

# Climate Change

The climate change vulnerability index ranks how likely a country is to be harmed by changing patterns in climate, natural hazards and ecosystems caused by climate change. Norway is the country best equipped to deal with climate change, with low population density, excellent healthcare and communication systems and high overall food and energy security. In contrast Somalia, with scarce natural resources, low food security, political violence and human rights risk, is extremely vulnerable to the impacts of climate change.

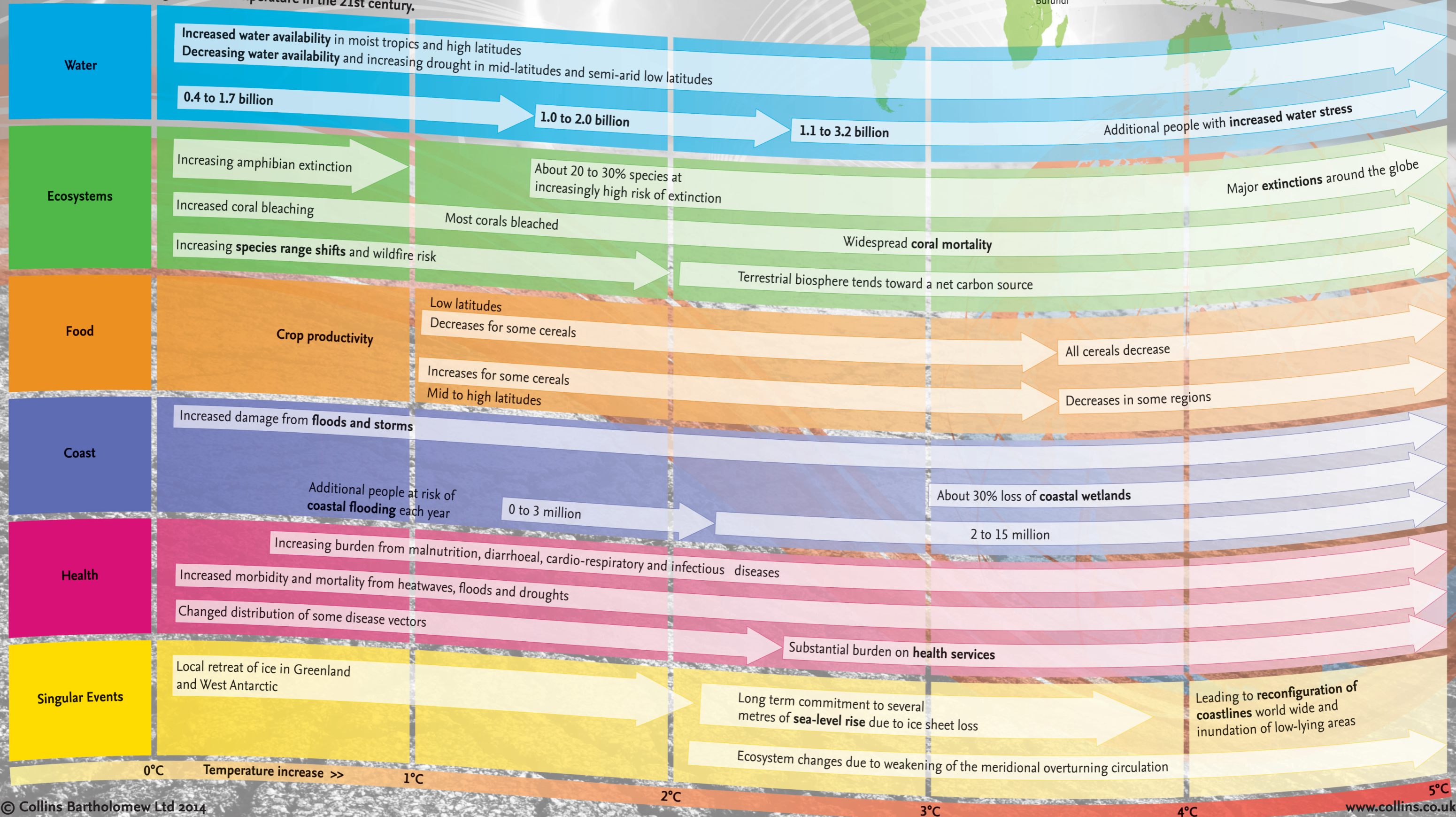
Highest climate vulnerability risk countries



**Collins**

of the 28 countries most at risk, **22** are in Africa

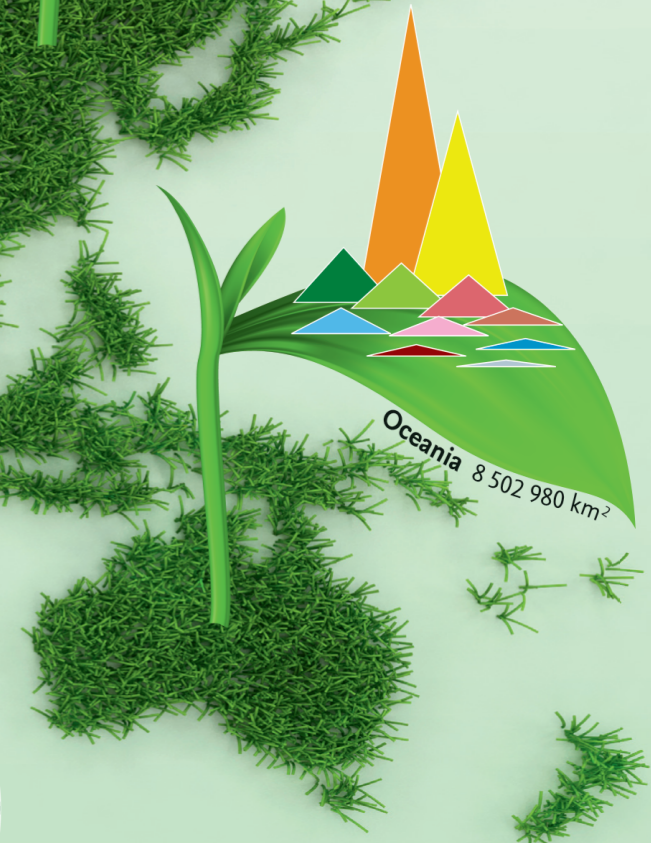
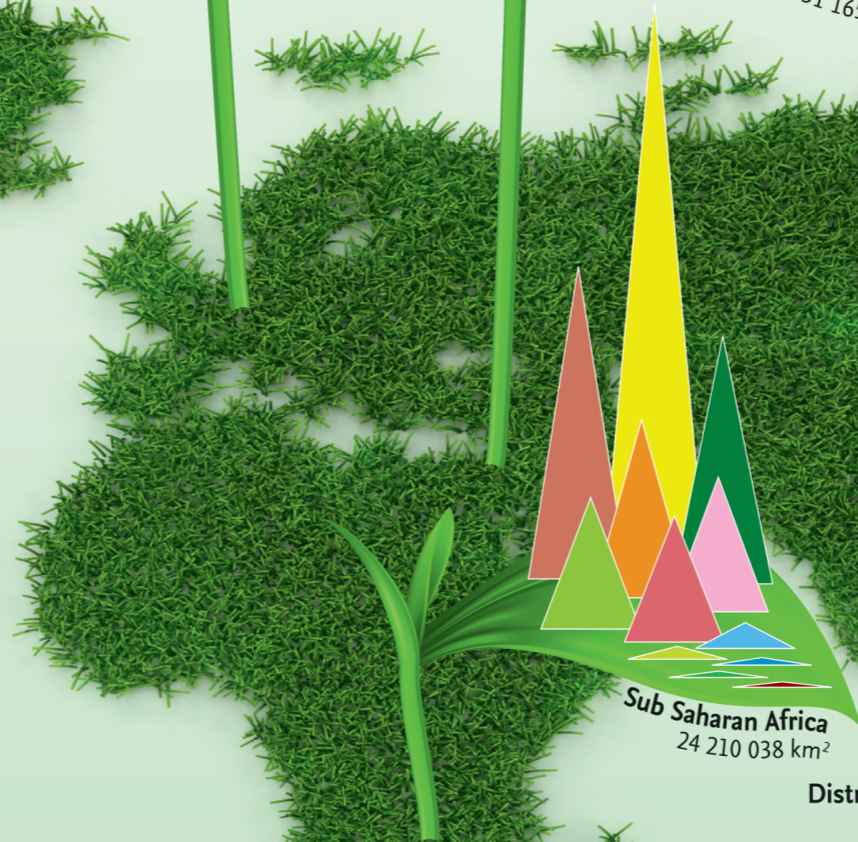
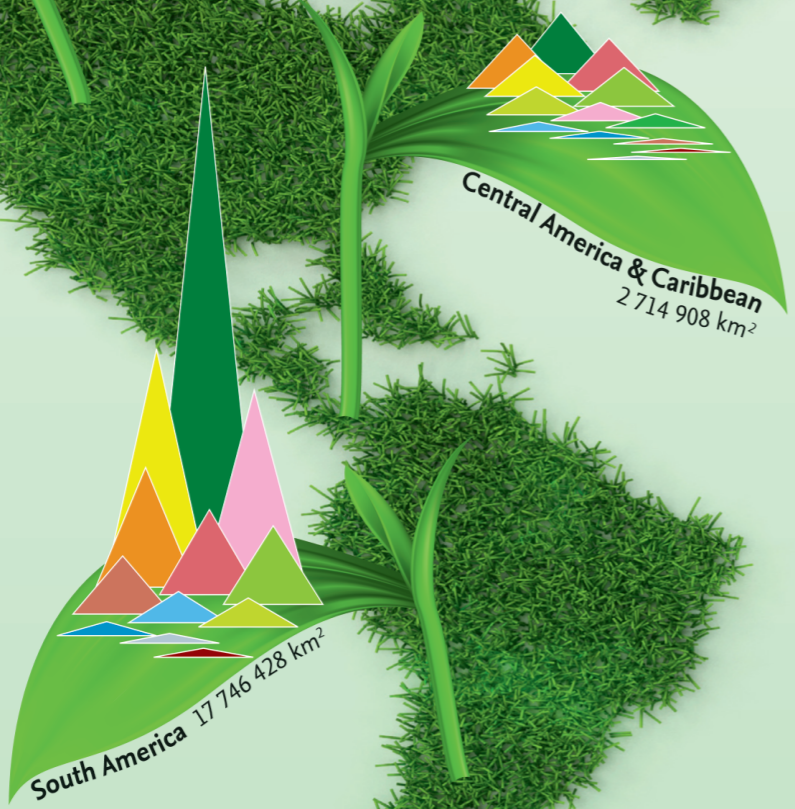
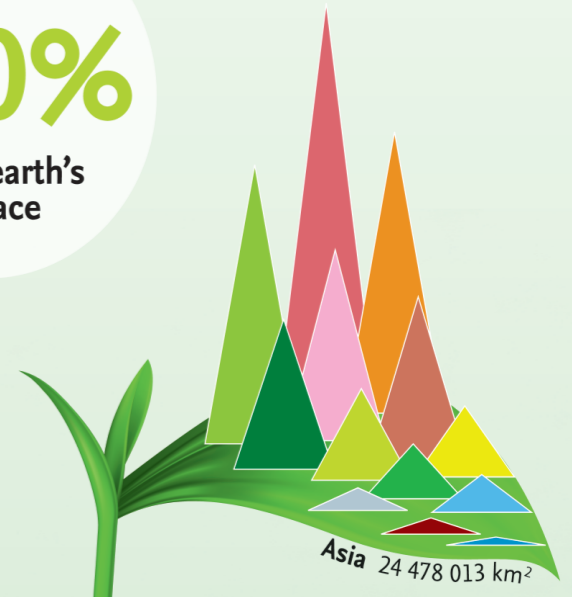
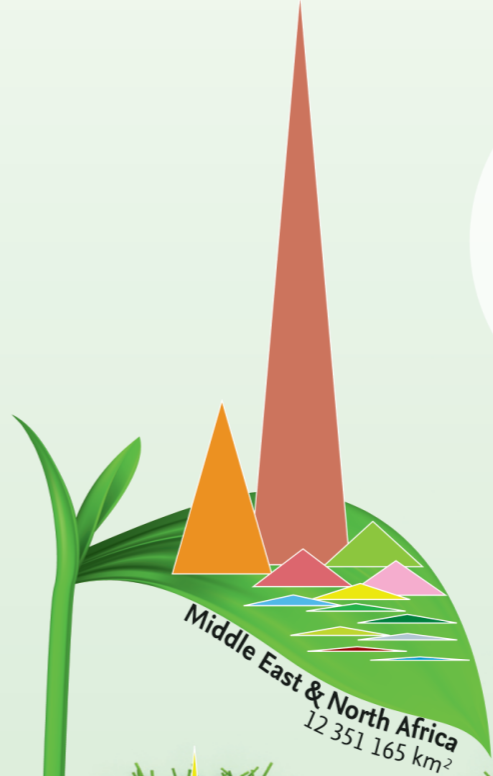
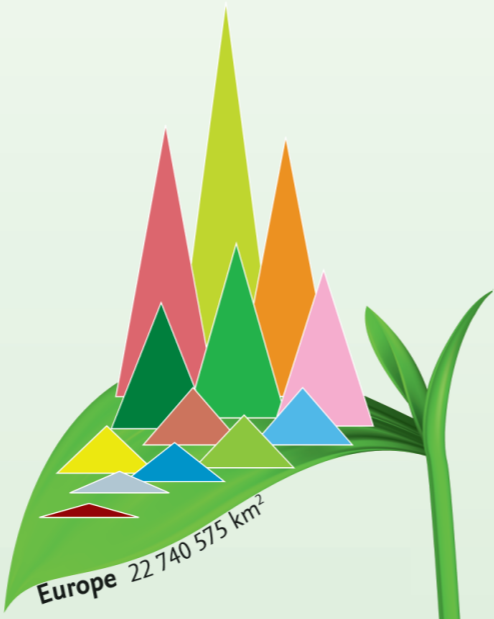
Global impacts projected for changes in climate associated with different amounts of increase in global average surface temperature in the 21st century.



# Biomes of the World

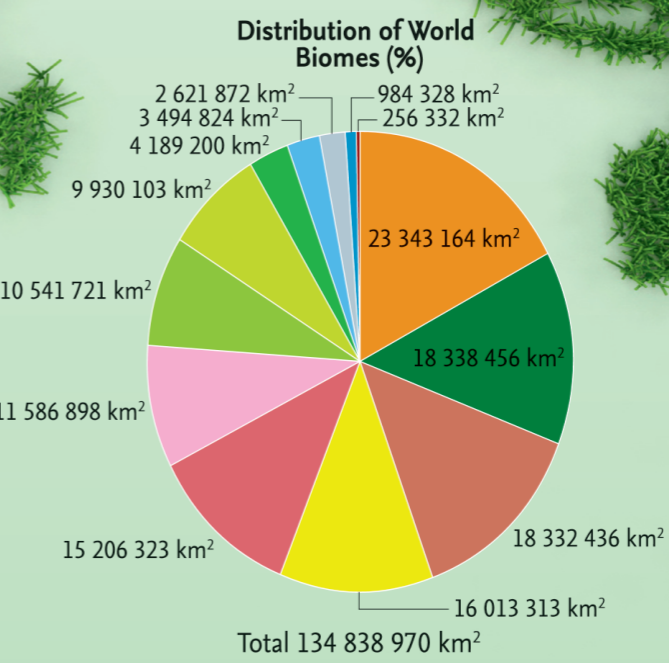
A biome is a large area with geographic and climatic similarities as well as similar flora, fauna, and microorganisms. Species living in each biome are adapted to its varying conditions of water, heat and soil. Biomes are classified according to their predominant vegetation. The conservation and preservation of biomes is a major concern to us all.

forests cover  
**>30%**  
of the earth's  
surface



- Key**
- Evergreen forest
  - Deciduous forest
  - Mixed forest
  - Shrublands
  - Savannah
  - Grasslands
  - Permanent wetlands
  - Croplands
  - Urban and built up
  - Cropland/ Natural vegetation mosaic
  - Snow and Ice
  - Barren or sparsely vegetated
  - Water bodies

The height of each symbol represents the area of a biome (square kilometres)



# Environmental Issues and Pollution

## Key

- Desertification**
  - Existing deserts
  - Areas at risk of desertification
- Deforestation**
  - Existing tropical forests
  - Forests destroyed since 1940
- Water pollution**
  - Severe coastal pollution
  - Persistent coastal pollution
  - Oil slicks
  - Significant oil spill
  - River pollution
  - Coral reefs at risk
- Air pollution**
  - Major city with air pollution problem due to industry and vehicle exhaust
  - Pollution hotspot

Some chemicals and biological materials cause harm or discomfort to humans and other living organisms. When they are introduced to the atmosphere, the air becomes polluted. The most common pollutants produced by human activity include sulphur oxides, nitrogen oxides, carbon monoxide and carbon dioxide. High levels of fine particles in the air (particulate matter, PM) are linked to health hazards such as heart disease, breathing problems and lung cancer. Chemical and biological pollution of rivers and oceans can cause harm to fish, coral reefs and other aquatic life.

**Chernobyl power plant, Ukraine, 1986**  
The world's worst nuclear accident. A 19 mile exclusion zone around the plant still remains uninhabitable.  
**People affected** >5.5 million  
**Pollutants** Uranium, plutonium, radioactive iodine, caesium-137, strontium

**Dzerzhinsk chemical manufacturing, Russian Federation**  
Chemical waste seeping into groundwater leads to acute poisoning and death.  
**People affected** 300 000  
**Pollutants** Chemicals and toxic byproducts from the manufacture of chemical weapons

**Norilsk heavy metals smelting complex, Russian Federation**  
Annually over 4 million tonnes of heavy metals are dispersed into the air. Deaths from respiratory diseases are considerably higher than in other parts of the region.  
**People affected** 134 000  
**Pollutants** Air pollution, SO<sub>2</sub>, heavy metals, particulates, nitrogen and carbon oxides, phenols and hydrogen sulphide

**Rudnaya Pristan lead smelter, Russian Federation**  
Drinking water, interior dust and garden crops contain dangerous levels of lead leaked from an old smelter.  
**People affected** 90 000  
**Pollutants** Lead, cadmium, mercury and antimony

**Mayлуу-Suu uranium plant, Kyrgyzstan**  
Almost 2 million cubic metres of radioactive mining waste threaten one of the most fertile and densely populated areas of Central Asia.  
**People affected** 23 000 (potentially millions)  
**Pollutants** Uranium mine tailings, heavy metals and cyanides

**Linfen coal mines, China**  
Rapid development of the coal industry has caused serious air pollution resulting in chronic health problems for the inhabitants of Linfen.  
**People affected** 200 000  
**Pollutants** Fly-ash, carbon monoxide, nitrogen oxides, PM<sub>2.5</sub>, PM<sub>10</sub>, sulphur dioxide

**Fukushima, Japan 2011**  
Nuclear power plant meltdown caused by a tsunami after a powerful earthquake led to a 20 km exclusion zone immediately after the disaster. The plant is still leaking radiation and it could be over 20 years before the area becomes habitable.  
**People affected** >20 000 in the immediate vicinity  
**Pollutants** Uranium, plutonium, radioactive iodine, caesium-137, strontium

**Oil spill, Gulf of Mexico, 2010**  
Also known as the Deepwater Horizon oil spill, this was the largest accidental marine oil spill in the history of the petroleum industry. By the time the leak was finally stopped, around 5 million barrels of crude oil had been released into the sea.  
**People affected** Unknown  
**Pollutants** Crude oil, Chemical dispersants (used to break up the oil)

**Haina car battery recycling smelter, Dominican Republic**  
Alarming levels of lead have been found in human blood and in the soil.  
**People affected** 85 000  
**Pollutants** Lead

**La Oroya poly-metallic smelter, Peru**  
Adults and children have been exposed to toxic emissions from the smelter and vegetation has been destroyed by acid rain.  
**People affected** 35 000  
**Pollutants** Lead, copper, zinc, sulphur dioxide

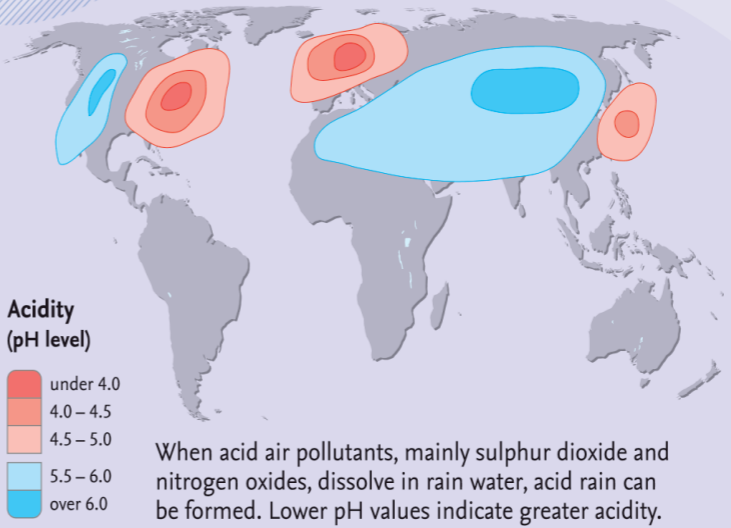
**Ranipet chemical factory, India**  
Groundwater has been contaminated due to 1.5 million tonnes of solid waste accumulating over 20 years.  
**People affected** 3 500 000  
**Pollutants** Chemicals from tannery waste

**Kabwe mining and smelting operations, Zambia**  
Decades of contamination have left debilitating concentrations of lead in the soil and water.  
**People affected** 250 000  
**Pollutants** Lead, cadmium

## Air pollution (PM<sub>10</sub> micrograms per m<sup>3</sup>)



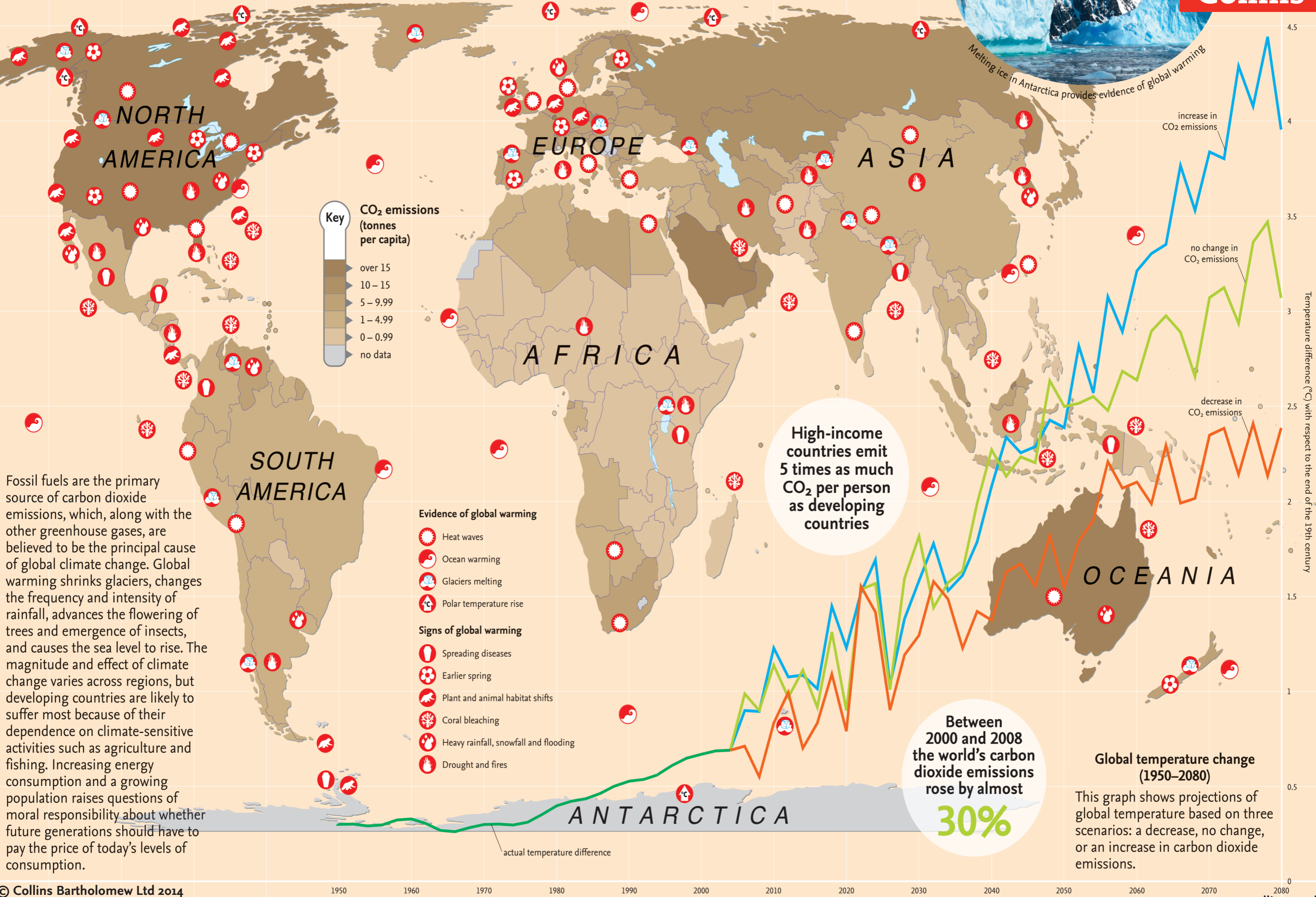
## Acid rain



# Global Warming



Melting ice in Antarctica provides evidence of global warming



**Key**

**CO<sub>2</sub> emissions (tonnes per capita)**

- over 15
- 10 – 15
- 5 – 9.99
- 1 – 4.99
- 0 – 0.99
- no data

- Evidence of global warming**
- Heat waves
  - Ocean warming
  - Glaciers melting
  - Polar temperature rise
- Signs of global warming**
- Spreading diseases
  - Earlier spring
  - Plant and animal habitat shifts
  - Coral bleaching
  - Heavy rainfall, snowfall and flooding
  - Drought and fires

Fossil fuels are the primary source of carbon dioxide emissions, which, along with the other greenhouse gases, are believed to be the principal cause of global climate change. Global warming shrinks glaciers, changes the frequency and intensity of rainfall, advances the flowering of trees and emergence of insects, and causes the sea level to rise. The magnitude and effect of climate change varies across regions, but developing countries are likely to suffer most because of their dependence on climate-sensitive activities such as agriculture and fishing. Increasing energy consumption and a growing population raises questions of moral responsibility about whether future generations should have to pay the price of today's levels of consumption.

High-income countries emit 5 times as much CO<sub>2</sub> per person as developing countries

Between 2000 and 2008 the world's carbon dioxide emissions rose by almost **30%**

**Global temperature change (1950–2080)**

This graph shows projections of global temperature based on three scenarios: a decrease, no change, or an increase in carbon dioxide emissions.