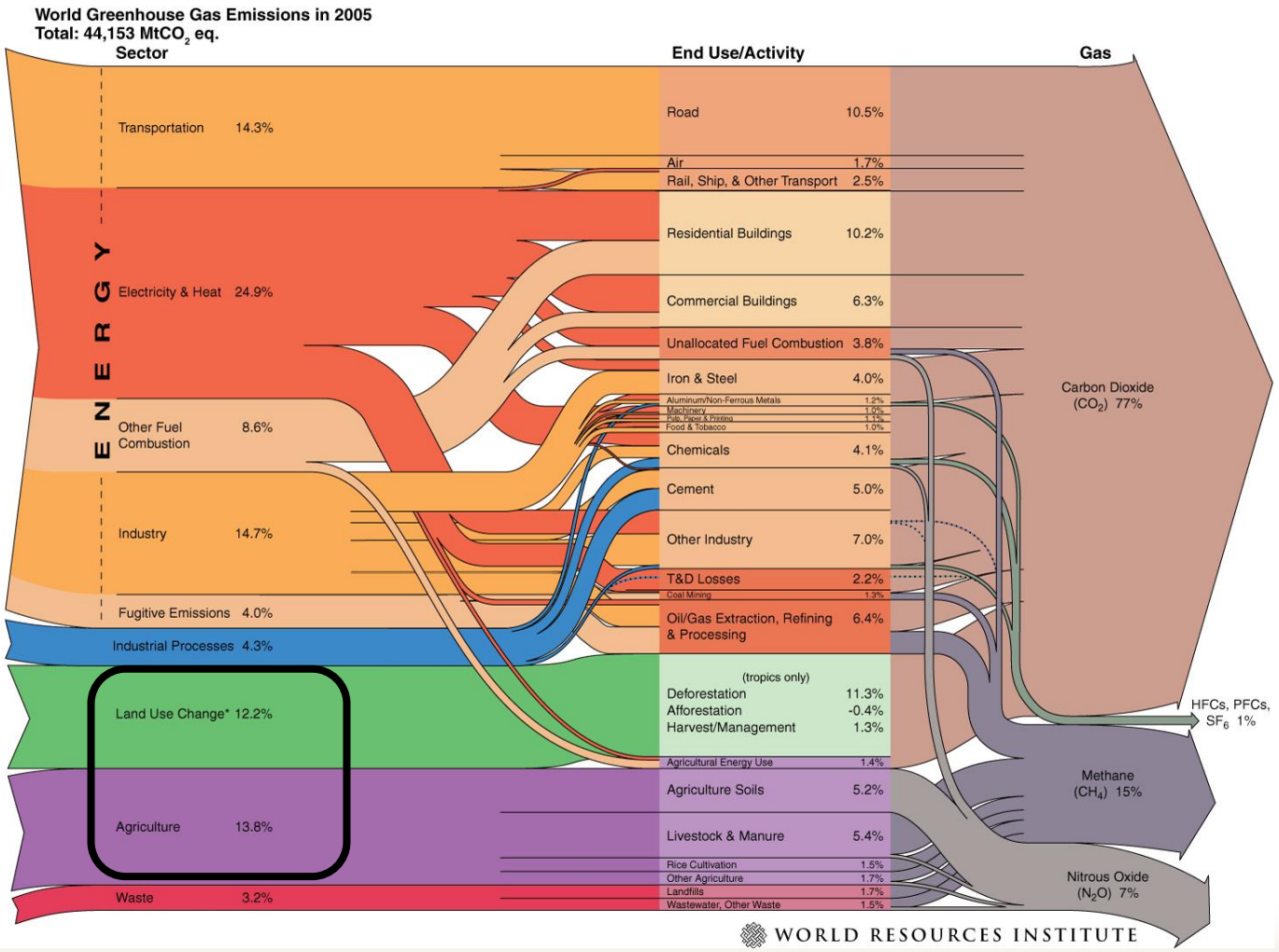
# Natural and anthropogenic sources of $CO_2$




Source: http://www.climate-change-knowledge.org/uploads/co2_all_source.png

# Where do emissions come from?

Energy
Total
66,5%




$CO_2$: 77% of GHG

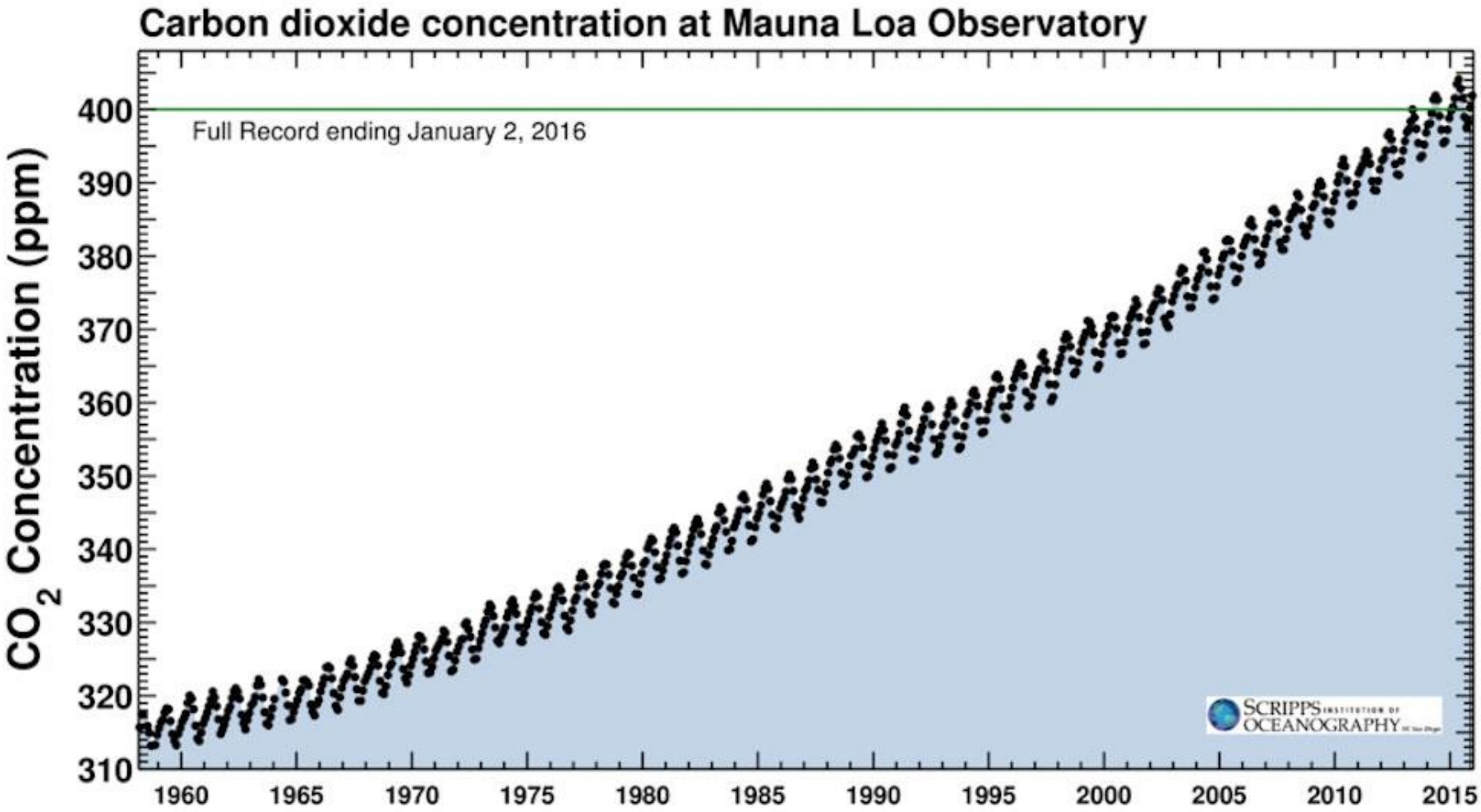
Others: 1% of GHG

Land use change/ Agriculture 26%

Methane: 15%

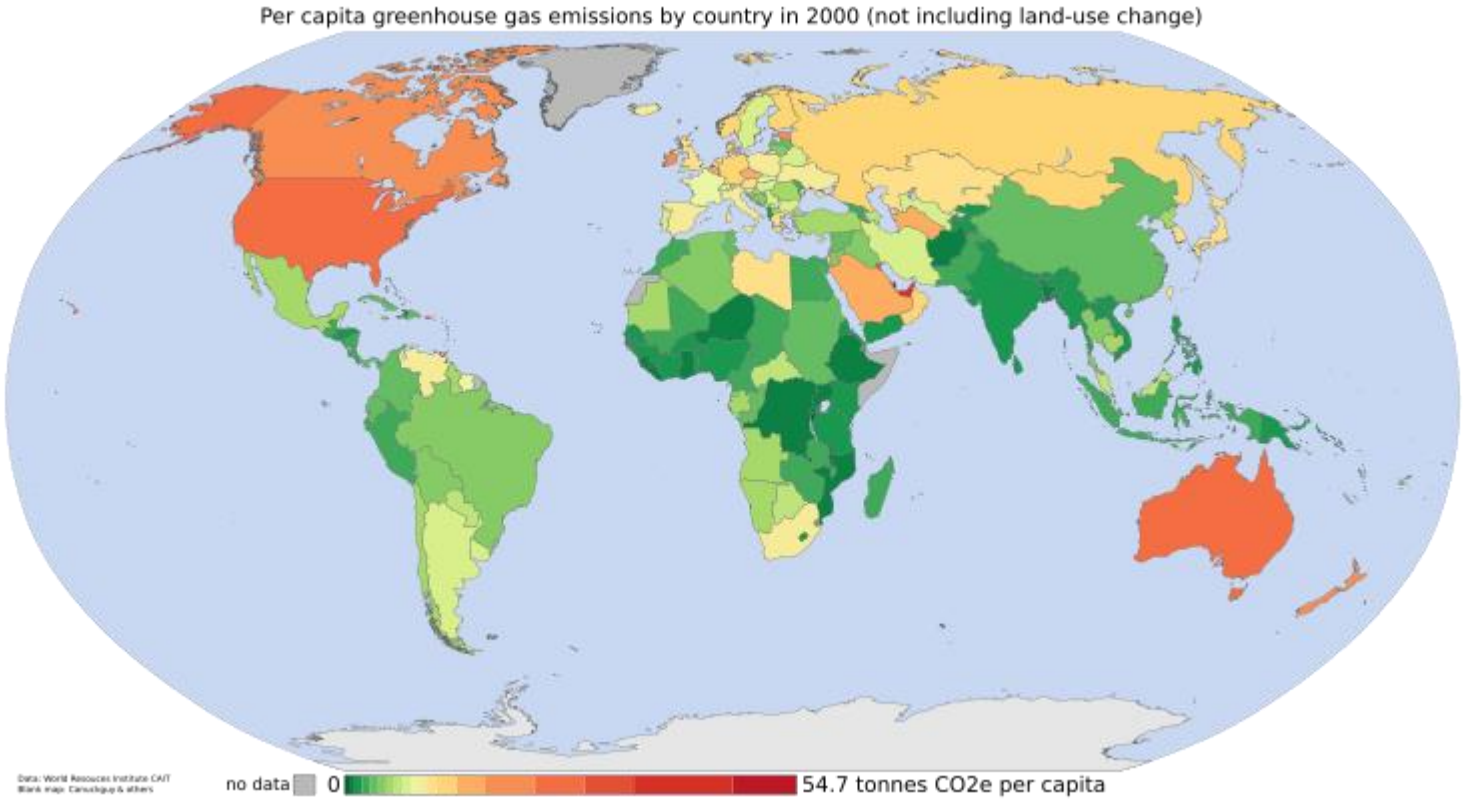
Nitrous oxide: 7%

Source: cait.wri.org



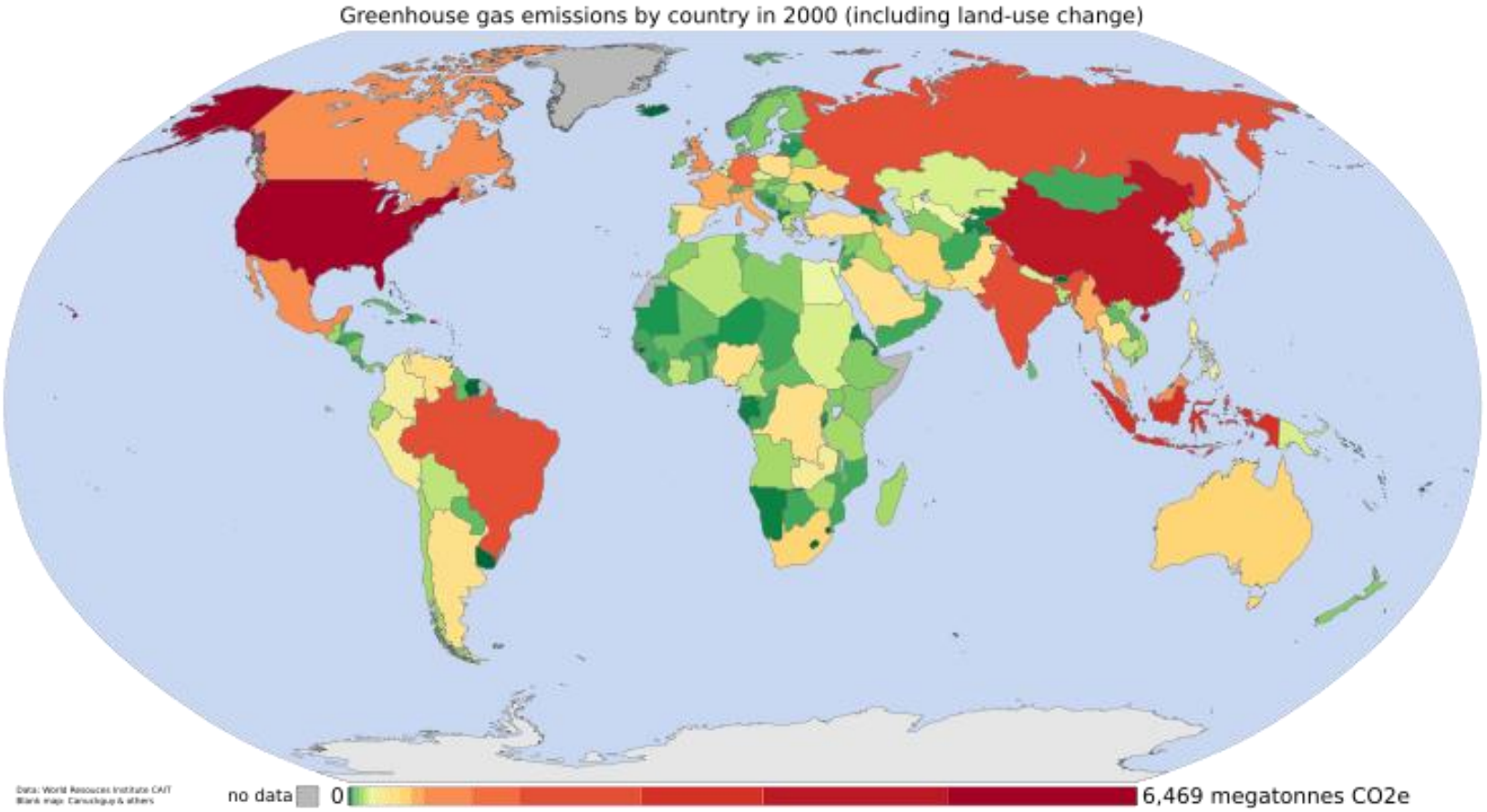

$CO_2$ concentration before industrialisation: ca. 280 ppm

# GHG emissions by country per capita (2000)



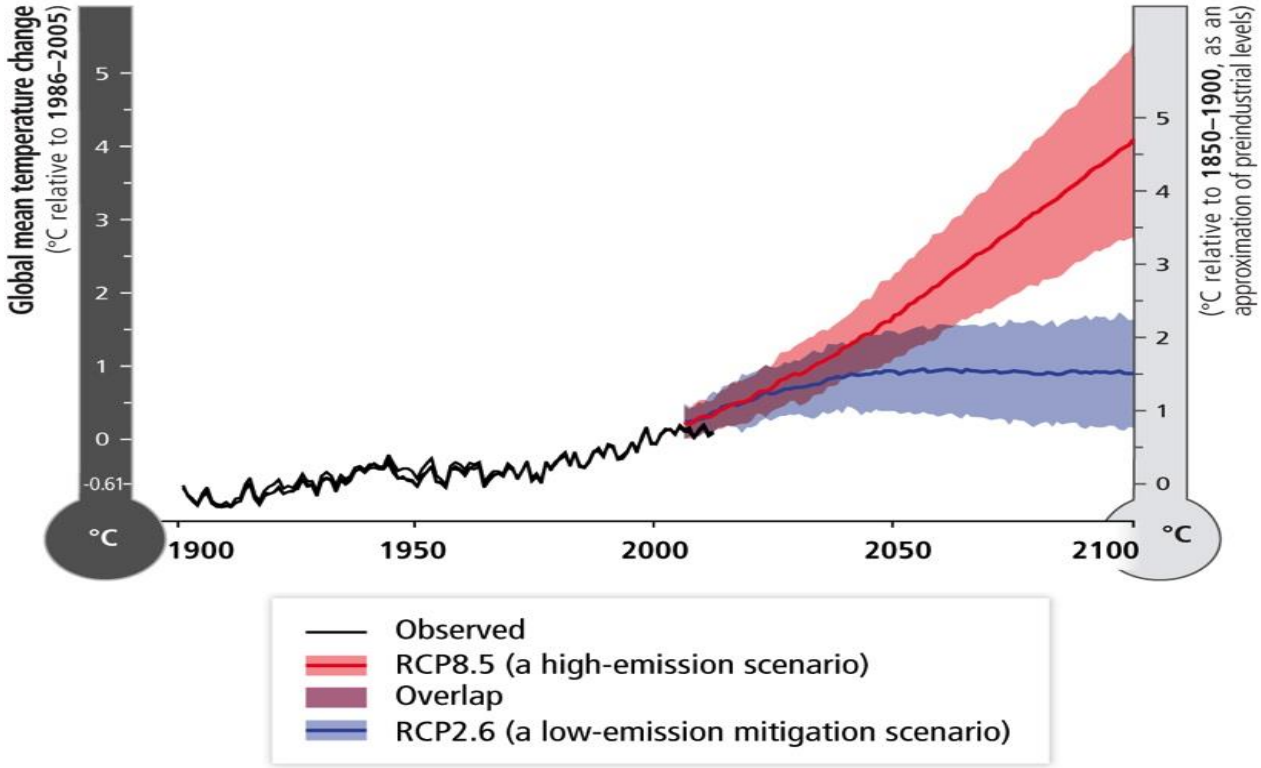

Source: wikipedia

# GHG emissions by country (2000)



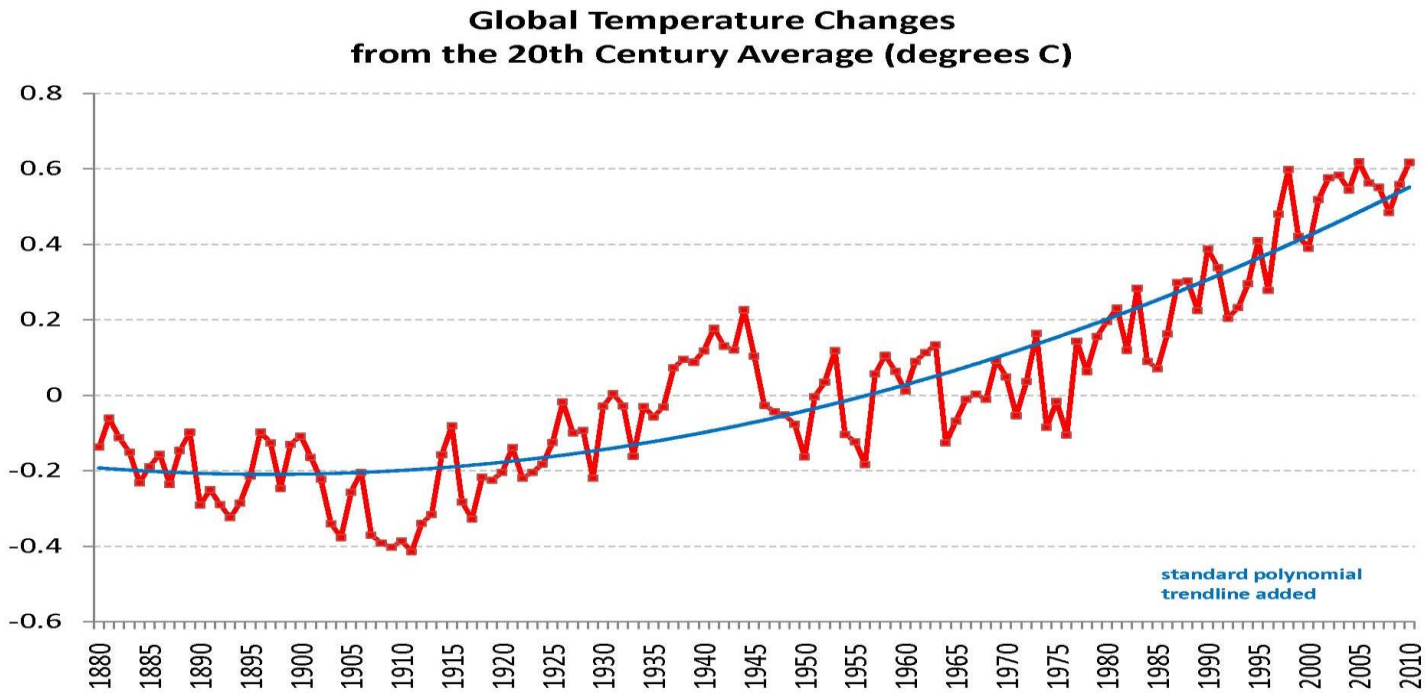

Source: wikipedia

# IPCC Scenarios (RCP – Representative Concentration Pathways)




*Source: Climate Change 2014: Impacts, Adaptation, and Vulnerability. IPCC*

# Global temperature changes



# Signals of global warming

Rising temperatures, heat waves

Sea level rise

Melting ice

Ocean acidification

Changing rainfall patterns

Changes in extreme events

Scientists very sure

Less clear, and regional differences

Source: Red Cross Climate Training Kit. Module 1a – Climate change science and impacts

# From signals to tangible effects

## Climate signals

- change in temperature patterns
- change in precipitation patterns
- increase in extreme weather events (storms, heat waves...)
- melting of pole caps, glaciers and permafrost
- sea-level rise
- ocean acidification

## Effects

- droughts
- change of natural systems' productivity
- increase in forest fires
- exceptional floods
- loss of land
- health issues
- ...

- food insecurity
- loss of income
- ...

→ vulnerable livelihoods

→ economic damages

# How to react?

- **Adaptation**:

Manage the unavoidable

- **Mitigation**:

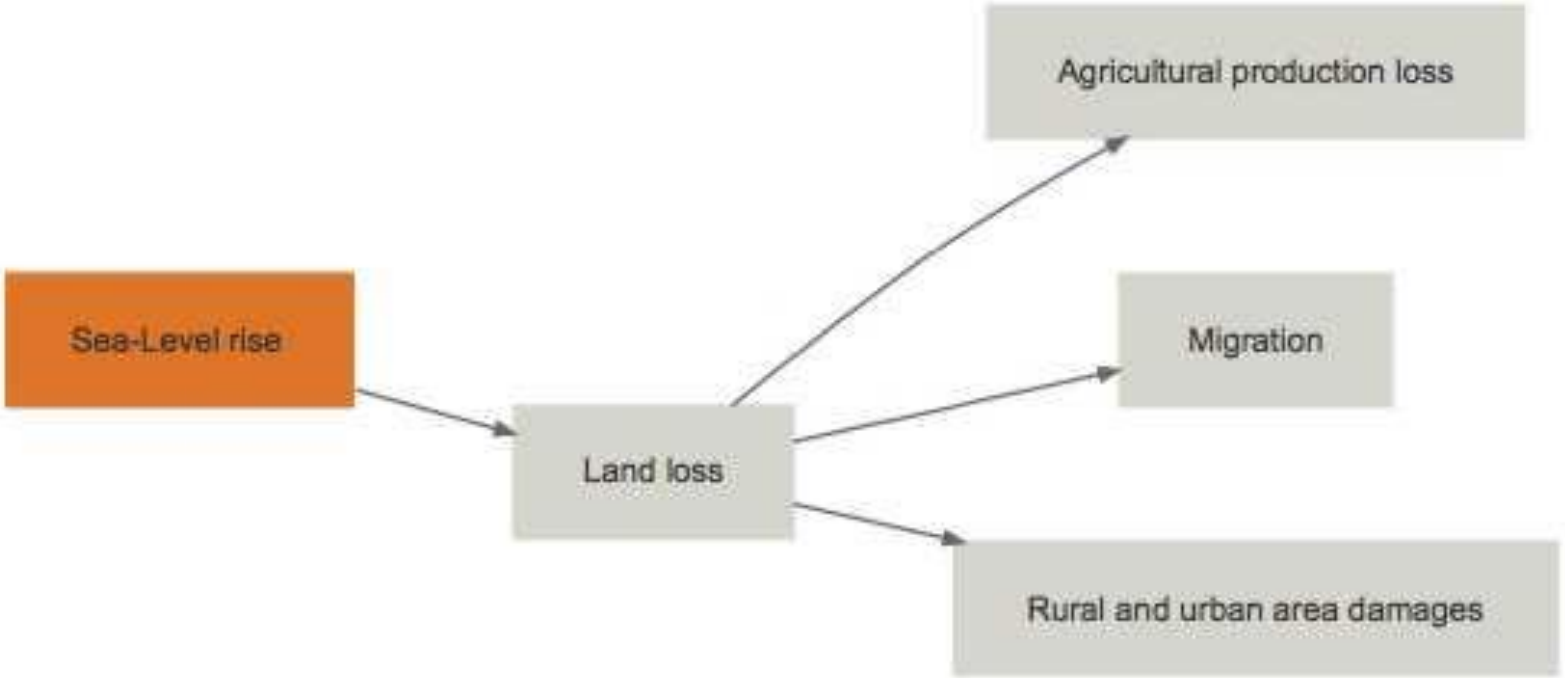
Avoid the unmanagable

# Adaptation to climate change

**Adaptation (IPCC, 2013):** The process of **adjustment** to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or **avoid harm** or exploit **beneficial opportunities**. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

**Goal:**
**reduce negative effects of climate change and benefit from positive effects**

# Adaptation - thinking in impact chains



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# Adaptation measures – examples

Photos: C. Berger

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Photo: C. Berger

Photo: MetOffice UK

# Mitigation of GHG

**Mitigation (IPCC, 2013):** A human intervention to **reduce the sources** or **enhance the sinks** of greenhouse gases (GHGs).

Paris (CoP 2015): +2°C maximum, desirable: 1,5°C

**Goal:**
**reduce emissions in order to alleviate the extent of climate change**

# Mitigation measures – examples


Source: rkmp.co.in

Source: gussd.wordpress.com

# Adaptation and mitigation: complementary strategies