The international challenge of climate change: perspectives from the Garnaut Review

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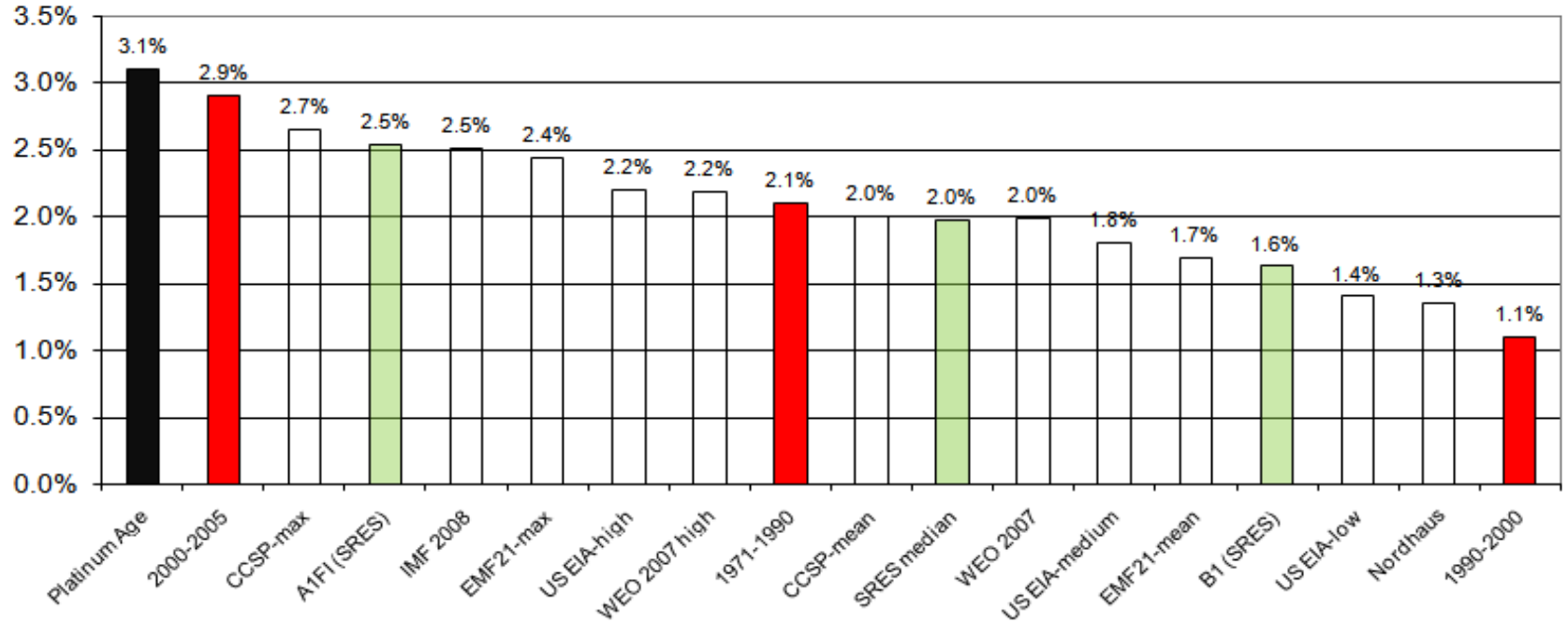
A. Climate change impacts

Emissions are growing much faster than projected, and will continue to do so.

Garnaut Review (Platinum Age) projections for 2005-2030 compared with range of existing projections for the same period and historical CO2 emissions growth.



Which implies that under "business as usual" temperatures will rise more quickly than expected.

- The IPCC range of best estimates for global average temperature increase over the century is 1.8 to 4.0 degrees Celsius.
- Applying the same science, but using the new emission projections, the Garnaut Review projects a best estimate global average temperature increase of 5.1 degrees Celsius.

The impact of +5°C temperature increases would be catastrophic.

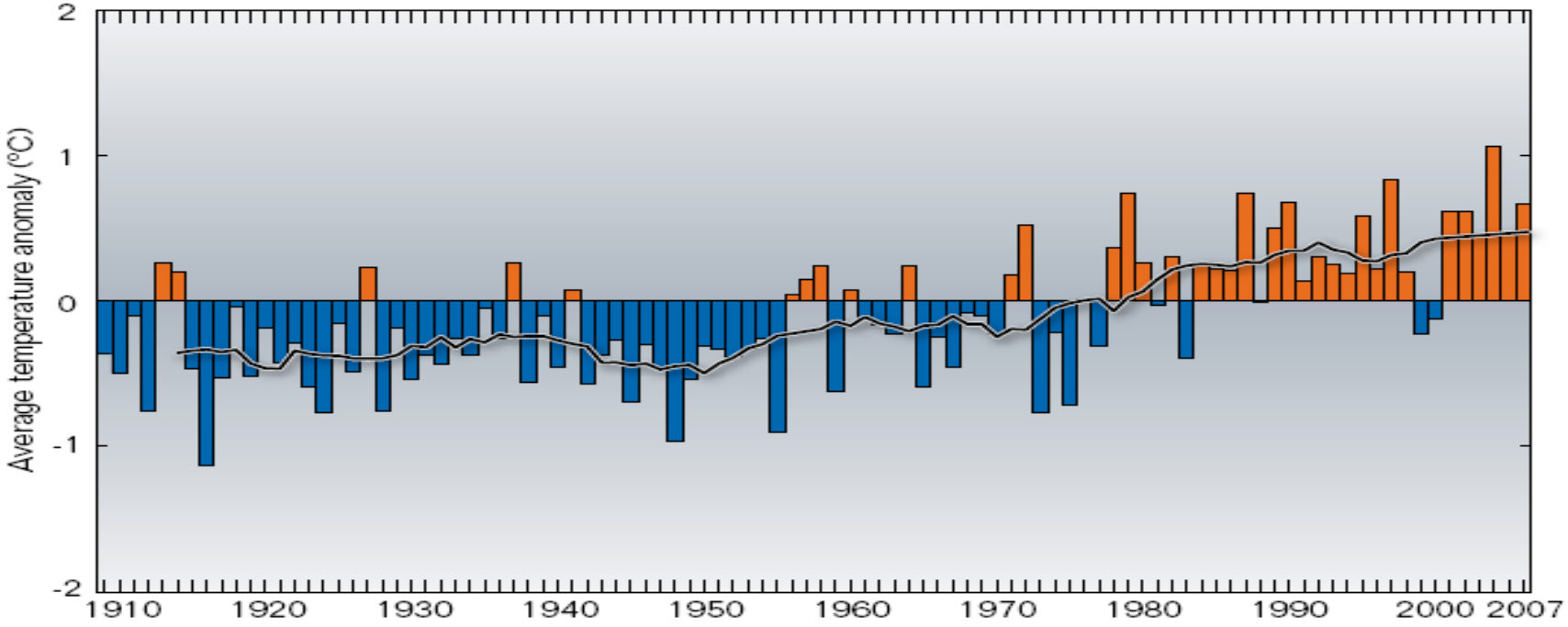
A temperature increase of this order would lead to

"a terra incognita biosphere within a hundred years whose mass species extinctions, radical alterations of natural environments, and other extreme outdoor consequences of a different planet will have been triggered by a geologically instantaneous temperature change that is significantly larger than what separates us now from past ice ages."

- Martin Weitzmann, Harvard.

Temperatures have already increased in Australia

Figure 5.1 Australian annual average temperature anomalies, 1910–2007

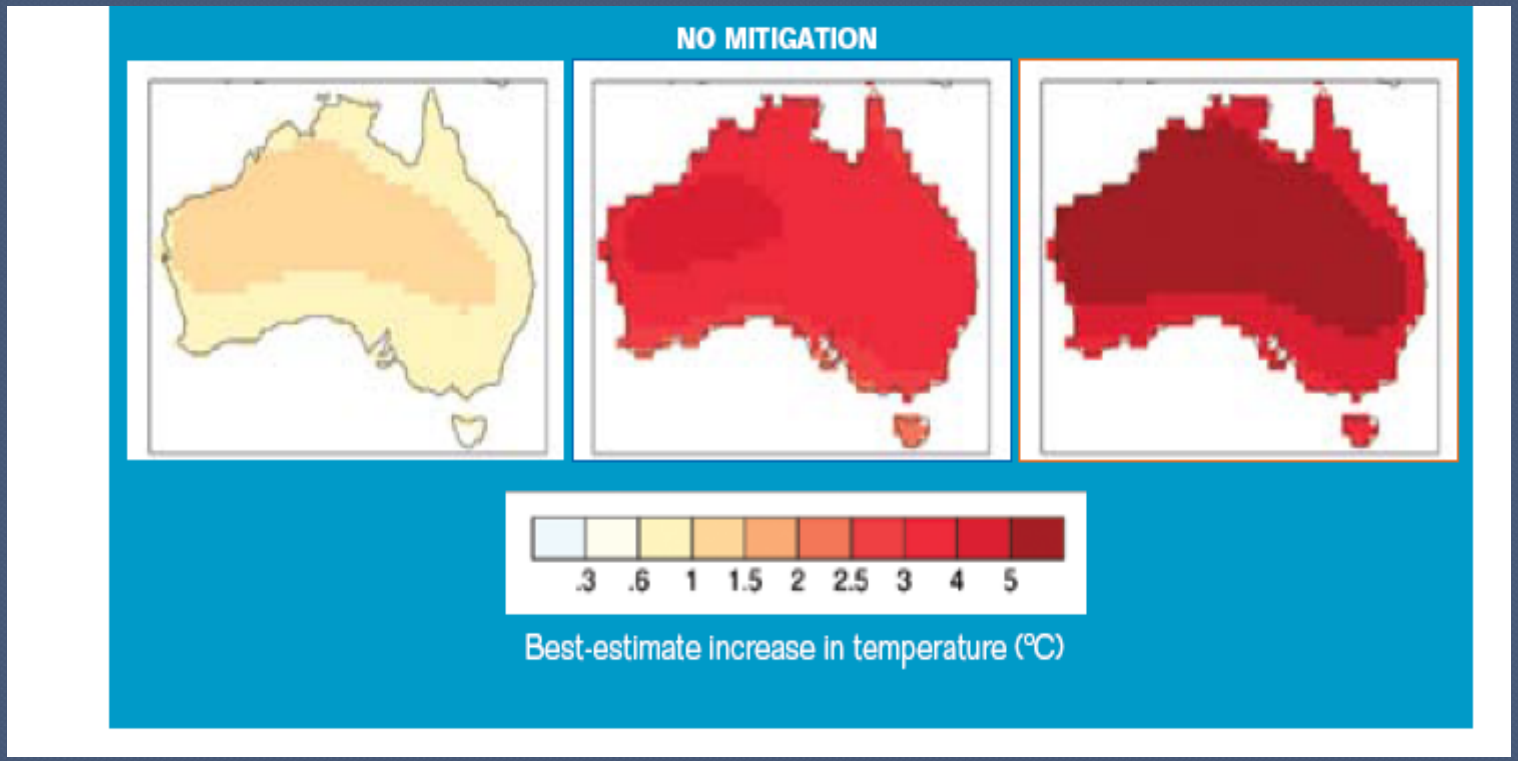


Note: The data show temperature difference from the 1961–90 average. The black line shows the eleven-year running averages.

Source: BoM (2008).

And will continue to rise

2030 2070 2100



Heatwaves and bushfires

Table 5.3 Projected increases in days over 35°C for all capital cities under a no-mitigation case

	Current	2030	2070	2100
Melbourne	9	12	21	27
Sydney	3.3	4.4	9	14
Brisbane	0.9	1.7	8	21
Adelaide	17	22	34	44
Perth	27	35	56	72
Canberra	5	8	21	32
Darwin	9	36	221	312
Hobart	1.4	1.7	2.5	3.4

Source: CSIRO (2008a).

Table 5.4 Projected per cent increases in the number of days with very high and extreme fire weather for selected years

	Approximate year		
	2013	2034	2067
Very high	+2–13	+10–30	+20–100
Extreme	+5–25	+15–65	+100–300

Note: This study was based on scenarios producing 0.4°C, 1.0°C and 2.9°C temperature increases, which equate to the years in this table under a no-mitigation case.

Source: Lucas et al. (2007).

Coastal settlements

- More than 80% of Australia lives within 50 km of the coast.
- Cilmate change will put significant pressure on coastal infrastructure through storm damage and localized flash flooding.
- Increases in temperature will degrade buildings.
- Combination of low soil moisture and floods will degrade building foundations and other infrastructure.

Regional impacts

- In general, developing countries are more vulnerable to climate change.
- Impacts are expected through agriculture, infectious disease, severe weather events, and sea-level rise.
  - Asia's densest areas are on the coast. 105 million people in Asia at risk from 1 m rise in sea level. Low-lying Pacific atoll countries are the most at risk. PNG could also be badly affected.
- There is the possibility that economic or disaster impacts will spill over into the security and political domain.

B. Mitigating climate change

A global challenge requiring developed (rich) country leadership

- The extent of climate change in Australia will be determined by the volume of global emissions. Australia is responsible for only 1.5% of global emissions.
- The international agreements on climate change oblige developed countries to take the lead in reducing emissions and in financing the reduction of emissions in developing countries.

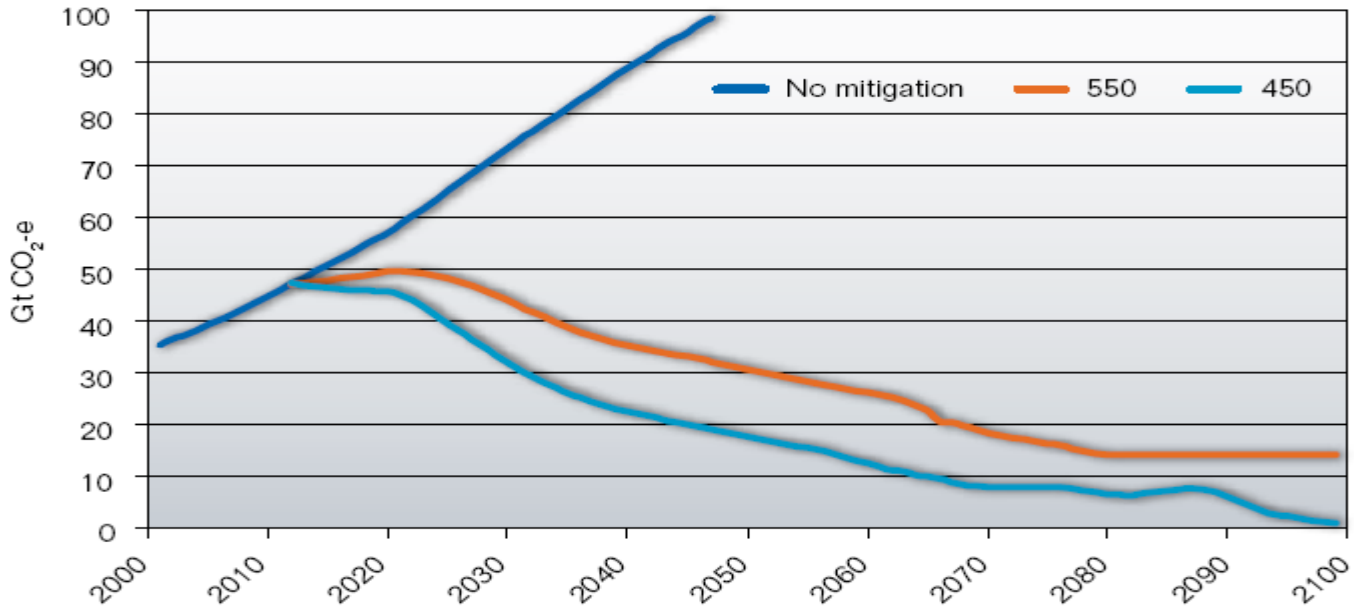
Kyoto and beyond

- The developed countries (except the US) have agreed under the Kyoto Protocol to reduce emissions up to 2012.
- Developing countries have very limited obligations under Kyoto.
  - Their emission reductions *can* offset emissions in developed countries.
- Focus is now on a post-2012 agreement, involving steeper reductions for developed countries and greater obligations for developing countries.
- A new deal is meant to be forged in Copenhagan by the end of 2009, but there are large uncertainties around that prospect.
  - Global action is likely, but its timing is uncertain.

Global emissions will need to fall quickly if the worst climate change impacts are to be avoided.

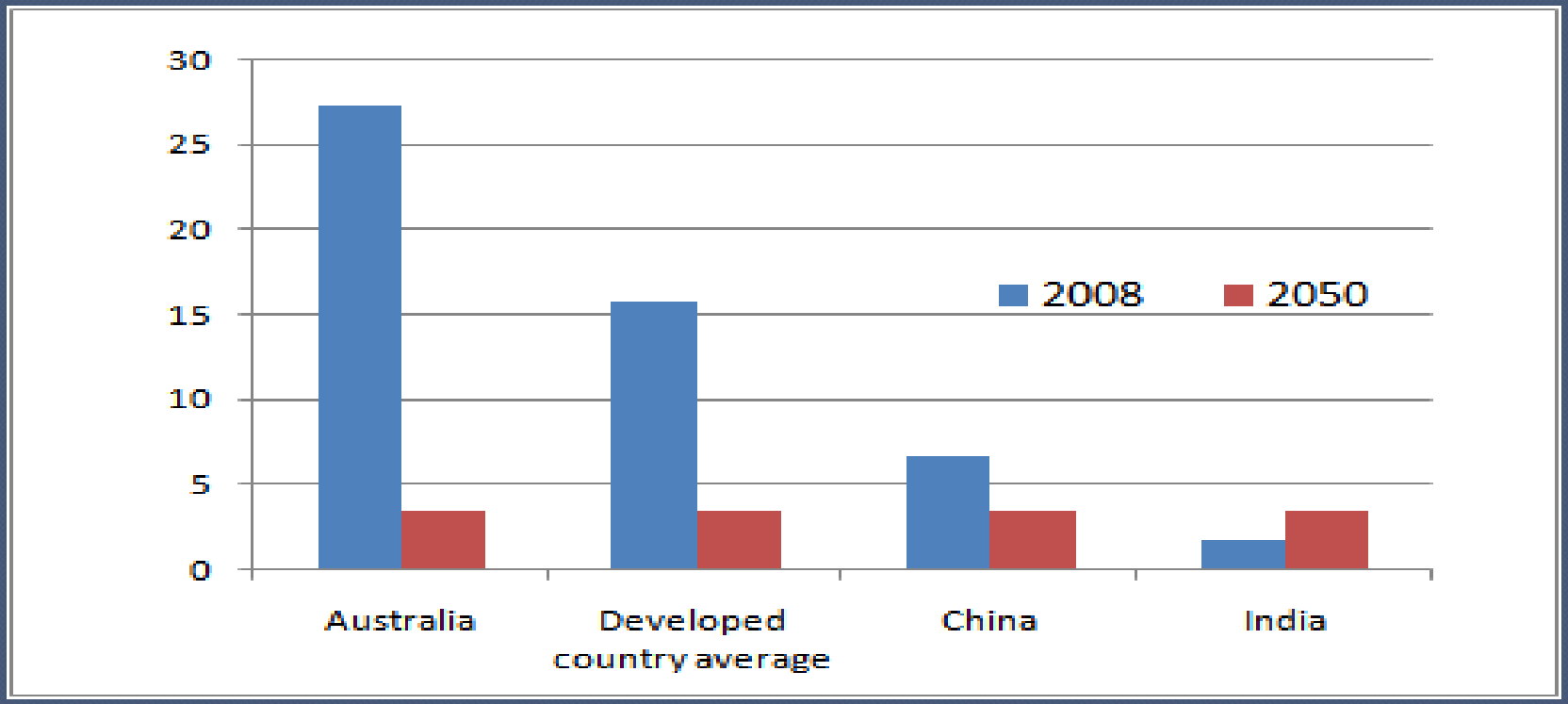
- The best we can hope for is to limit temperature increase to 2-3 degrees. Even this will require a steep reduction in emissions.

Figure 9.3 **Emissions trajectories for the no-mitigation, 550 and 450 scenarios, 2000–2100**



Developed country emissions will need to fall much more sharply

Per capita emissions (t/CO2-e) now and required in 2050 as modelled by Garnaut Review to achieve stabilization of greenhouse gases at 550 ppm



Possible 2050 targets for Australia

- Government target: 60% reduction relative to 2000 levels
- Required as part of a '550' or 3°C global agreement: 80% reduction
- Required as part of a '450' or 2°C global agreement: 90% reduction.

How to decarbonize the Australia economy?

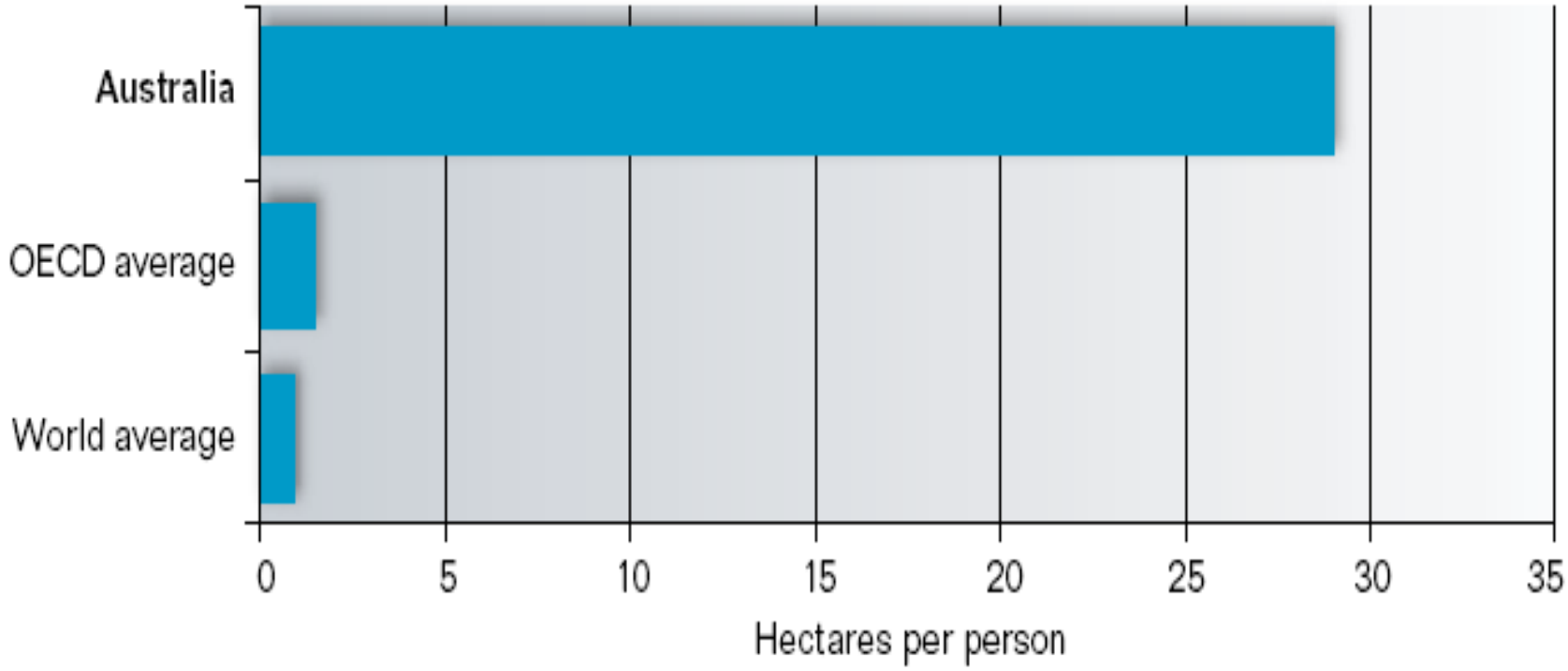
- Unchartered territory, but agreement that cost-effective approaches will
  - Be broad-based.
  - Let the market decide.
- This would argue for a carbon tax or an emissions trading scheme.
- Most developed countries, including Australia, are opting for an ETS.

Biosequestration could make a huge contribution globally

- Biomass and soil store approximately three times the amount of carbon that is currently found in the atmosphere, and the annual exchange of carbon between the atmosphere and natural forests is 10 times more than the annual global carbon emissions from humans burning fossil fuels.
- Small differences at the margin could make a huge difference in total volumes of emissions.
- It is estimated that globally 18% of anthropogenic emissions due to deforestation.

And especially in Australia

Figure 7.14 Per capita area of forested and wooded land, 2005



Source: FAO (2008).

Some examples of Australia's biosequestration potential

- Cessation of land clearing has saved 60 Mt CO_2 annually.
- Afforestation and reforestation removed about 23 Mt CO_2 from the atmosphere in 2006; this could increase to 50 Mt CO_2 by 2020.
- Allowing logged forests to realize their sequestration potential is equivalent to avoiding emissions of 136 Mt CO_2 per year for the next 100 years.
- Restoration of degraded rangelands could absorb 250 Mt CO_2 per year for several decades.

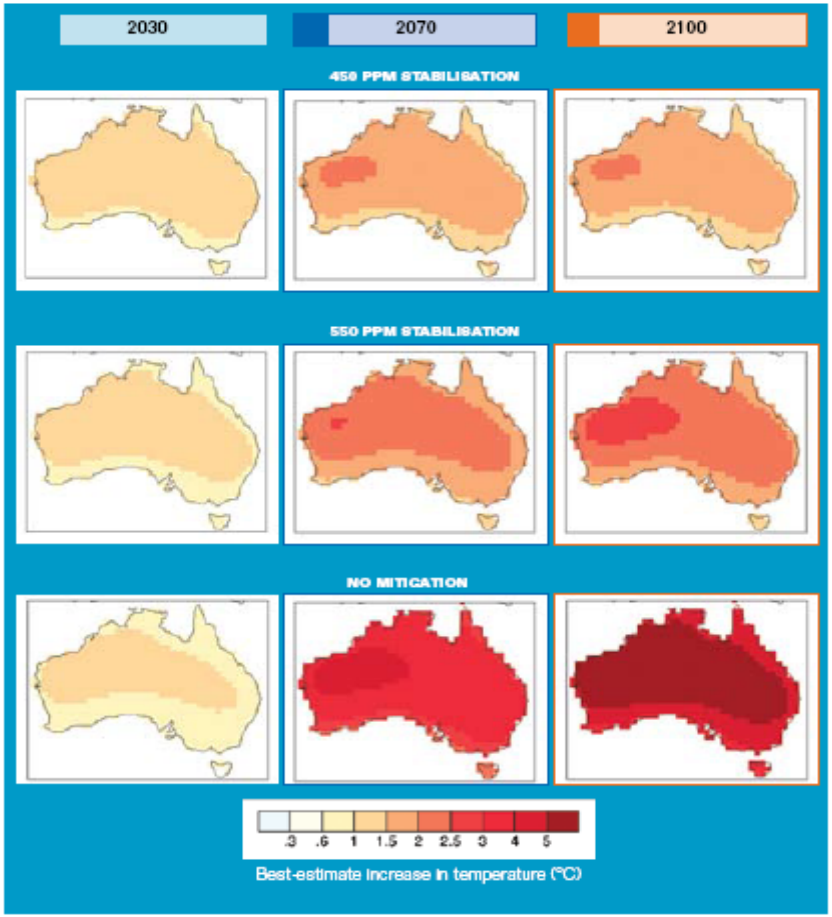
Issues with biosequestration

- At the current time, only emissions from land clearing and reforestation are included in Australia's emissions cap. Australia has chosen **not** to account for emissions resulting from "revegetation, forest management, cropland management, and grazing land management."
- Why?
  - Measurement difficulties
  - Politics: the logging native forest issue.
  - Risk of bushfire.

C. Adapting to climate change

Significant climate change is inevitable, even with successful mitigation

Figure 5.3 Best estimate (50th percentile) of Australian annual temperature change at 2030, 2070 and 2100 under three emissions cases



Note: The no-mitigation case is based on the SRES A1FI scenario. Values greater than or equal to 5 are represented with the same colour.

Source: CSIRO (2008c).

How to adapt?

- Most adaptation costs will be borne by households and business, but governments will also need to help.
- Bushfires will become more likely and more costly.
  - More expenditure and research into bushfire control.
- To protect coastal settlements, large costs will be incurred to alter building design, provide sea wall protection, and improve drainage.
- Increased defence and aid expenditures likely.

D. Conclusion

Conclusion

- Climate change not a fad, but a durable and increasingly important area of policy.
- We are still in the experimental phase of the policy response, at both the national and international level.
- Land-management issues are going to be huge in relation to both mitigation and adaptation.