



Foreign &
Commonwealth
Office

Climate change: what are the security implications?

Frances Wood
Head of Climate Security
UK Foreign and Commonwealth Office

Overview

- What is climate security?
- How to tackle it?
- What is the UK doing?
- What is the EU, NATO and the UN doing?

What is climate security?



- Climate change will cause physical impacts such as flooding, temperature rises, shifts in precipitation.
- What happens to people?
- How do people and governments behave?

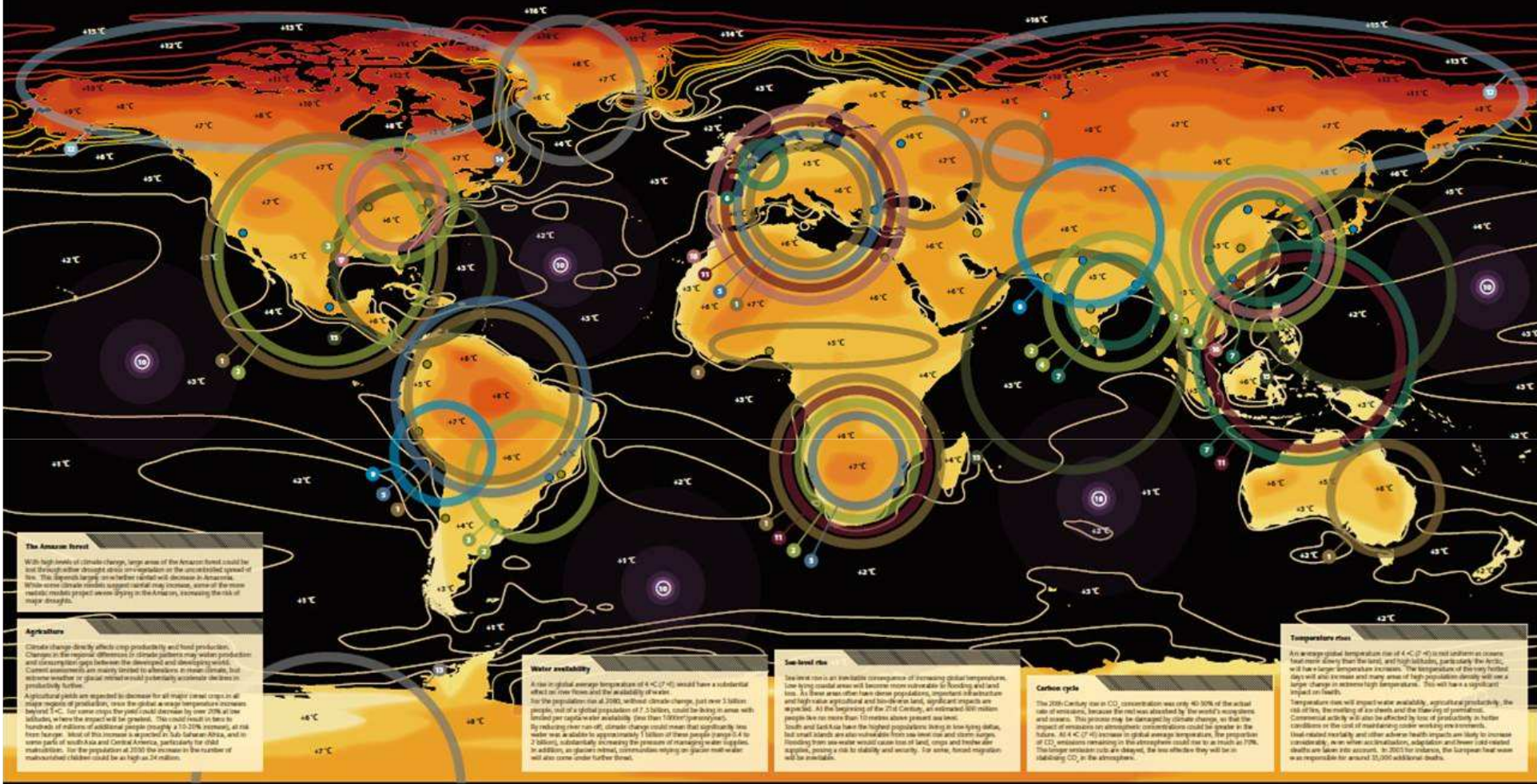
UK view

“Climate change is potentially the greatest threat to global stability and security, and therefore to national security” UK National Security Strategy 2009

Limit the security risks

- UK and EU see 2C maximum rise is needed to limit risks to global security
- Moving to low-carbon is the only way to limit the impacts from climate change
- 4C risks security implications we cannot contain

The impact of a global temperature rise of 4 °C (7 °F)



The Amazon forest

With high levels of climate change, large areas of the Amazon forest could be lost through either drought alone or vegetation as the accelerated spread of fire. This depends largely on whether rainfall will decrease in Amazonia. While recent climate models suggest rainfall may increase, some of the more realistic models project severe drying in the Amazon, increasing the risk of major droughts.

Agriculture

Climate change directly affects crop productivity and food production. Changes in the regional differences in climate patterns may reduce production and consumption gaps between the developed and developing world. Current assessments are mainly limited to alterations in mean climate, but extreme weather or greater rainfall could substantially erode the increase in productivity further.

Agricultural yields are expected to decrease for all major cereal crops in all major regions of production, even the global average temperature increases beyond 1 °C. For some crops the yield could decrease by over 20% at low latitudes, where the impact will be greatest. This could result in tens to hundreds of millions of additional people (roughly a 10-20% increase) at risk from hunger. Most of this increase is projected in Sub-Saharan Africa, and in some parts of South Asia and Central America, particularly for wheat and maize production. For the population of 2050 the increase in the number of malnourished children could be as high as 34 million.

Water availability

A rise in global average temperatures of 4 °C (7 °F) would have a substantial effect on river flows and the availability of water.

For the population rise at 2050, without climate change, just over 3 billion people, out of a global population of 7.5 billion, could be living in areas with limited per capita water availability (less than 1000m³ per person/year). By reducing river run-off, climate change could mean that significantly less water was available to approximately 1 billion of these people (up to 2 billion), substantially increasing the pressure of managing water supplies. In addition, as glaciers retreat, communities relying on glacier melt water will also come under further threat.

Sea level rise

The sea level rise is an inevitable consequence of increasing global temperatures. Low lying coastal areas will become more vulnerable to flooding and land loss. In these areas often have dense populations, important infrastructure and high value agricultural and forested land, significant impacts are expected. At the beginning of the 21st Century, an estimated 60 million people live in more than 10 metres above present sea level. South and East Asia have the highest populations living in low lying deltas, but small islands are also vulnerable from sea level rise and storm surges. Flooding from sea water would cause loss of land, crops and homes due to agriculture, posing a risk to stability and security. For some, forced migration will be inevitable.

Carbon cycle

The 20th Century rise in CO₂ concentration was only 40-50% of the actual rate of emissions, because the rest was absorbed by the world's oceans and forests. This process may be damaged by climate change, so that the impact of emissions on atmospheric concentrations could be greater in the future. At 4 °C (7 °F) increase in global average temperature, the proportion of CO₂ emissions remaining in the atmosphere could rise to as much as 70%. The longer carbon stays in the atmosphere, the less effective they will be in stabilizing CO₂ in the atmosphere.

Temperature rise

An average global temperature rise of 4 °C (7 °F) is not uniform as warmer heat more slowly than the land, and high latitudes, particularly the Arctic, will see larger temperature increases. The temperature of the very hottest days will increase and many areas of high population density will see a large change in extreme high temperatures. This will have a significant impact on health.

Temperature rise will impact water availability, agricultural productivity, the risk of fire, the melting of ice sheets and the thawing of permafrost. Commercial activities will also be affected by loss of productivity in harsh conditions or the cost of maintaining cooler working environments. Heat related mortality and other adverse health impacts are likely to increase considerably, as are other air-borne diseases, adaptation and better cold related deaths are taken into account. In 2050 for instance, the European heat wave was responsible for around 22,000 additional deaths.

- 1 High-impact fire danger projected to affect every populated continent, beyond existing fire risk high-danger category includes large areas of the United States, Canada, South America, west of the Indian Ocean, and East Asia, the Levant, western and southern Australia and southern Europe.
- 2 Maize and wheat yields reduced by up to 40% at low latitudes.
- 3 Soybean yield could decrease in all regions of production, including North and South America, western and eastern Asia.
- 4 Decrease in rice yield of up to 30% in China, India, Bangladesh and Indonesia.
- 5 Water resources affected by up to 70% reduction in run-off around the Mediterranean, southern Africa and large areas of South America.

- 6 Sea level rise combined with storm surges could pose a serious threat to people and assets in the Netherlands and south-western parts of the US.
- 7 Sea levels could rise as much as 80 cm by the end of the century. Large cities, 4-6 °C (7 °F) could result in a much higher rise to sea level. Sea level increases are likely to be even greater in low-lying, delta-prone or heavily affected tropical islands and low-lying regions such as Bangladesh.
- 8 For the population at 2075, a mean sea level rise of 53 cm means that up to an additional 130 million people per year would be flooded due to extreme sea levels. The sea level rise of these people due to sea level rise is 24 million people/year could be flooded along the Indian Ocean coast, 25 million along the east Asian coast and 31 million people would be flooded along the South-East Asian coast.
- 9 Other vulnerable regions include Africa, Caribbean Islands, Indian Ocean Islands and Pacific small islands.

- 10 Half of all floating ice glaciers significantly reduced by 2050, even at a global average temperature rise of 4 °C.
- 11 The Hindu river basin obtains 70% of its summer flow from glacial melt. In China, 20% of the population lives in three river basins that have glacial melt provide the principal dry season water source.
- 12 Complete disappearance of glaciers from every region in South America, in Peruvian Cordillera Occidental summer runoff from glaciers reduced by up to 60% in the glacier area late by 70%.
- 13 Major crop yields could be fundamentally altered by ocean acidification which would have a significant impact on fisheries. This could cause substantial loss to marine and fish. The loss of coral reef habitats due to acidification may seriously affect many commercial fish species and could pose problems for coastal communities relying on the economic taking of reef species.

- 14 Drought events occur twice as frequently across southern Africa, South-East Asia and the Mediterranean basin.
- 15 Altered currents suppression of near surface perturbation from the North Atlantic, reduction of precipitation in Central and North America and loss of the sea level rise due to the perturbation of the sea level.
- 16 It is not known how stable the West Antarctic Ice Sheet is, or whether a 4 °C (7 °F) global average temperature rise will melt it. This is not known. If it is not known, it will melt and contribute a further 3.3 metres to long-term sea level rise globally.
- 17 Greenland Ice Sheet has a 60% likelihood of irreversible decline. This would result in a very long-term sea level rise of up to 7 metres globally.

- 18 Tropical cyclones could be more intense and destructive. Global precipitation increases, particularly in coastal areas, and sea level rise causes greater systems and less intense coastal storms. Storms to destruction and loss of life as a result of storm surges, the major system disaster flooding from storm surges has been the primary cause of death.
- 19 Hottest days of the year could be as much as 6 °C (11 °F) warmer over highly populated areas of eastern China.
- 20 Hottest days of the year could become as much as 10-12 °C (18-22 °F) warmer over western North America, affecting Toronto, Chicago, New York and Washington DC.
- 21 Hottest days of the year across Europe could be as much as 8-12 °C (14-22 °F) warmer.

Disease patterns have changed with an overall increase in diarrhoea, vector-borne disease such as malaria and dengue fever, malnutrition and the health impacts of other weather events such as flooding and drought.

°C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
+	2	4	5	7	9	11	13	14	16	18	20	22	23	25	27

City populations
 ● 5 - 10 million ● 10 - 20 million

Source: IPCC Working Group II Contribution to the Fourth Assessment Report (AR4)

These impacts are based on a range of climate change scenarios. The higher the temperature rise, the greater the impacts. The data shown is based on a 4 °C (7 °F) rise in global average temperature.

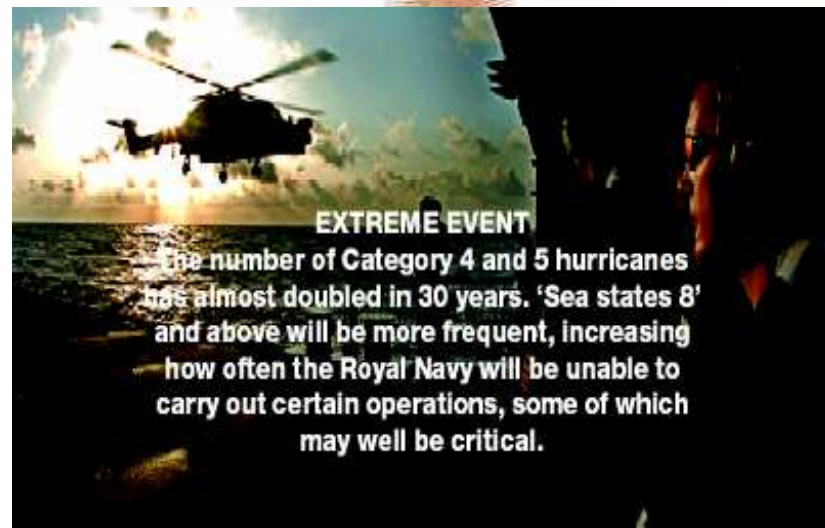
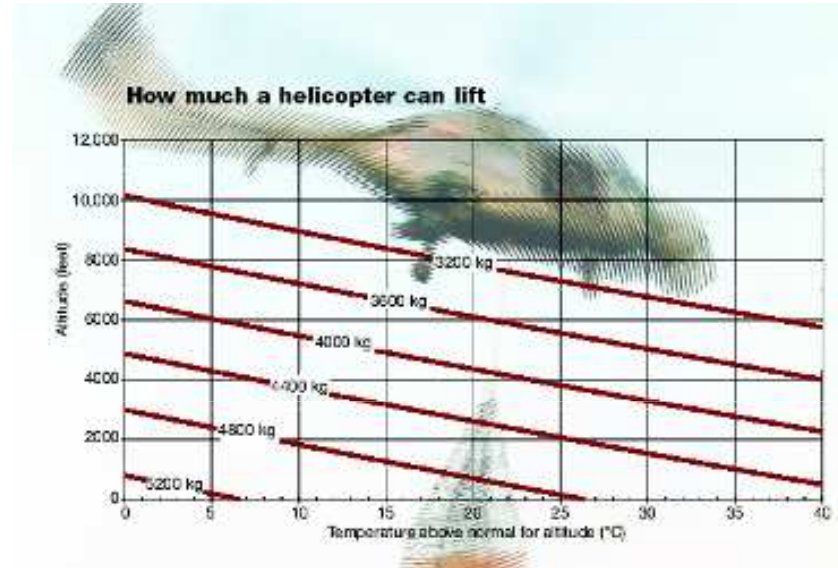
UK approach so far



- Broaden and deepen the debate globally
 - UN Security Council debate in April 2007
- Limit emissions
 - Climate Change Act 2008
 - Carbon budgets
- Plan for the security implications already committed to
 - UK risk assessment
 - Departmental adaptation plans

Defence

- What will be required of defence in the future?
- What will defence need to change for future operations?
- What can defence do to reduce its own impact?
- What are the benefits to defence?



EU view and approach



- Climate change poses threat to EU security (similar to UK approach)
- Leading report published by High Rep in March 2008. Followed by most recent recommendations in December 2009
- Led by Germany, Denmark, Sweden, France, Spain and UK

NATO view and approach



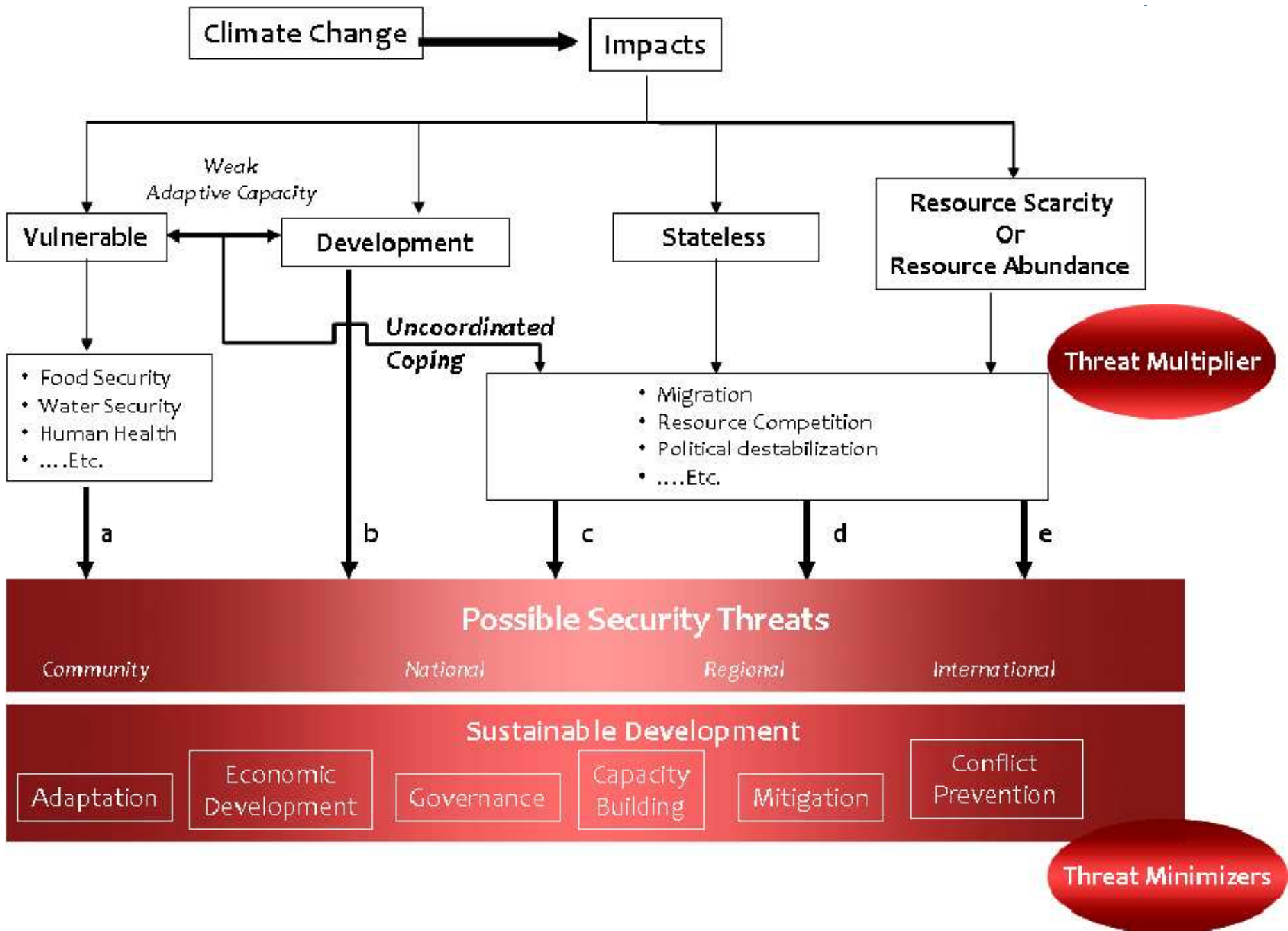
- “to my mind, the bottom line is clear. We may not yet know the precise effects, the exact costs or the definite dates of how climate change will affect security. But we already know enough to start taking action...the security implications of climate change need to be better integrated into national security and defence strategies...” Anders Fogh Rasmussen – NATO Secretary General: 1 Oct 09



UN



- Debate in Security Council in 2007
- Resolution passed by Small Island Developing States in 2009
- Secretary General's report in 2009



Questions?