



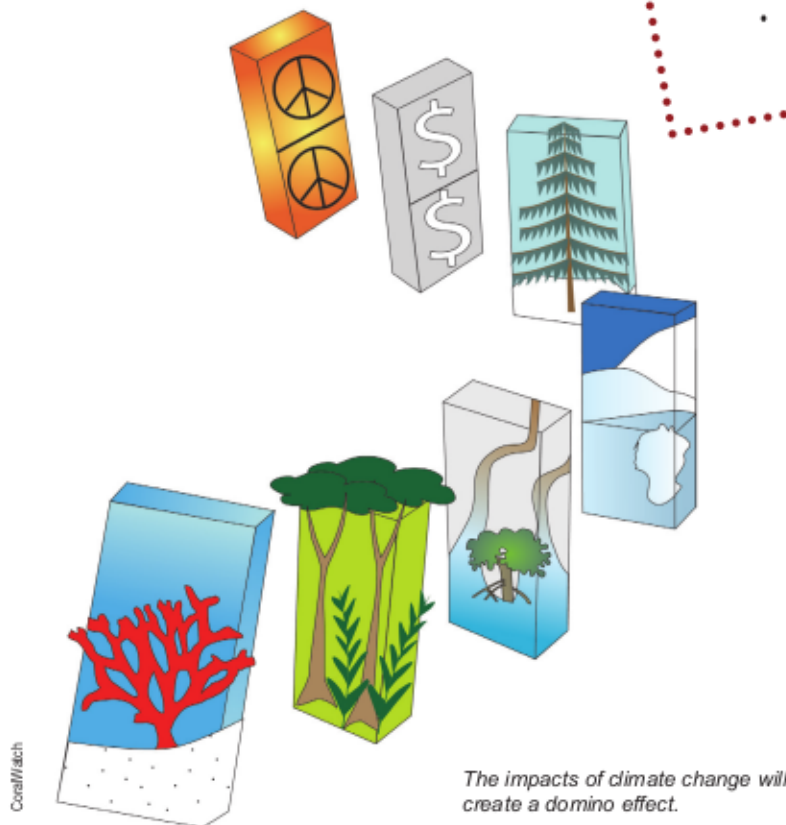
The aim of this activity is to explore the costs and benefits of climate change in different ecosystems across the world. You will investigate and create a poster presentation on the changes that will occur in human communities and natural systems if global temperatures increase above two degrees Celsius.

Time

Three hours (classroom)

Tools

- Computer
- Pen
- Paper



Background

The consensus that is derived from the data is that, if we wish to avoid the harsher effects of climate change, the average global temperature increase must remain below 2°C, with CO₂ emissions remaining at a 450ppm CO₂ equivalent. The long term projections by the IPCC suggest we are already dancing on this critical edge.

It is suggested that beyond 2°C the ecological fabric begins to tear, causing shifts in species range and transforming entire landscapes over time. Impediments such as farms, roads and cities lie directly in the path of the most favourable migration routes. This is why we see the projected increase in the rate of extinction occurring with the increases in global temperatures into the future. Redistribution of rainfall will impact natural and agricultural systems. The temperatures for the germination of some plants will be surpassed, with the extension in the ranges of pest and weed species contributing to a decrease in land productivity of staple cereal crops.

Vector borne diseases such as malaria, dengue and yellow fever will breach their equatorial confines as the range of their mosquito carriers is expanded with the increases in temperature. These alone will place a substantial additional burden on health systems, even in developed countries such as Australia. The further we move away from this threshold, the greater the magnification of the health effects. Malnutrition, diarrhoea, and





mortalities due to heat waves and flooding become part of an expanding array of health issues that must be addressed as terrestrial and marine ecosystems tend towards carbon sources rather than sinks, accelerating changes.

Every country, regardless of their geographic location and economic status, will be affected by climate change to some degree. Developing countries will be the most vulnerable but developed nations will also be overwhelmed. America watched, first in fascination, then in horror, as one of its states descended into chaos and anarchy when Hurricane Katrina caused the death of 1800 people as 80% of New Orleans was submerged in flood waters.



Jennifer Sutton

The science informs us that to avoid the dangerous impacts of climate change, CO₂ levels should be no greater than 450ppm, a situation expected to arrive in the next six years. The economists, while conceding that this is the case, point to the economic realities, which show why it is not achievable in the near term, resulting in setting a limit of 550ppm CO₂. Beyond this is unknown territory. The International Energy Agency has suggested that on current trends we are moving to an emissions scenario where 1000ppm by the end of this century is a very real possibility. Inherent within all these conclusions is a level of risk.

The two strategies available to us are mitigation (taking steps to reduce our carbon emissions) and adaptation (coping with those effects that cannot be avoided). It will be the level of engagement on local and international scales that will determine the risks of the adverse affects of climate change. While each nation will have its own individual approach, tailored to their social and economic circumstances, it will only be through an international agreement on the accepted levels of carbon dioxide in the atmosphere that the scope of response by each nation state will be determined.

To achieve a level of stabilisation for carbon emissions at 450ppm will require nothing short of an energy revolution. Following a global agreement, all countries would need to reduce their 2000 level carbon emissions by 80-90% by 2050, with emissions peaking no later than 2015. The sheer scale of the challenge that would confront all nations makes meeting this target unlikely in the short to medium term.

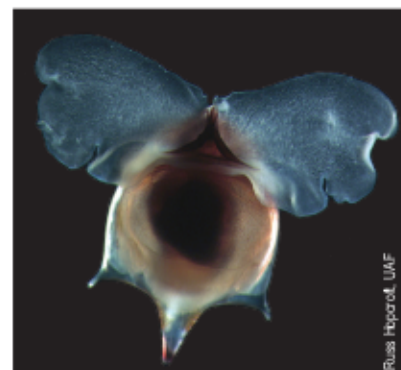
To keep our reefs intact, 350ppm is suggested as the target level for a safe climate, which we have already surpassed.



Sean Chester, Marine Photobank



Wen Sung



Rusya Hippocamp, UWF

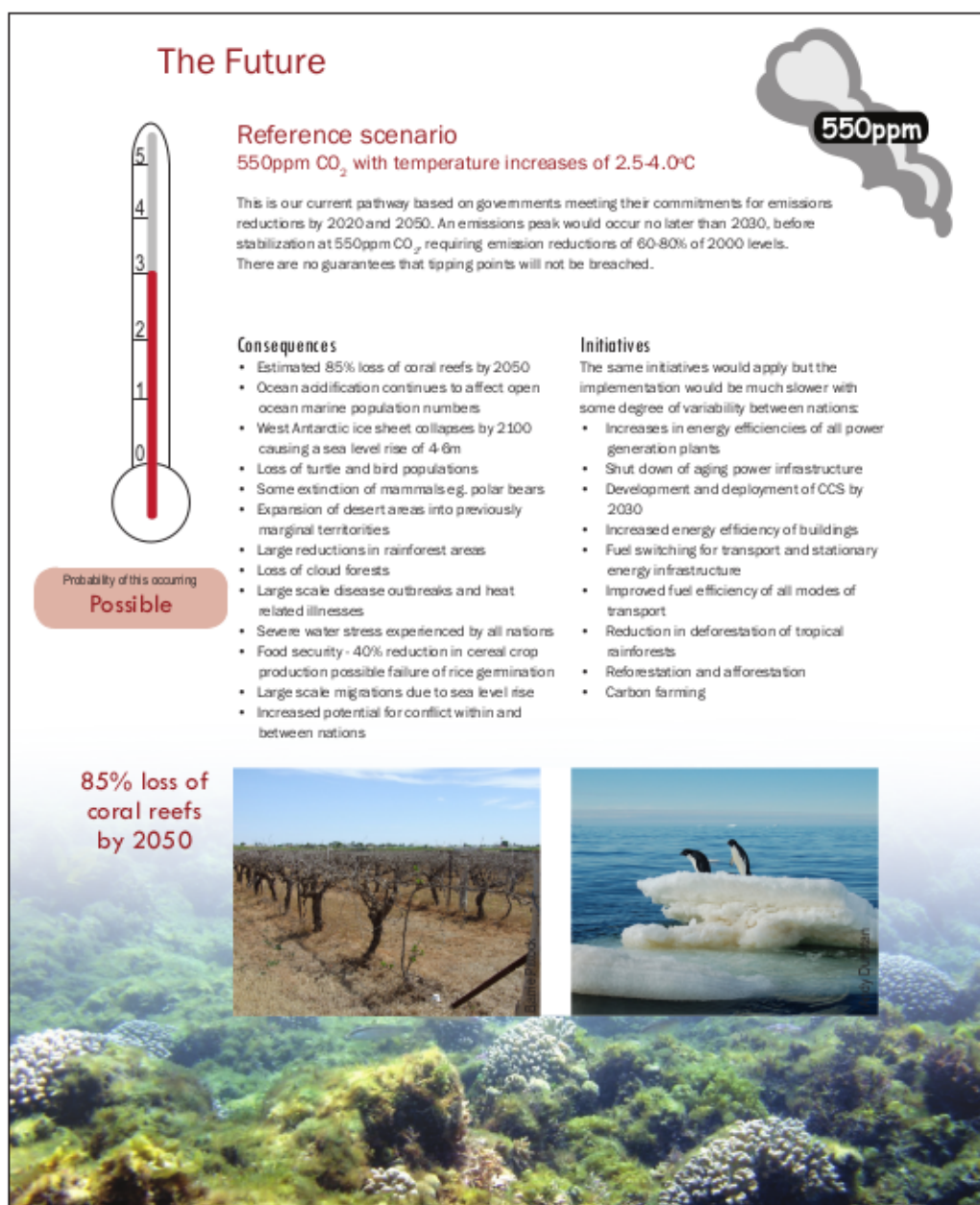
Over 16,000 plant and animal species are now threatened worldwide with extinction. Polar bears, green tree frogs, corals and planktonic pteropods are under threat right now.





Classroom activity

1. During this activity you will research and create a poster on the effects a 2°C temperature increase will have on a chosen biome.
2. In a group of three choose one of the following biomes:
Tundra
Polar region
Rainforest
Deserts
Temperate forests
Grass and rangelands
Marine ecosystems
Freshwater ecosystems
3. Research the following question: What are the costs and benefits of a 2°C rise in temperature to the biome, the people who use it and the economy it helps to support?
4. Create a poster to display along side other biomes on the planet that other groups will research.
5. As a class, discuss each biome briefly and the kinds of costs and benefits climate change means.





Questions

1. State the biome you investigated and how you would be personally affected by the changes predicted there from a 2°C global temperature rise.
2. What is the relationship between developed and developing countries and the geography of the biomes?
3. List some ways of improving the resilience of biomes and the communities that they support.
4. Which regions are most likely to benefit from climate change and why?
5. Describe what tipping points are.
6. What are the factors that influence any ecosystem surpassing these points?
7. Explain ways that temperature increase magnifies and exacerbates the existing pressures within an ecosystem.
8. What are some tipping points that may be triggered within your biome?
9. How are changes within an ecosystem linked to the overall stability of an economy?
10. Discuss some of the key changes within our society that will ensure that we stay below the 550ppm CO₂ limit.

Research projects

1. Investigate the issues of food and water security.
2. Using a diagram and labels, draw what an 'energy revolution' would look like.
3. What are the social and ecological impacts resulting from the loss of one of these biomes?
4. What are the security implications of climate change?
5. How would you manage some of the situations given in the example of the future?

References

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