

# Briefing

## Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment, Working Group 2 report

### Questions and answers in advance of publication

The Intergovernmental Panel on Climate Change is a UN body tasked with producing five yearly updates of knowledge on the scientific, technical and socio-economic aspects of climate change. It has three scientific working groups each producing and publishing a detailed report. These are synthesised into one document after completion of all three.

The first group Working Group 1, The Physical Science Basis (WG1) published its report in September 2013. A Friends of the Earth summary of its findings is available [here](#). The second group Working Group 2 will publish their report on 31<sup>st</sup> March 2014.

This Questions and Answers briefing – produced in advance of the Working Group 2 report – explains what the report will cover, what their last report said, and predicts the content of the forthcoming report.

#### Take home messages

Climate change will hit the poorest countries hardest despite these countries being least responsible for causing it.

Without very rapid reductions in carbon pollution the impacts from climate change will be very severe. Billions of people will be negatively affected.

Whilst cutting carbon pollution is an urgent necessity, so is adaptation. The rich countries that have done most to cause climate change must support adaptation in developing countries.

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For more than 40 years we've seen that the wellbeing of people and planet go hand in hand – and it's been the inspiration for our campaigns. Together with thousands of people like you we've secured safer food and water, defended wildlife and natural habitats, championed the move to clean energy and acted to keep our climate stable. Be a Friend of the Earth – see things differently.

## Summary

The impacts of climate change impacts are already being felt by people across the world, particularly in the form of extreme weather (briefing available [here](#)). Those that are most affected are those in developing countries, despite being the least responsible for the carbon pollution that is causing climate change.

In 2007, the Intergovernmental Panel on Climate Change – the world’s top climate scientists – warned that unless we very rapidly cut carbon pollution deeply the future climate impacts would be much more severe. Floods, water stress, food production and increased disease would result. 20-30% of plant and animal species would be at increased risk of extinction. Again, it was thought that developing countries would be hit hardest, with wealthy countries less impacted and more able to adapt (see summary of regional impacts p5-7)

The 2014 report from IPCC Working Group 2 is likely to paint a bleaker picture. It will be much clearer that climate change is leading and will lead to more extreme weather, and that this will cause significant damage in both rich and poor countries. It will say that even with adaptation food production could decline in all regions of the world, with a backdrop of rising demand and rising populations. Many more millions could go to bed hungry every night. It will say that significantly cutting carbon pollution will mitigate some of these impacts significantly, but even with this much more needs to be done in terms of adaptation, particularly supporting developing countries.

## Questions and answers

*Note that the predictions of what will be in the report are based on reading of science over past years plus media reports and rumours about the forthcoming report. They should therefore be treated with caution.*

### What is the report and how was it produced?

The WG2 report will have 30 chapters produced by 310 authors, consisting of 61 Coordinating Lead Authors, 183 Lead Authors, and 66 Review Editors from 73 countries. The summary report will be agreed line by line by up to 195 countries in Japan on 25<sup>th</sup> to 29<sup>th</sup> March 2014. The report can therefore be considered very robust and, because of the nature of the process, is likely to be conservative in its conclusions.

### What does it cover?

It will cover impacts of climate change on: resources such as water, food production and ecosystems; urban and rural areas and infrastructure; human health impacts; adaptation needs; and it will have a chapter on each of ten world regions.

### What doesn't it cover?

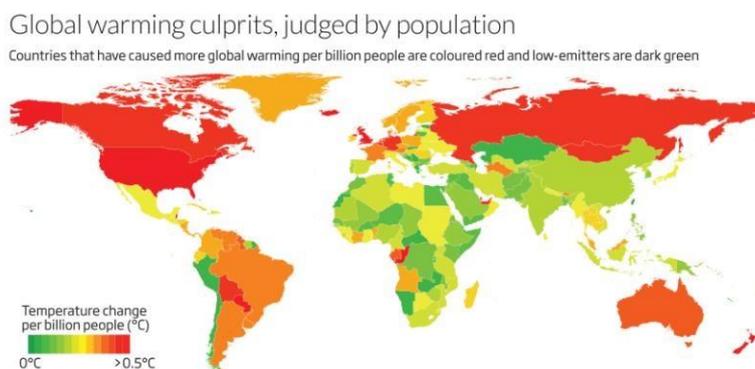
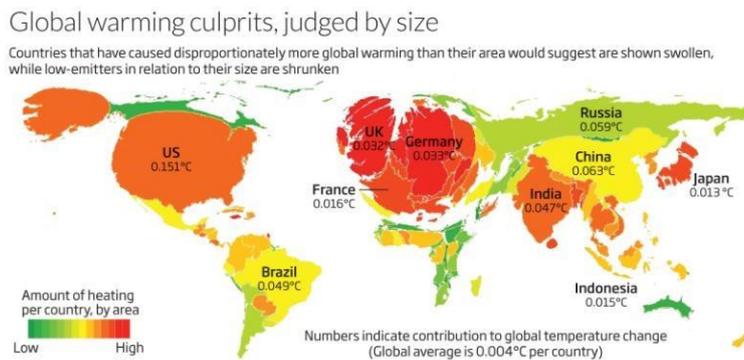
It doesn't cover the physical evidence of climate change. This was covered in the Working Group 1 report published in September 2013, a summary of which is available [here](#). Nor does it identify options for cutting carbon pollution. This will be covered by IPCC Working Group 3 which will report in April 2014.

### What did the last report say?

The last report made clear that climate change was already having impacts on ecosystems and that human health impacts were becoming more apparent. It also said that “even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades” but without these “climate change would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt.”

They identified that developing countries were likely to bear the brunt of the future impacts of climate change, although no regions would be totally immune (see below for more detail on particular regions). In fact, it would have been possible to read the Summary for Policy Makers and conclude that impacts for Northern Europe and North America would be very limited. This perhaps explains the paucity of effort on mitigation in these regions. This is likely to change in the next report (see below)

A [recent map](#) produced by New Scientist magazine illustrates the injustice this represents by identifying that developed countries like USA, Russia, Germany and the UK are largely responsible for the warming that has occurred to date.



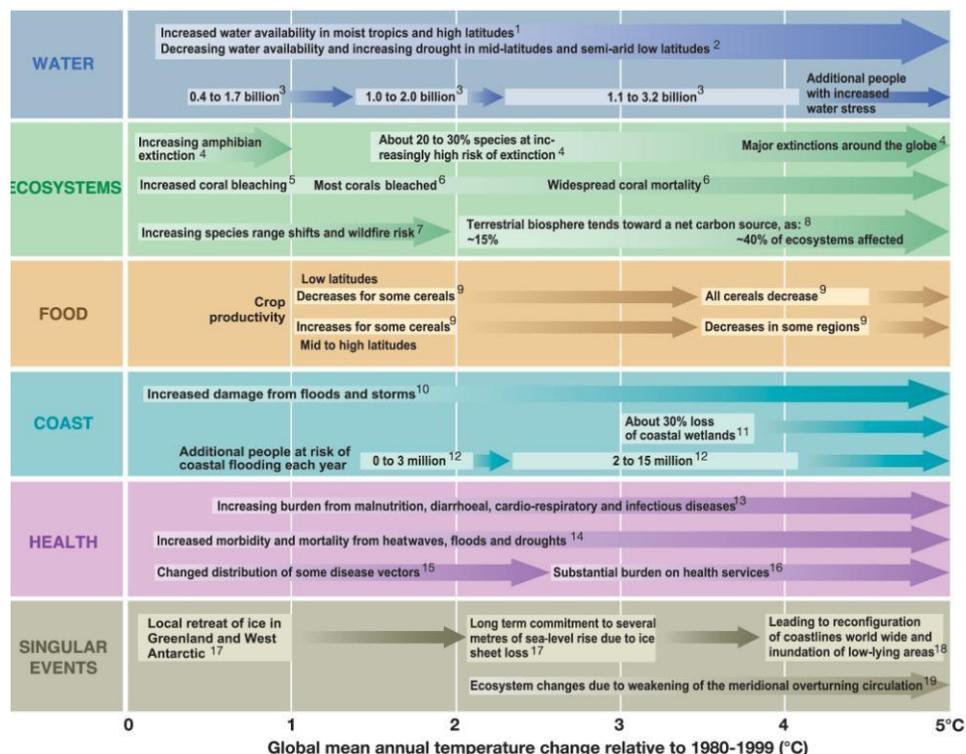
Source: New Scientist, 15<sup>th</sup> January 2014, issue 2952

The WG2 report identified a range of impacts that were already occurring at the time of publication – such as:

- increased runoff and earlier spring peak discharge in many glacier and snow-fed rivers;

- earlier timing of spring events, such as leaf-unfolding, bird migration and egg-laying; □ pole-ward and upward shifts in ranges in plant and animal species;
- a trend in many regions towards earlier ‘greening’ of vegetation; changes in ranges and abundance of algal, plankton and fish in high-latitude oceans;
- some human health impacts, such as heat-related mortality in Europe, infectious disease vectors in some areas, and allergenic pollen in Northern Hemisphere high and midlatitudes;
- enhanced risk of glacier lake outburst floods caused by melting glaciers;
- warmer and drier conditions in the Sahelian region of Africa, reducing the length of growing season; and
- losses of coastal wetlands and mangroves and increasing damage from coastal flooding.

But it was the projected impacts of future warming that were particularly worrying. The following diagram illustrates this (further detail below). Note that the temperature increase in the diagram is relative to 1980-1990, for increases since pre-industrial add 0.7 degrees.



AR4, WG2, Table TS.3 in Technical Summary

They suggested:

- By mid-century, annual average river runoff and water availability are projected to increase by 10-40% at high latitudes and in some wet tropical areas, and decrease by 10-30% over some dry regions at mid-latitudes and in the dry tropics, some of which are presently water-stressed areas.

- More frequent heavy precipitation events will increase flood risk.
- A decline in water supplies stored in glaciers and snow cover reducing water availability in regions where more than one billion people live.
- Drought-affected areas will likely increase in extent.
- Approximately 20-30% of plant and animal species assessed are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C.
- Crop productivity is projected to increase slightly at mid- to high latitudes for local mean temperature increases of up to 1-3°C depending on the crop, and then decrease beyond that in some regions. At lower latitudes, especially seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (12°C), which would increase the risk of hunger. Globally, the potential for food production is projected to increase with increases in local average temperature over a range of 13°C, but above this it is projected to decrease
- The health of millions will be impacted, particularly those with low adaptive capacity, through: increases in malnutrition; increased deaths, disease and injury due to heatwaves, floods, storms, fires and droughts; increased diarrhoeal disease; and changes in distributions of infectious disease vectors (e.g. mosquitoes).
- Many millions more people are projected to be flooded every year due to sea-level rise by the 2080s. Those densely-populated and low-lying areas where adaptive capacity is relatively low, and which already face other challenges such as tropical storms or local coastal subsidence, are especially at risk.
- Poor communities will be especially vulnerable as they have more limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies.

The report had chapters providing greater detail for particular regions which can be found [here](#). Below is a very brief summary for some regions.

### **Africa**

- By 2020, between 75 million and 250 million people are projected to be exposed to increased water stress due to climate change.
- Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change. In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020.
- Local food supplies are projected to be negatively affected by decreasing fisheries resources in large lakes due to rising water temperatures

### **Small islands**

- Small islands, whether located in the tropics or higher latitudes are especially vulnerable to the effects of climate change, sea-level rise and extreme events.
- Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources, e.g., fisheries, and reduce the value of these destinations for tourism.
- Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of island communities.
- Climate change is projected by mid-century to reduce water resources in many small islands, e.g., in the Caribbean and Pacific, to the point where they become insufficient to meet demand during low-rainfall periods.

## Asia

- Decreases in freshwater availability in Central, South, East and South-East Asia is projected to decrease which, along with other factors, could adversely affect more than a billion people by the 2050s.
- Coastal areas, especially heavily-populated mega-delta regions in South, East and South-East Asia, will be at greatest risk due to increased flooding from the sea.
- It is projected that crop yields could increase up to 20% in East and South-East Asia while they could decrease up to 30% in Central and South Asia by the mid-21st century. Taken together and considering the influence of rapid population growth and urbanisation, the risk of hunger is projected to remain very high in several developing countries.
- Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in the hydrological cycle associated with global warming.

## Latin America

- By mid-century it is projected that there will be a gradual replacement of tropical forest by savannah in eastern Amazonia. There is a risk of significant biodiversity loss through species extinction in many areas of tropical Latin America.
- In drier areas, climate change is expected to lead to salinisation and desertification of agricultural land. Productivity of some important crops is projected to decrease and livestock productivity to decline.
- Changes in precipitation patterns and the disappearance of glaciers are projected to significantly affect water availability for human consumption, agriculture and energy generation.

## Europe

- In Southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a region already vulnerable to climate variability, and to reduce water availability, hydropower potential, summer tourism and, in general, crop productivity. It is also projected to increase health risks due to heat-waves, and the frequency of wildfires.
- Northern Europe will experience more frequent winter floods and endangered ecosystems. The disbenefits are likely to outweigh benefits such as fewer winter deaths.

## North America

- Warming in western mountains is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources.
- Disturbances from pests, diseases and fire are projected to have increasing impacts on forests, with an extended period of high fire risk and large increases in area burned. Moderate climate change in the early decades of the century is projected to increase aggregate yields of rain-fed agriculture by 5- 20%, but with important variability among regions.

- Cities that currently experience heat-waves are expected to be further challenged by an increased number, intensity and duration of heat-waves during the course of the century.

### **What is likely to be different this time?**

Since AR4 there has been a considerable body of research into the potential impacts of climate change. The WG2 AR5 report will increase concerns compared to the WG2 AR4 Report. It will again stress that without very significant reductions in carbon pollution the impacts will be much more severe. Above 4 degrees warming – the current trajectory – will lead to very high risks of irreversible severe impacts for which we have a very limited capacity to respond. In others words we simple won't be able to adapt to the magnitude of negative impacts.

The main differences between the AR4 report of 2007 and this 2014 AR5 report are likely to be in the following areas:

#### *Extreme weather*

A special IPCC report on extreme weather events<sup>i</sup> has been published, plus a number of attribution studies identifying whether or not climate change was responsible (at least in part) for extreme weather events over recent years. For example, half of twelve extreme weather events in 2012 - including US heat-waves, Super-storm Sandy, and extreme rainfall in Australia – have been linked to climate change. The World Meteorological Organisation has said that over 350,000 lives were lost globally due to extreme weather between 2000 and 2010. Friends of the Earth has produced a briefing summarizing research in this area<sup>ii</sup>.

The WG2 AR5 report is likely to be much clearer that climate change is leading to extreme weather across all regions and these are having very significant impacts on people and economies.

#### *Food production*

There are many studies projecting the impacts of climate change on food production, with or without adaptation. Estimating impacts is complicated because impacts result from a range of stresses, such as extreme daily temperatures, changes in water availability (e.g. irrigation), increases in ozone pollution, etc. In addition elevated carbon dioxide levels acts as a fertilizer for crops. One recent study that considered the combined effects of fresh water availability, CO2 fertilisation and climate change suggested global losses could be very significant by 2100; in the region of 25%+ even if irrigation were to be expanded. Against this backdrop is a growing demand for food.

The WG2 AR5 report is likely to state that even with adaptation global agriculture productivity could decline in all regions, although developing country regions are likely to be hit hardest. A net decline in ocean productivity due to warming and acidification will exacerbate this challenge.

#### *Adaptation*

The WG2 AR5 report will have a much bigger focus on the need for adaptation not just in the physical sense of better infrastructure, flood defences and agricultural changes, but also in

economics, politics and governances. These latter changes are necessary to enable the adaptation by the most vulnerable.

### **Reasons to be worried**

It is clear that extreme weather is having a huge cost on lives and livelihoods across the world. Yet the planet has so far only warmed by around 0.8 degrees centigrade since preindustrial times. Even with very rapid reductions in carbon pollution – the IPCC RCP 2.6 scenario in Working Group 1 report – the warming will increase to around 1.5 degrees centigrade.

The impacts on food productivity are still unclear, but the more research that is carried out the more bleak the picture gets, particularly when researchers combine the multiple stresses on food production (temperatures including daily extremes, precipitation, availability of irrigation water, etc).

The impact on ecosystems and species are still poorly understood. It is very possible that as temperatures warm some systems could undergo abrupt changes. These systems provide important environmental services, such as food, water, etc. Abrupt changes are likely to spell deep trouble for people that depend on the particular ecosystem, but are also likely to be felt globally.

Without rapid reductions in carbon pollution we will move into an amount of climate change which it may be impossible to adapt to, with the widespread loss of life and human suffering this implies. Current trajectories, taking into account current mitigation pledges, are moving us into the danger zone.

### **What are others likely to say?**

The IPCC report has a much stronger focus on adaptation. This is of course necessary, as we have seen the devastating impacts of extreme weather. But it is very likely that vested interests and climate deniers are likely to identify adaptation as the primary response to climate change, not mitigation. However, the IPCC report is clear that without mitigation we may not be able to adapt.

But as important is the reality is that most developing countries do not have the resources to adapt. The adaptation first approach, the champions of which are likely to oppose massive financial transfers to developing countries, is most likely to reduce but not eliminate impacts in the rich world whilst condemning billions in poorer countries to climate hell.

### **Where are the reports?**

The Working Group 2 AR5 Summary for Policy Makers and detailed report will be published on 31<sup>st</sup> March at: <http://www.ipcc-wg2.gov/AR5/ar5.html>

Their earlier 2007 reports can be found here:  
<http://www.ipccwg2.gov/publications/AR4/index.html>

## References

<sup>i</sup> IPCC, 2012: Summary for Policymakers. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 1-19 <sup>ii</sup>

Friends of the Earth (2013), Extreme weather events and climate change, [http://www.foe.co.uk/sites/default/files/downloads/extreme\\_weather\\_cc.pdf](http://www.foe.co.uk/sites/default/files/downloads/extreme_weather_cc.pdf)