

CONFRONTING CLIMATE CHANGE: AVOIDING THE UNMANAGEABLE AND MANAGING THE UNAVOIDABLE

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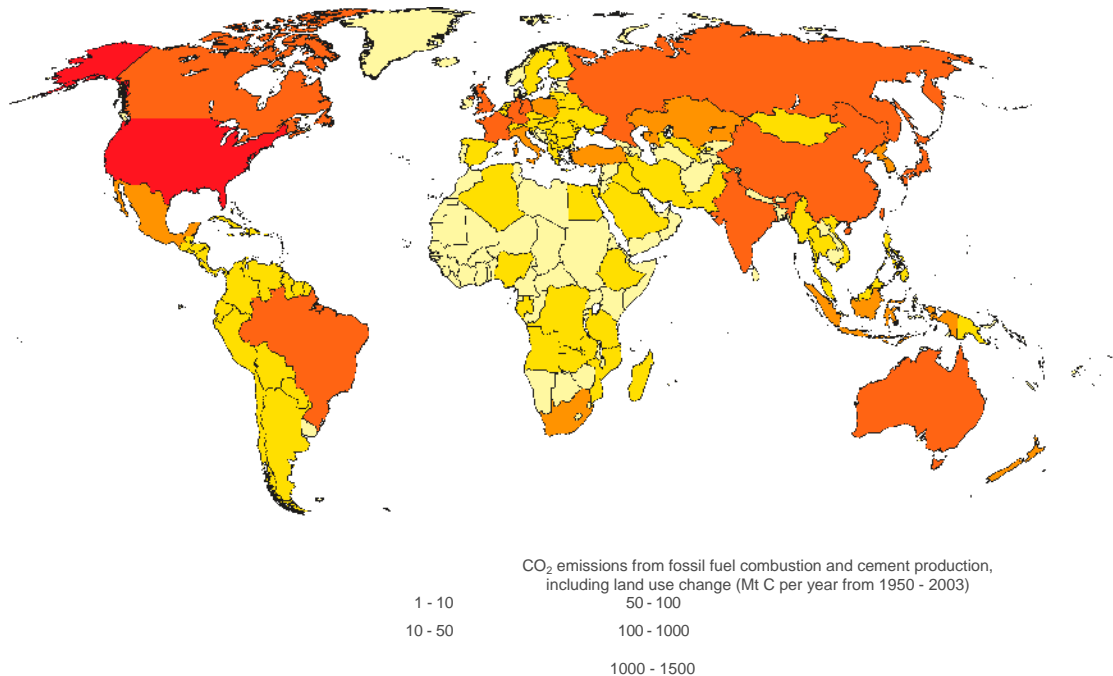


Figure ES.1. The annual emissions of CO₂ by country, averaged over the period 1950 to 2003, in millions of tonnes of carbon per year (MtC/year).

The seemingly modest changes in average temperature experienced over the 20th century have been accompanied by significant increases in the incidence of floods, droughts, heat waves, and wildfires, particularly since 1970. It now appears that the intensity of tropical storms has been increasing as well. There have also been large reductions in the extent of summer sea ice in the Arctic, large increases in summer melting on the Greenland Ice Sheet, signs of instability in the West Antarctic Ice Sheet, and movement in the geographic and altitudinal ranges of large numbers of plant and animal species.

Even if human emissions could be instantaneously stopped, the world would not escape further climatic change. The slow equilibration of the oceans with changes in atmospheric composition means that a further 0.4°C to 0.5°C rise in global-average surface temperature will take place as a result of the current atmospheric concentrations of greenhouse gases and particles.

If CO₂ emissions and concentrations grow according to mid-range projections, moreover, the global average surface temperature is expected to rise by 0.2°C to 0.4°C per decade throughout the 21st century and would continue to rise thereafter. The cumulative warming by 2100 would be approximately 3°C to 5°C over preindustrial conditions. Accumulating scientific evidence suggests that changes in the average temperature of this magnitude are likely to be associated with large and perhaps abrupt changes in climatic patterns that, far more than average temperature alone, will adversely impact agriculture, forestry, fisheries, the availability of fresh water, the geography of disease, the livability of human settlements, and more (see Figure ES.2). Even over the next decade, the growing impacts of climate change will make it difficult to meet the UN's Millennium Development Goals (MDGs).

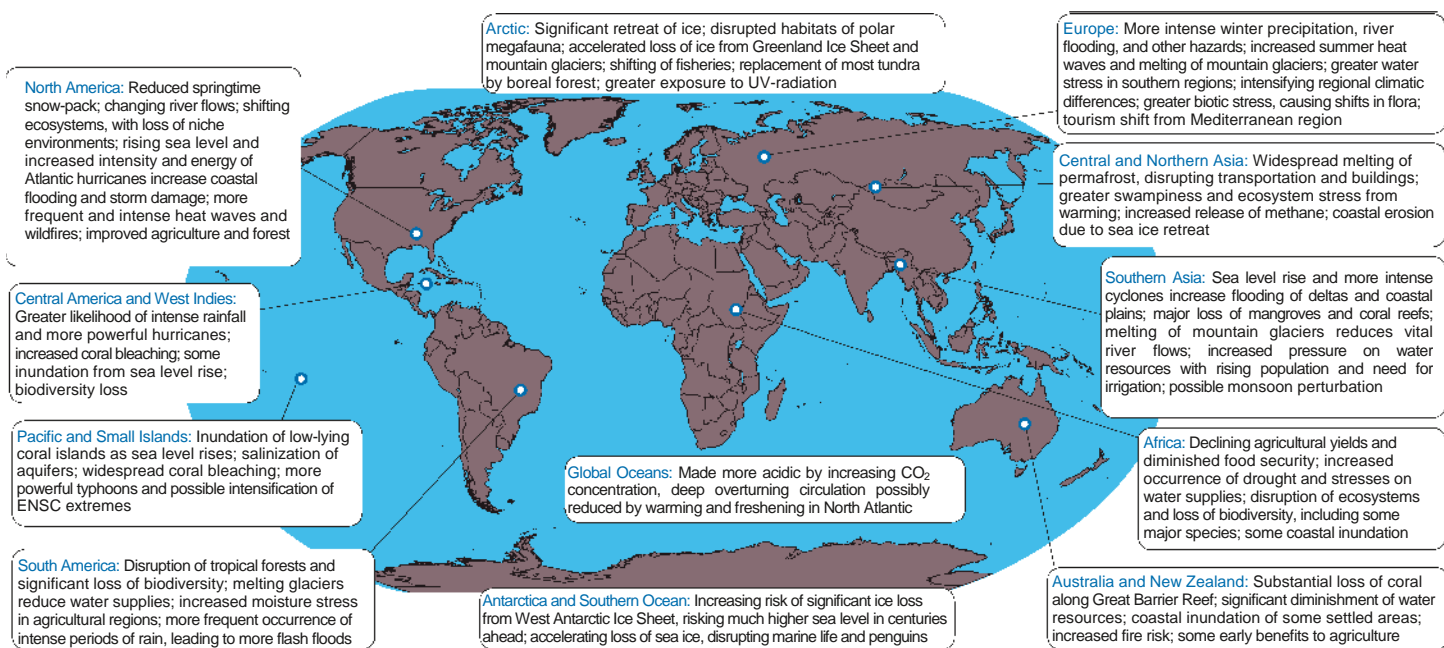


Figure ES.2. Significant impacts of climate change that will likely occur across the globe in the 21st century.

No one can yet say for certain what increase in global-average surface temperature above the 1750 value is “too much,” in the sense that the consequences become truly unmanageable. In our judgment and that of a growing number of other analysts and groups, however, increases beyond 2°C to 2.5°C above the 1750 level will entail sharply rising risks of crossing a climate “tipping point” that could lead to intolerable impacts on human well-being, in spite of all feasible attempts at adaptation.

Ramping up mitigation efforts quickly enough to avoid an increase of 2°C to 2.5°C would not be easy. Doing so would require very rapid success in reducing emissions of CH₄ and black soot worldwide, and it would require that global CO₂ emissions level off by 2015 or 2020 at not much above their current amount, before beginning a decline to no more than a third of that level by 2100. (The stringency of this trajectory and the difficulty of getting onto it are consequences, above all, of the emission levels already attained, the long time scale for removal of CO₂ from the atmosphere by natural processes, and the long operating lifetimes of CO₂-emitting energy technologies that today are being deployed around the world at an increasing pace.)

But the challenge of halting climate change is one to which civilization must rise. Given what is currently known and suspected about how the impacts of climate change are likely to grow as the global-average surface temperature increases, we conclude that the goal of society’s mitigation efforts should be to hold the increase to 2°C if possible and in no event more than 2.5°C.

Managing the Unavoidable

Even with greatly increased efforts to mitigate future changes in climate, the magnitude of local, regional, and global changes in climatic patterns experienced in the 21st century will be substantial.

- A 2°C increase in the global-average surface temperature above its 1750 value is likely, for example, to result in up to a 4°C warming in the middle of large continents and even larger increases in the polar regions. Regional changes will be even more extreme if global average temperatures rise by 3°C or higher.
- Climate change during the 21st century is likely to entail increased frequency and intensity of extreme weather, increases in sea level and the acidity of the oceans that will not be reversible for centuries to millennia, large-scale shifts in vegetation that cause major losses of sensitive plant and animal species, and significant shifts in the geographic ranges of disease vectors and pathogens.
- These changes have the potential to lead to large local-to-regional disruptions in ecosystems and to adverse impacts on food security, fresh water resources, human health, and settlements, resulting in increased loss of life and property.
- Some sectors in some locations may benefit from the initial changes in climate. Most impacts are expected to be negative, however, with the social and economic consequences disproportionately affecting the poorest nations, those in water-scarce regions, and vulnerable coastal communities in affluent countries.



Managing the unavoidable changes in climate, both by promoting adaptation and by building capacity for recovery from extreme events, will be a challenge. International, national, and regional institutions are, in many senses, ill prepared to cope with current weather-related disasters, let alone potential problems such as an increasing number of refugees fleeing environmental damages spawned by climate change. Society will need to improve management of natural resources and preparedness/response strategies to cope with future climatic conditions that will be fundamentally different from those experienced for the last 100 years.

Integrating Adaptation and Mitigation to Achieve Multiple Benefits

The simultaneous tasks of starting to drastically reduce GHG emissions, continuing to adapt to intensifying climate change, and achieving the MDGs will require skillful planning and implementation, all the more so because of the interaction of these aims.

For example, clean and affordable energy supplies are essential for achieving the MDGs in the developing countries and for expanding and sustaining well-being in the developed ones. Energy's multiple roles in these issues provide "win-win" opportunities as well as challenges, including: