

Climate change and water

Ian Lowe

26 November 2007



“global average surface temperature now about 0.8° above its level in 1750... significant increases in the incidence of floods, droughts, heat waves and wildfires... it appears the intensity of tropical storms has been increasing as well”

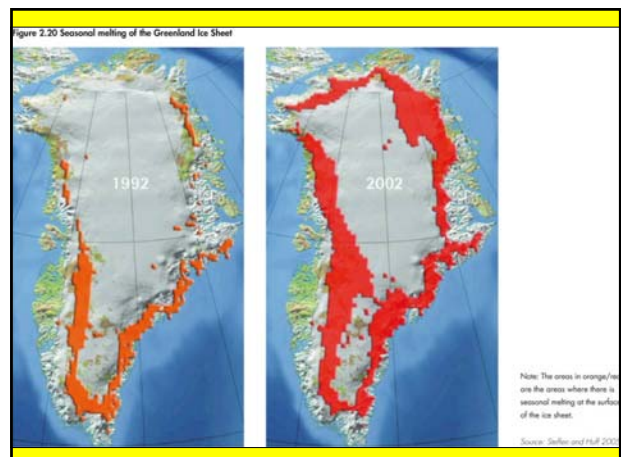
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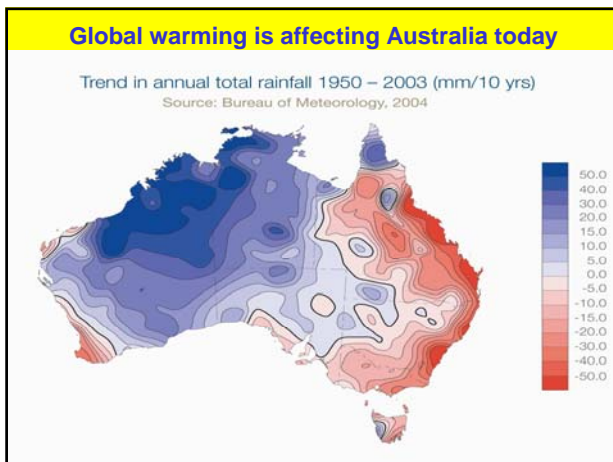
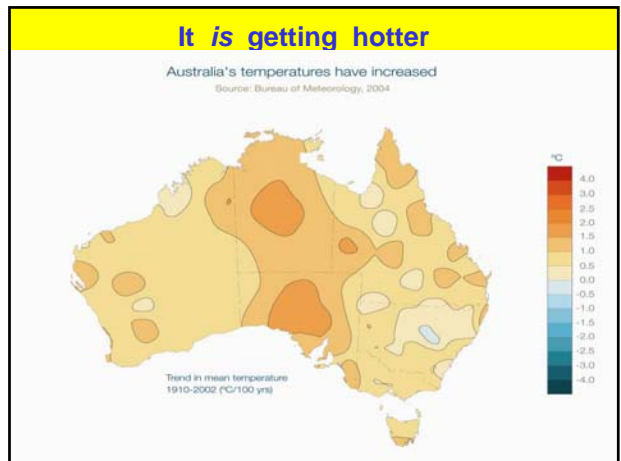
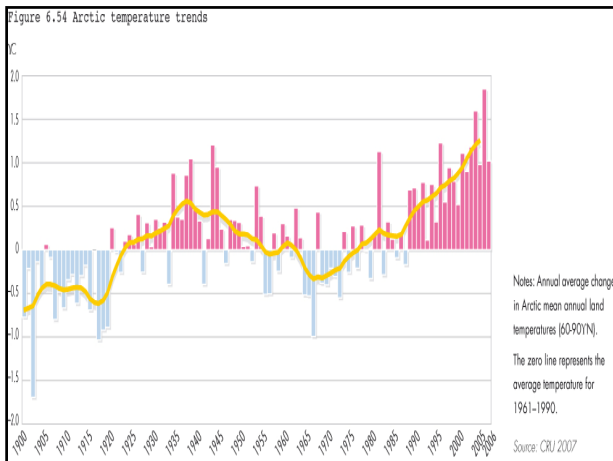
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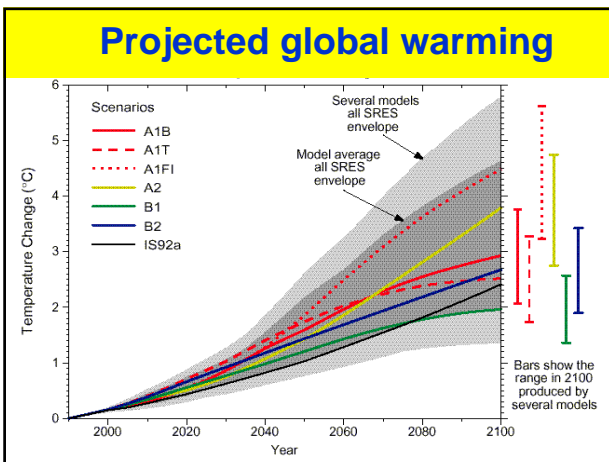
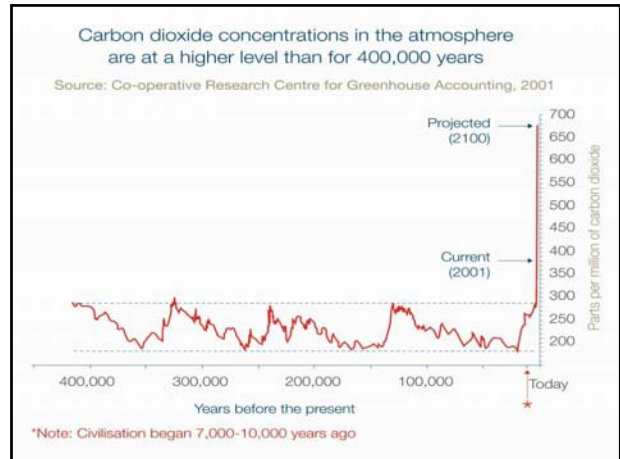
“There have also been large reductions in the extent of summer ice in the Arctic, large increases in summer melting of the Greenland Ice Sheet, signs of instability in the West Antarctic Ice Sheet, and movement in the geographic and altitudinal ranges of large numbers of plant and animal species”

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- ### Some impacts of change
- Reduced agricultural production
 - Water supply, e.g. desalination
 - Costs of extreme events, e.g. 1999 Sydney hailstorm, > \$2000 million, 2003 Canberra bushfires ~ \$400 million
 - Cyclone Larry, ~ \$1000 million in direct costs + effect on tourism...
- Ian Lowe
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Summer days over 35°

city	now	2030	2070
Sydney	2	2 - 4	3 - 11
Canberra	4	6 - 10	7 - 30
Melbourne	8	9 - 12	10 - 20
Adelaide	10	11 - 22	14 - 28
Perth	15	16 - 24	18 - 39

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Frosty winter nights

centre	now	2030	2070
Canberra	44	31 - 42	6 - 38
Orange	38	18 - 32	1 - 27
Launceston	21	10 - 18	0 - 14
Dalby (Qld)	10	3 - 7	0 - 6
Nuriootpa SA	9	2 - 7	0 - 5

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Responses to IPCC 4AR

- “There is no doubt that the Earth is warming and that many other associated changes in climate are now observable... equally clear that human activities, primarily the emission of greenhouse gases, are the main cause” - Prof Will Steffen
- “The likelihood of abrupt changes may be under-estimated by the current models” - Prof Andy Pitman

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Increased likelihood of non-linear changes

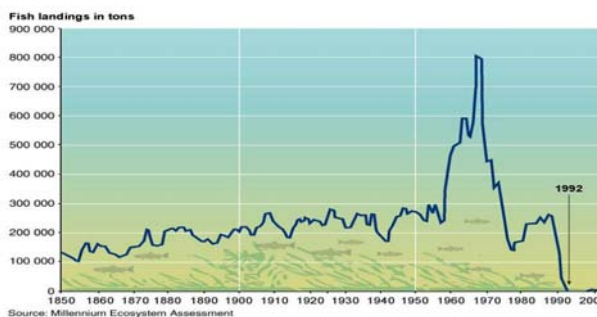
There is *established but incomplete* evidence that our impacts on ecosystems are increasing the likelihood of non-linear changes ... with important consequences for human well – being.

Millennium Assessment Report 2005

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An example of non-linear change



Millennium Assessment Report 2005

Possible non-linear changes

- North Atlantic circulation
- Methane from Arctic tundra
- Melting of [polar] ice
- Drying of rainforests
- Clearing and burning of peatlands

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What is “dangerous” climate change ?

- Two degrees of warming might be dangerous
- Three degrees almost certainly is

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How close is this ?

- Current CO₂ 380 ppm
- With other GHG, ~ 460 ppm CO₂ equiv
- With cooling aerosols, ~ 380 ppm
- 510 ppm, 67 % chance warming > 2°

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UK Government estimates

- 2003: 550 ppm, temperatures are expected to rise between 2 and 5 °C
- 2006: “a limit closer to 450ppm or even lower might be more appropriate to meet a 2° C stabilisation limit”

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IPCC report, Sunday 18 Nov.

- Evidence of warming “unequivocal”
- Effects could be “abrupt or irreversible”
- All countries will be affected
- Poor nations, low-lying areas
- Emissions can be cut at moderate cost
- Window of opportunity closing fast

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IPCC chair Rajendra Pachauri

- “We need a new ethic by which every human being realises the importance of the challenge and starts to take action through changes in lifestyle and attitude”
- “Every country in the world has to be committed to a shared vision and a set of common goals and actions that will help us move toward a much lower level of emissions”

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So IPCC targets:

- Global emissions to peak no later than 2015
- Global emissions reduced 80% by 2050
- So OECD nations 20 – 45 % cut by 2020, 80 – 95 % by 2050

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Waterways issues

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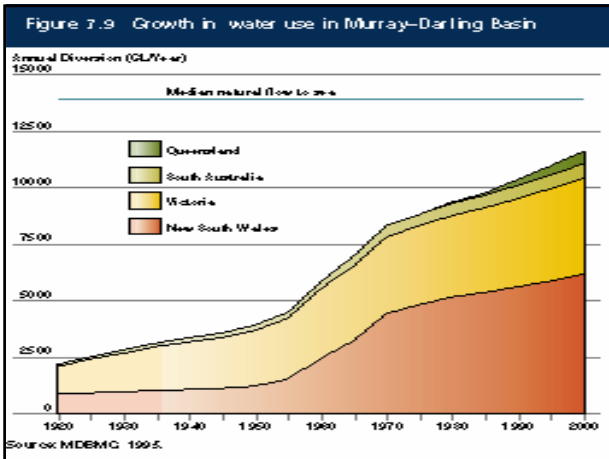
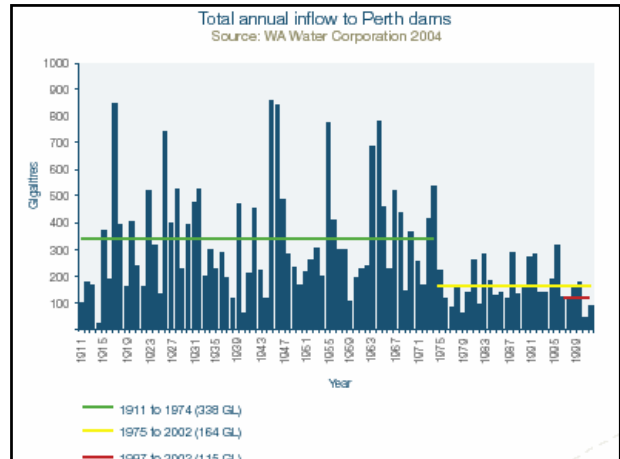
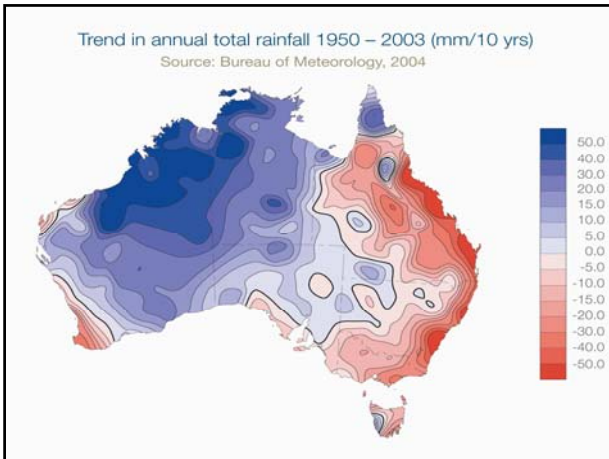
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Infrastructure & Climate Change Risk Assessment for Victoria

- CSIRO, Maunsell Aust, Phillips Fox
- “worsening water shortages as temperatures climb and rainfall is reduced”
- “we have to plan as if we’ll be living in a different country”

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The Murray

“vegetation change, increases in farm dams, increased groundwater use and climate change could reduce the flow in the river Murray by 2000 GL/year by 2025”
- Dr Richard Davis, LWA

[“Living Murray” proposes returning 500 GL]

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By 2020

- Higher average temperatures
- More very hot days
- Fewer very cold nights
- Further changes to rainfall, runoff
- More frequent extremes [long dry spells, severe rainfall events]
- Hence greater pressure on streams, riparian zone, biological diversity

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Community-based monitoring

- Essential: no possible alternative for the ~ 5000 sites covered
- Early warning of emerging problems
- Basis for effective partnerships to maintain health of waterways, catchments
- Engagement of community
- (through schools) education

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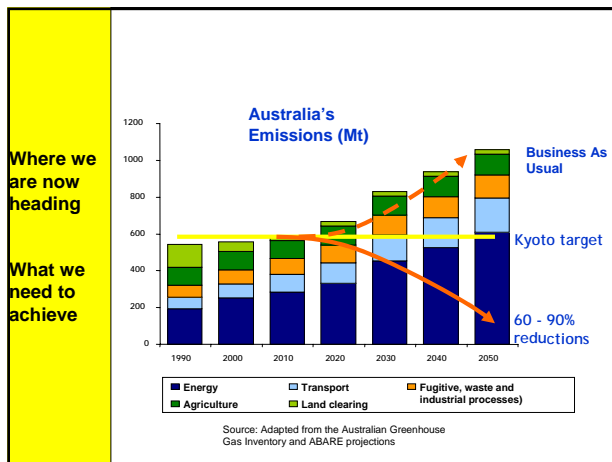
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The key messages for schools and community groups

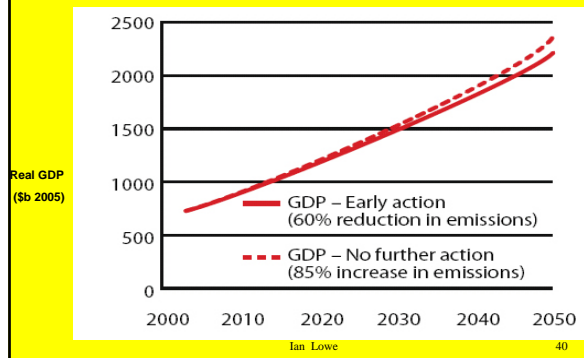
- Climate change is happening now
- Our choices will influence future
- “worsening water shortages as temperatures climb and rainfall is reduced”
- “we have to plan as if we’ll be living in a different country”

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It's Achievable and Affordable



Conclusion

- Climate change is happening now and will worsen
- There will be impacts on waterways
- Community monitoring will be of increasing importance
- So continuing role for Waterwatch

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