Climate change and impacts on our environment and society

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Global net emissions of greenhouse gases have continued to rise

![Graph showing global net anthropogenic GHG emissions from 1990 to 2019. The graph indicates that emissions have increased steadily from 1990 to 2019, with significant contributions from CO₂ from fossil fuel and industry (CO₂FFI) and methane (CH₄).](image-url)
Aquecimento global em 2081-2100 relativo a 1850-1900 (°C)

Estamos caminhando para um aumento médio de temperatura de 3.7 °C

Com ações previstas na COP27, 3.2 °C

Missão impossível: limitar a 1.5 °C, ou 2 °C
Simulated change at 4 °C global warming

Geographical distribution is very variable

IPCC WG1 AR6 Executive Summary
Large changes in precipitation

Simulated change at 4 °C global warming
Soil humidity changes with 4 degrees warming
More frequent climate extremes
With every increment of global warming, regional changes become more pronounced
Adverse impacts from human-caused climate change will continue to intensify

a) Observed widespread and substantial impacts and related losses and damages attributed to climate change

Water availability and food production
- Physical water availability
- Agriculture/crop production
- Animal and livestock health and productivity
- Fisheries yields and aquaculture production

Health and well-being
- Infectious diseases
- Heat, malnutrition and harm from wildfire
- Mental health
- Displacement

Cities, settlements and infrastructure
- Inland flooding and associated damages
- Floods
- Storms
- Damages to infrastructure and buildings
- Damages to key economic sectors

Biodiversity and ecosystems
- Terrestrial ecosystems
- Freshwater ecosystems
- Ocean ecosystems

Key
- Observed increase in climate impacts to human systems and ecosystems assessed at global level
  - Adverse impacts
  - Adverse and positive impacts
  - Climate-driven changes observed, no global assessment of impact direction

Confidence in attribution to climate change
- *** High or very high confidence
- ** Medium confidence
- * Low confidence

b) Impacts are driven by changes in multiple physical climate conditions, which are increasingly attributed to human influence

Attribution of observed physical climate changes to human influence:

<table>
<thead>
<tr>
<th>Medium confidence</th>
<th>Likely</th>
<th>Very likely</th>
<th>Virtually certain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in agricultural &amp; ecological drought</td>
<td>Increase in fire weather</td>
<td>Increase in compound flooding</td>
<td>Increase in heavy precipitation</td>
</tr>
</tbody>
</table>
c) The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term.
Risks are increasing with every increment of warming.
Future climate change is projected to increase the severity of impacts across natural and human systems and will increase regional differences.

Examples of impacts without additional adaptation

a) Risk of species losses

Percentage of animal species and seagrasses exposed to potentially dangerous temperature conditions\(^1,2\)

\(^1\)Projected temperature conditions above the estimated historical (1850-2005) maximum mean annual temperature experienced by each species, assuming no species relocation.

\(^2\)Includes 30,652 species of birds, mammals, reptiles, amphibians, marine fish, benthic marine invertebrates, krill, cephalopods, corals, and seagrasses.
There are multiple opportunities to climate action
Limiting warming to 1.5°C and 2°C involves rapid, deep and in most cases immediate greenhouse gas emission reductions.

Net zero CO₂ and net zero GHG emissions can be achieved through strong reductions across all sectors.

2019 emissions were 12% higher than 2010.

Implemented policies result in projected emissions that lead to warming of 3.2°C, with a range of 2.2°C to 3.5°C (medium confidence).

**Key**
- Implemented policies (median, with percentiles 25-75% and 5-95%)
- Limit warming to 2°C (>67%)
- Limit warming to 1.5°C (>50%) with no or limited overshoot
- Model range for 2015 emissions
- Past GHG emissions and uncertainty for 2015 and 2019 (dot indicates the median)
The path to sustainability

Conditions that enable individual and collective actions

- Inclusive governance
- Diverse knowledges and values
- Finance and innovation
- Integration across sectors and time scales
- Ecosystem stewardship
- Synergies between climate and development actions
- Behavioural change supported by policy, infrastructure and socio-cultural factors

Conditions that constrain individual and collective actions

- Poverty, inequity and injustice
- Economic, institutional, social and capacity barriers
- Siloed responses
- Lack of finance, and barriers to finance and technology
- Tradeoffs with SDGs

IPCC AR6 Synthesis Report, 2023
O desenvolvimento sustentável é definido como o desenvolvimento que procura satisfazer as necessidades da geração atual, sem comprometer a capacidade das futuras gerações de satisfazerem as suas próprias necessidades.
Welcome to our new climate....

Thanks!!!

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**How Leading Scientists View Climate Change**

*Nature* surveyed authors of the latest report by the Intergovernmental Panel on Climate Change (IPCC) about their views on the future. Ninety-two of 233 authors and review editors provided responses.

**How much warming above pre-industrial times do you think is likely by 2100?**

- 1.5 °C: 24%
- 2 °C: 35%
- 2.5 °C: 20%
- 3 °C: 12%
- 3.5 °C: 9%
- 4 °C: 2%

*Includes 2 responses between 2.7 °C and 2.85 °C. 2.5 °C and 3.5 °C were write-in answers.

**Do you think the world is experiencing a ‘climate crisis’?**

- Yes: 88%
- No: 12%

**Do you think you will see catastrophic impacts of climate change in your lifetime?**

- Yes: 82%
- No: 18%

**Which kind of advocacy activities do you engage in?**

- Promote science through speeches, publications or videos: 98%
- Contact lawmakers or government officials to advocate specific climate policies: 40%
- Sign letters or petitions calling for action: 43%
- Participate in demonstrations: 28%

*Respondents could choose multiple answers.

**Do you think the IPCC should take on more of an advocacy role related to climate change?**

- Yes: 26%
- No: 74%

**Does the IPCC include suitable representation of experts from all countries?**

- Yes: 79%
- No: 21%

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*Nature Vol 599, 4/Nov/2021*
Soil humidity with 4 degrees warming
Risks: Impacts on food yield in a 3°C hotter planet

World Economic Forum: Global Risks 2016
Vulnerability is on the developing countries as well as the largest impacts in the tropics and sub-tropics.
Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming.

### Hot temperature extremes over land

#### 10-year event

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1850-1900</th>
<th>Present 1 °C</th>
<th>1.5 °C</th>
<th>2 °C</th>
<th>4 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once</td>
<td>now likely occurs 2.8 times (1.9 - 3.2)</td>
<td>will likely occur 4.1 times (2.8 - 4.7)</td>
<td>will likely occur 5.6 times (3.8 - 6.0)</td>
<td>will likely occur 9.4 times (8.3 - 9.6)</td>
<td></td>
</tr>
</tbody>
</table>

#### 50-year event

<table>
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<tr>
<th>Frequency</th>
<th>1850-1900</th>
<th>Present 1 °C</th>
<th>1.5 °C</th>
<th>2 °C</th>
<th>4 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once</td>
<td>now likely occurs 4.8 times (2.3 - 6.4)</td>
<td>will likely occur 8.6 times (4.3 - 10.7)</td>
<td>will likely occur 13.9 times (6.9 - 16.6)</td>
<td>will likely occur 39.2 times (27.0 - 41.4)</td>
<td></td>
</tr>
</tbody>
</table>

### Future global warming levels

- **10-year event**
  - +6 °C: 12 °C hotter
  - +5 °C: 11 °C hotter
  - +4 °C: 10 °C hotter
  - +3 °C: 9 °C hotter
  - +2 °C: 8 °C hotter
  - +1 °C: 7 °C hotter
  - 0 °C: 6 °C hotter

- **50-year event**
  - +6 °C: 21 °C hotter
  - +5 °C: 19 °C hotter
  - +4 °C: 17 °C hotter
  - +3 °C: 15 °C hotter
  - +2 °C: 13 °C hotter
  - +1 °C: 11 °C hotter
  - 0 °C: 9 °C hotter