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Climate Change:

bridging scientific knowledge and public policy

Forum
Parliament House, Canberra
18 March 2010

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Session 3

Responding to climate change: the social and economic impact

Chair:

Ms Anna-Maria Arabia

Executive Director

Federation of Australian Scientific and Technological Societies

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The social impacts of climate change in rural Australia

Dr Anthony Hogan
National Centre for Epidemiology & Population Health
Australian National University

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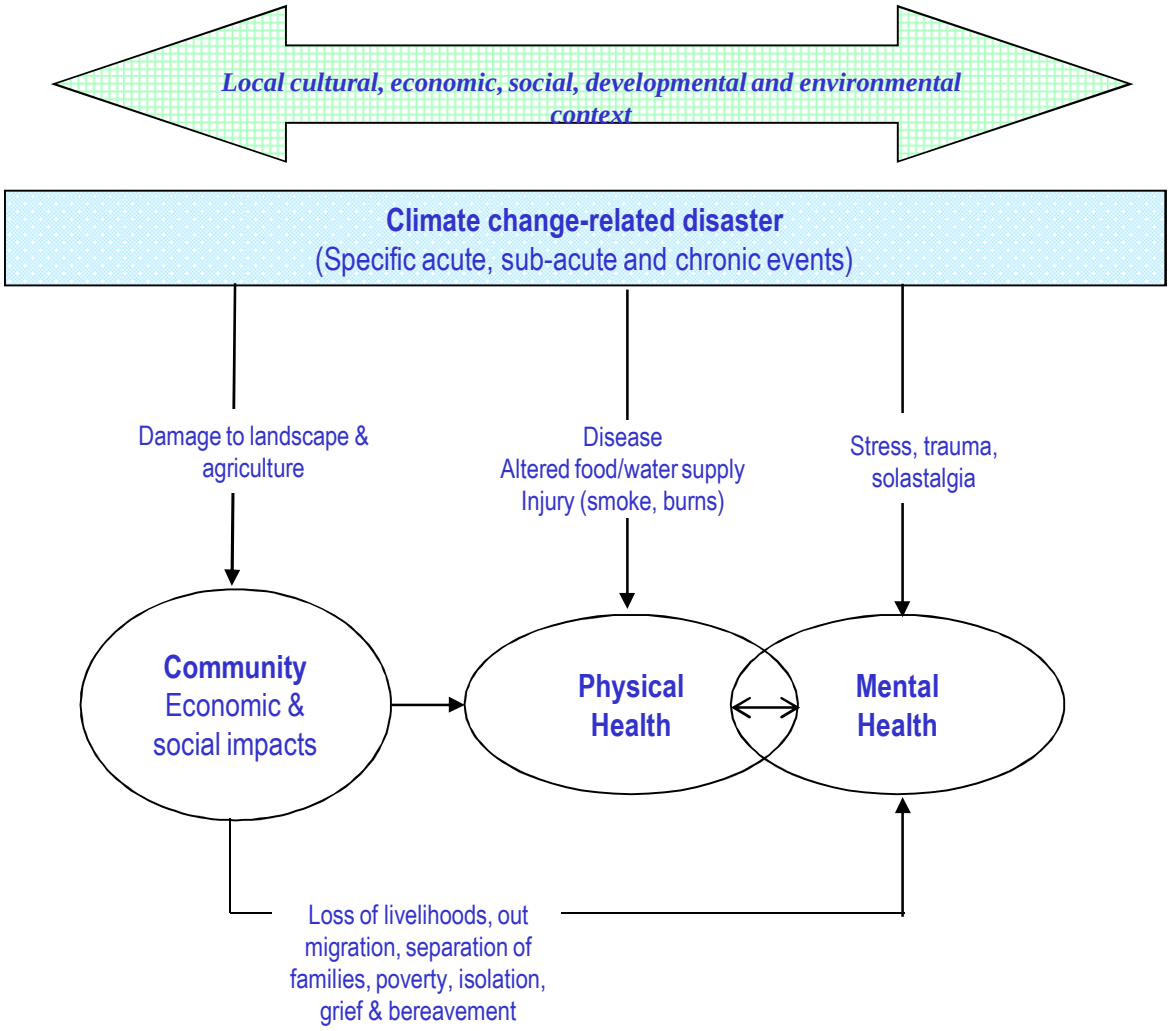
Climate and mental health

Anthony Hogan, Helen Berry, Suan Peng Ng & Adam Bode
National Centre for Epidemiology & Population Health

With thanks for the support from RIRDC and DAFF


Local cultural, economic, social, developmental and environmental context
Climate change-related disaster
(Specific acute, sub-acute and chronic events)
Damage to landscape & agriculture
Disease
Altered food/water supply
Injury (smoke, burns)
Stress, trauma, solastalgia
Community
Economic & social impacts
Physical Health
Mental Health
Loss of livelihoods, out migration, separation of families, poverty, isolation, grief & bereavement

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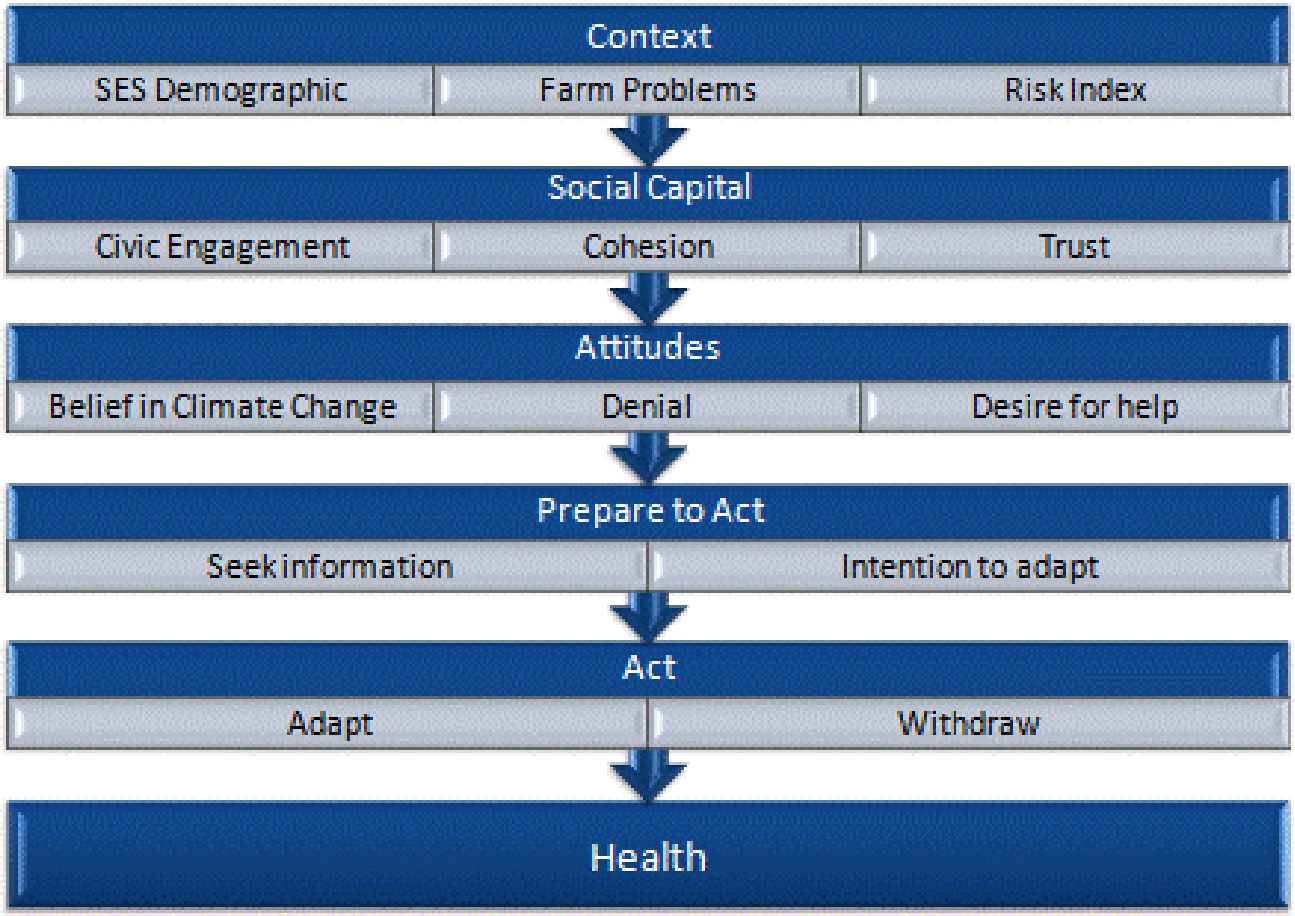
Examining how climate impacts on health



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20% of Australian farmers are quite affected

- in drought
- young and female farmers
- most on farm risk levels, the lowest incomes
- worst health
- isolated from information services
- most problems accessing support services
- uncertain about how they should adapt

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How climate models are helping farmers adapt

Prof. Graham Baker
for Prof Roger Stone
University of Southern Queensland

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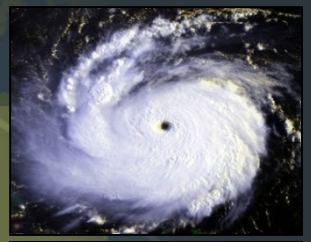
“A pragmatic view – the value of integrated climate modelling”





Prof Graham Baker
Prof Roger Stone

University of Southern Queensland, Toowoomba, Queensland Australia

The main message

- Climate change is here
  - Temperatures are rising, land area of extreme heat is spreading and rainfall is shifting
  - Significant consequences for Australian agriculture and regional communities
- Integration can be a powerful tool for decision making
  - Global to Australian to State to catchment
- It is being used to inform decisions in the agricultural sector e.g. cotton and peanut industries

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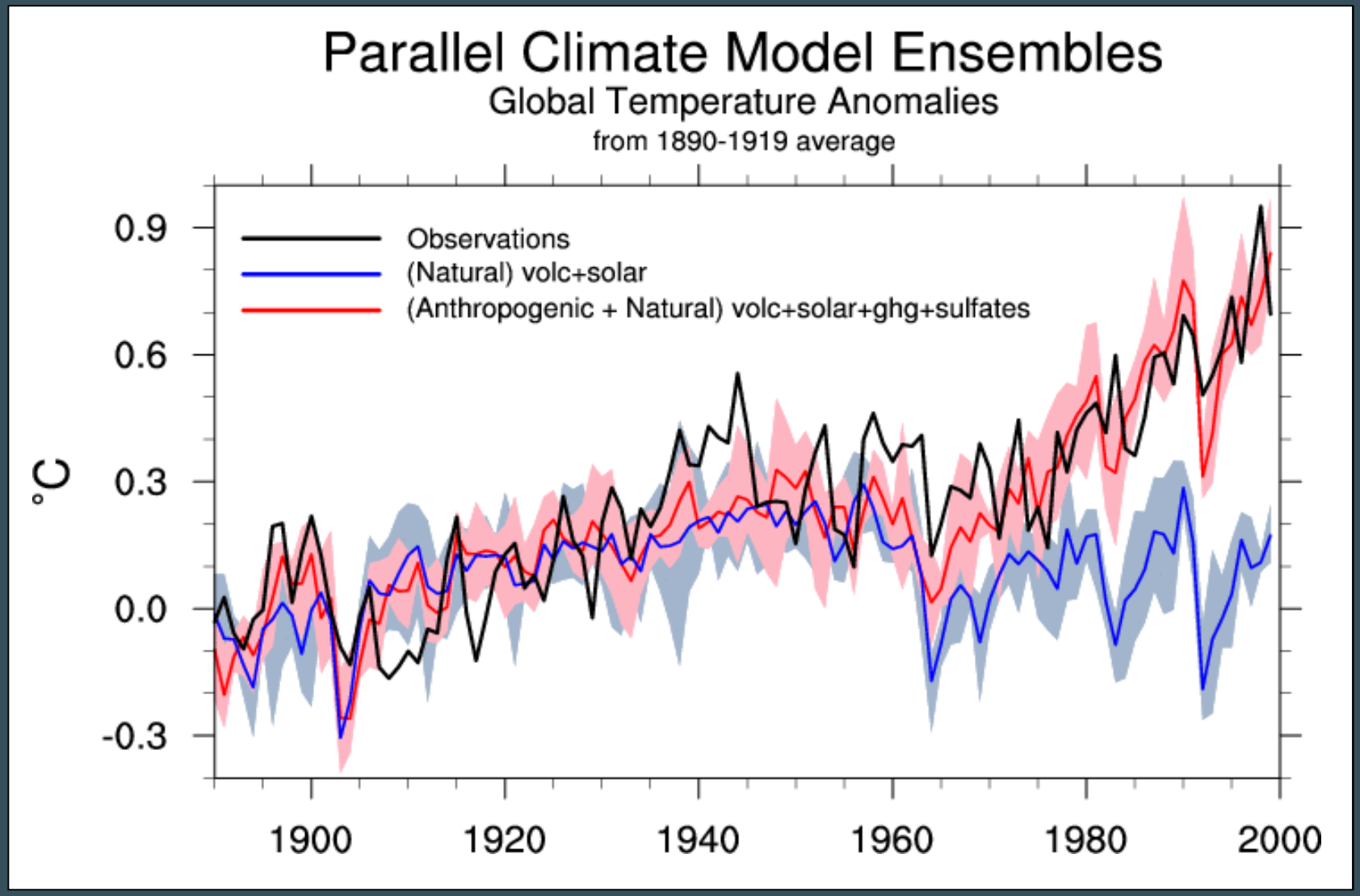
The complexities of the systems we are dealing with – climate variability, climate change and an example of agricultural management decisions

(Meinke and Stone, 2005)

Decision type (eg. only)	Frequency (year)
Logistics (eg. scheduling of planting / harvest operations)	Intraseasonal (>0.2)
Tactical crop management (eg. fertiliser/pesticide use)	Intraseasonal (0.2-0.5)
Crop type (eg. wheat or chickpeas)	Seasonal (0.5-1.0)
Crop sequence (eg. long or short fallows)	Interannual (0.5-2.0)
Crop rotation (eg. winter or summer crop)	Annual/biennial (1-2)
Crop industry (eg. grain or cotton, phase farming)	Decadal (~10)
Agricultural industry (eg. crop or pasture)	Interdecadal (10-20)
Landuse (eg. Agriculture or natural system)	Multidecadal (20+)
Landuse and adaptation of current systems	Climate change



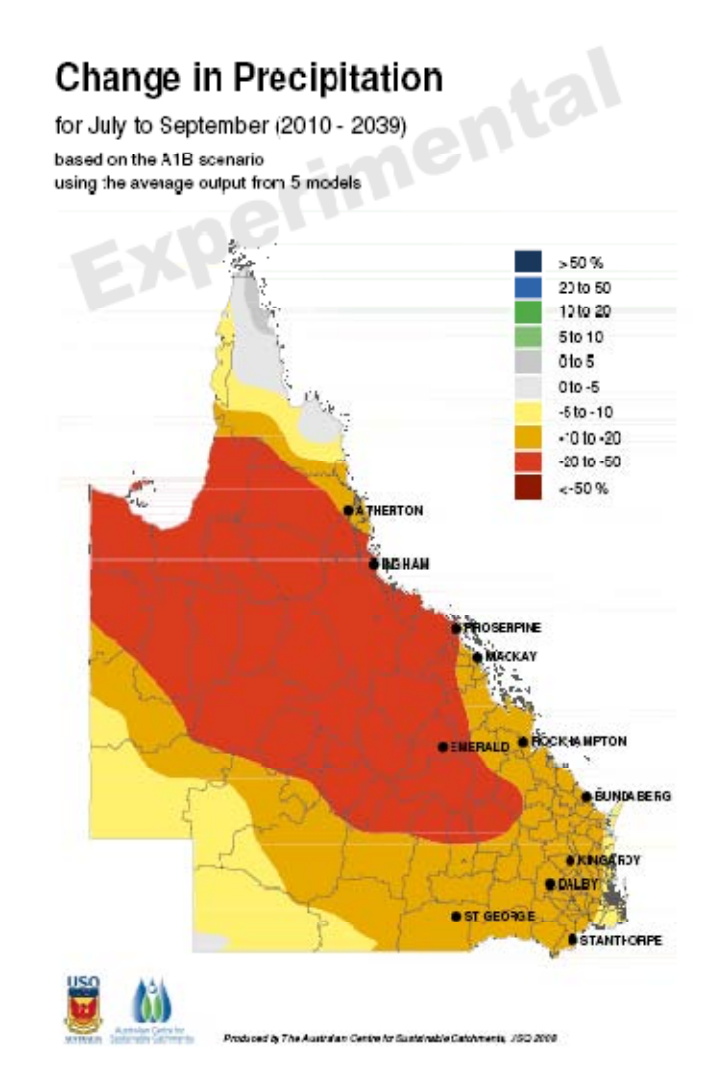
Courtesy Julie Arblaster, BoM/NCAR - US National Center for Atmospheric Research

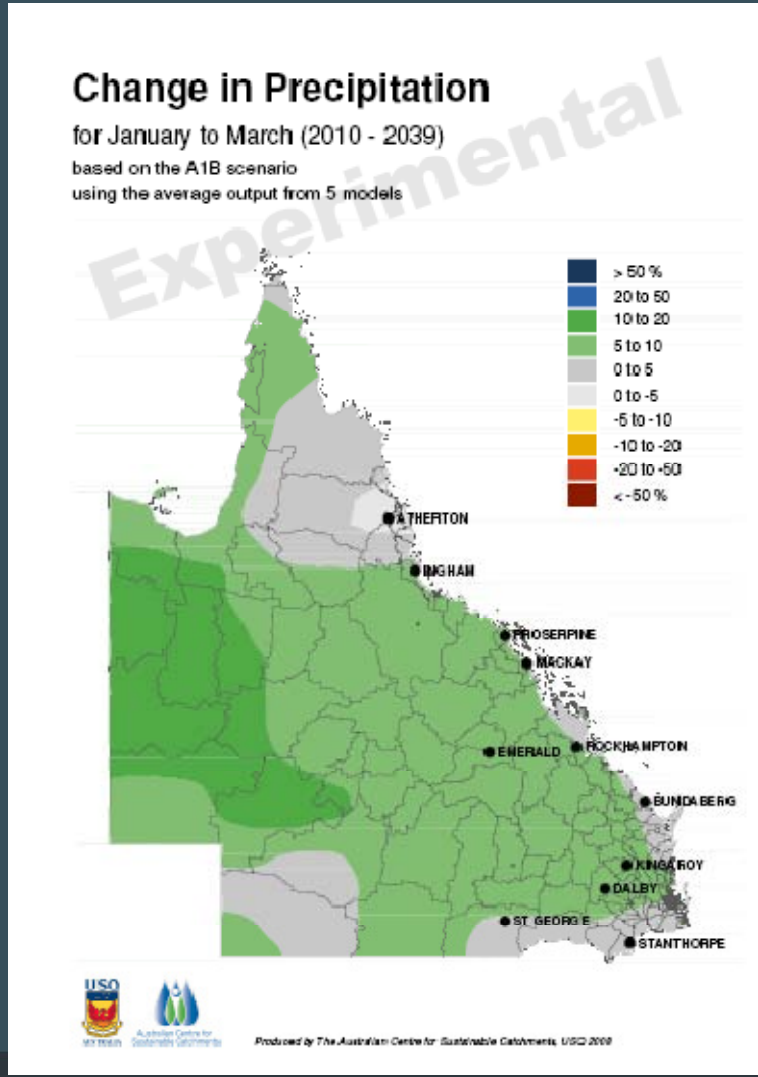
What's happening in Australia ?

Region	1900-2007	2020-2040 low	2010-2040 mean	2010-2040 high
Qld	4.6	48.9	62.2	73.8
NSW	4.5	43.5	62.1	81.0
VicTas	4.6	60.5	76.1	95.0
SW	4.6	49.1	68.4	86.3
NW	4.6	50.0	63.5	82.0
MDB	4.5	45.2	64.9	90.1
SWWA	4.6	63.1	81.9	97.1

*Simulated **percentage area having exceptionally hot years** for 1900-2007 and 2010-2040, **based on 13 climate models**.*
The low and high scenarios represent the lowest and highest 10% of the range of model results. (reproduced through courtesy CSIRO/Bureau of meteorology).

What's happening in Queensland ?

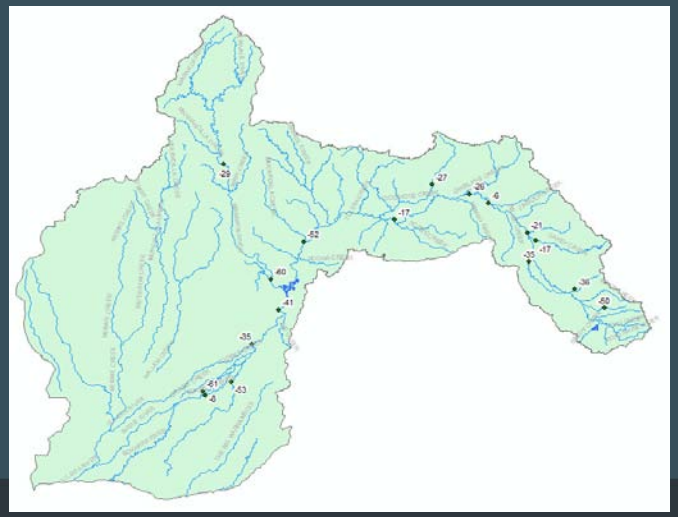




What's happening in the Lower Balonne ?

A current research example using this approach: assessing future streamflow and irrigation supply for a major Southern Queensland river system.

GFCM20	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historical rainfall	79mm	56mm	43mm	35mm	45mm	20mm	33mm	23mm	20mm	37mm	52mm	45mm
Projected rainfall	111mm	74mm	43mm	17mm	32mm	18mm	35mm	15mm	12mm	20mm	56mm	46mm
Change in rainfall	41%	31%	-1%	-49%	-29%	-7%	5%	-35%	-36%	-43%	7%	1%
Historical runoff	61cm	71cm	55cm	55cm	76cm	34cm	22cm	21cm	22cm	1cm	25cm	25cm
Projected runoff	126cm	252cm	117cm	38cm	28cm	15cm	14cm	14cm	2cm	0cm	22cm	28cm
Change in runoff	105%	251%	112%	-30%	-62%	-53%	-36%	-30%	-87%	-100%	-11%	10%



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Summary

Rather than only referring to past observed changes in precipitation or temperature, streamflow, etc, in climate change work we must start to utilise the best outputs from the best climate models – and develop continuing improved ways of integrating these outputs with agricultural, hydrological, economic and social models.

The recent BoM/CSIRO drought and climate statements reflect that approach (see Suppiah et al, 2007; Power et al, 2008).

Results of these types of analyses are compelling for regions such as Queensland, the Murray Darling Basin, and Australia

As an example, these outputs suggest potential for enhanced rainfall and streamflow for the January-March period for some Queensland regions – but reduced rainfall in general for future winters/springs – but suggests avenues for opportunities out of climate change adaptation.

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The scope for action

Prof. Amanda Lynch
School of Geography and Environmental Sciences
Monash University

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A low carbon future –capturing the opportunity

Ms Jennifer McAllister
Director
Climate Change, Air and Noise
NSW Department of Environment, Climate Change and Water

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Environment, Climate Change & Water

18 March 2010

Climate Change: A practical reality for state governments

Jennifer McAllister

Director, Climate Change Air and Noise Branch

Department of Environment, Climate Change and Water

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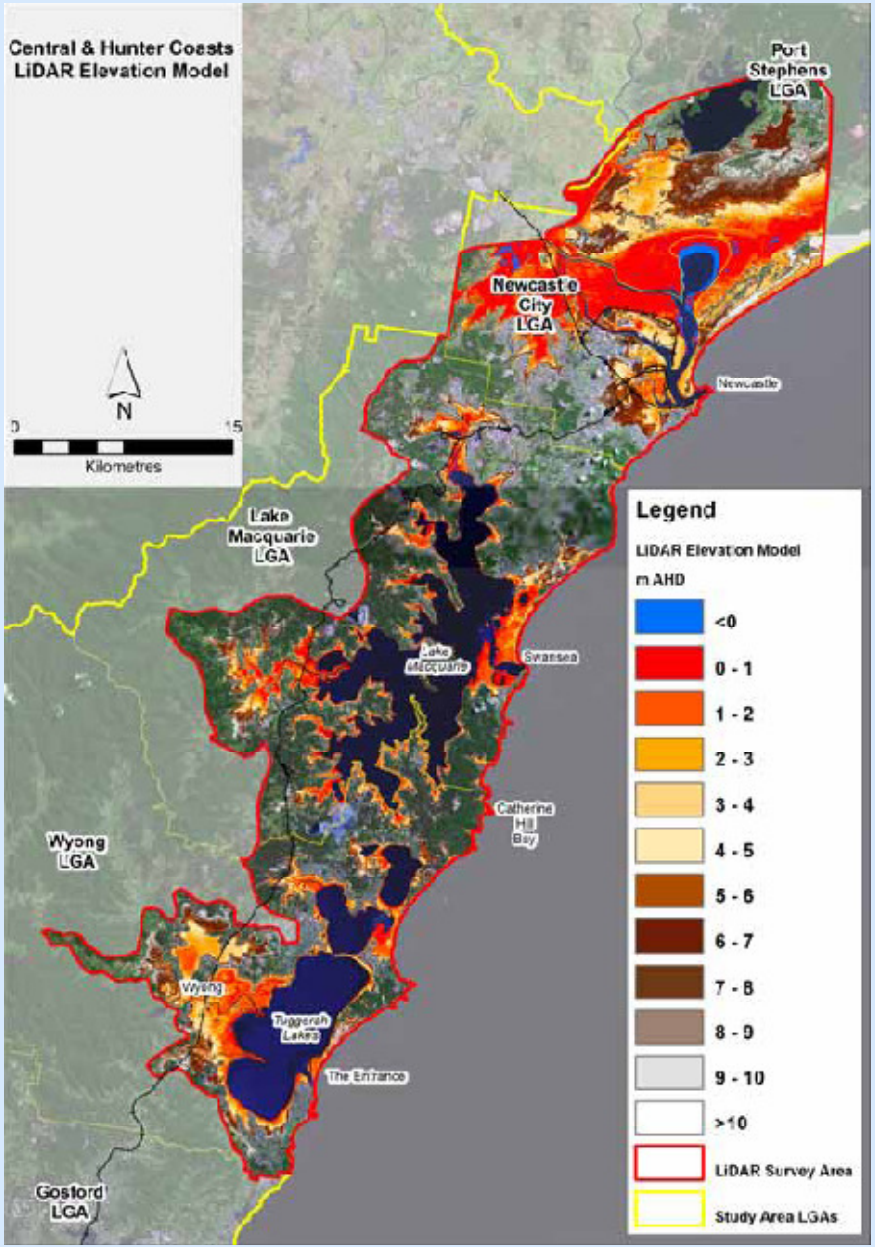

Digital elevation model of NSW Central and Hunter Coasts

- **The DEM highlights areas below 10m AHD**
- **The model is derived from NSW Government LiDAR survey completed in January 2007.**
- **Survey area of c.1234km2 includes Port Stephens (22% of LGA), Newcastle City (93%), Lake Macquarie (67%) and Wyong (40%) local government areas.**

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Assets lying below 1 metre

- 72,246 metres of roads
- 1045 metres of railway
- 1656 physical addresses
- 4 sewer pump stations in the Wyong council LGA
- 10,442m of sewer line in the Wyong council LGA
- 41 sports recreation facilities
- 4623.24 hectares of SEPP14 Wetlands

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Emerging energy sources

Prof. Ken Baldwin

ANU Climate Change Institute

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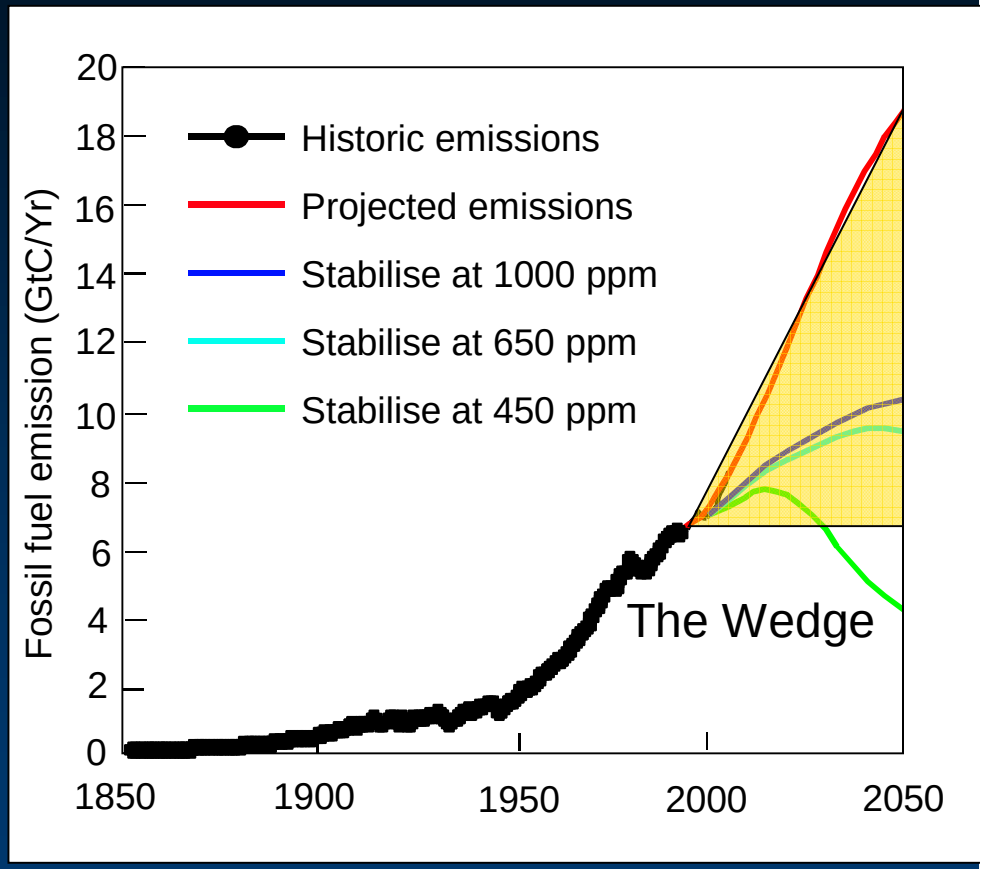
Emerging Energy Sources

Professor Ken Baldwin, ANU Climate Change Institute

Universities Australia Climate Forum

Emerging Energy Sources:
The key to reducing carbon emission

- Curbing greenhouse gas emission will require many parallel approaches
- No single energy source alone can completely mitigate climate change
- We need to invest in all potential carbon reduction measures in order to limit CO_2<450ppm => achieve a temperature rise of <2°C



At 2°C, there is a 50% probability of survival for the Barrier Reef

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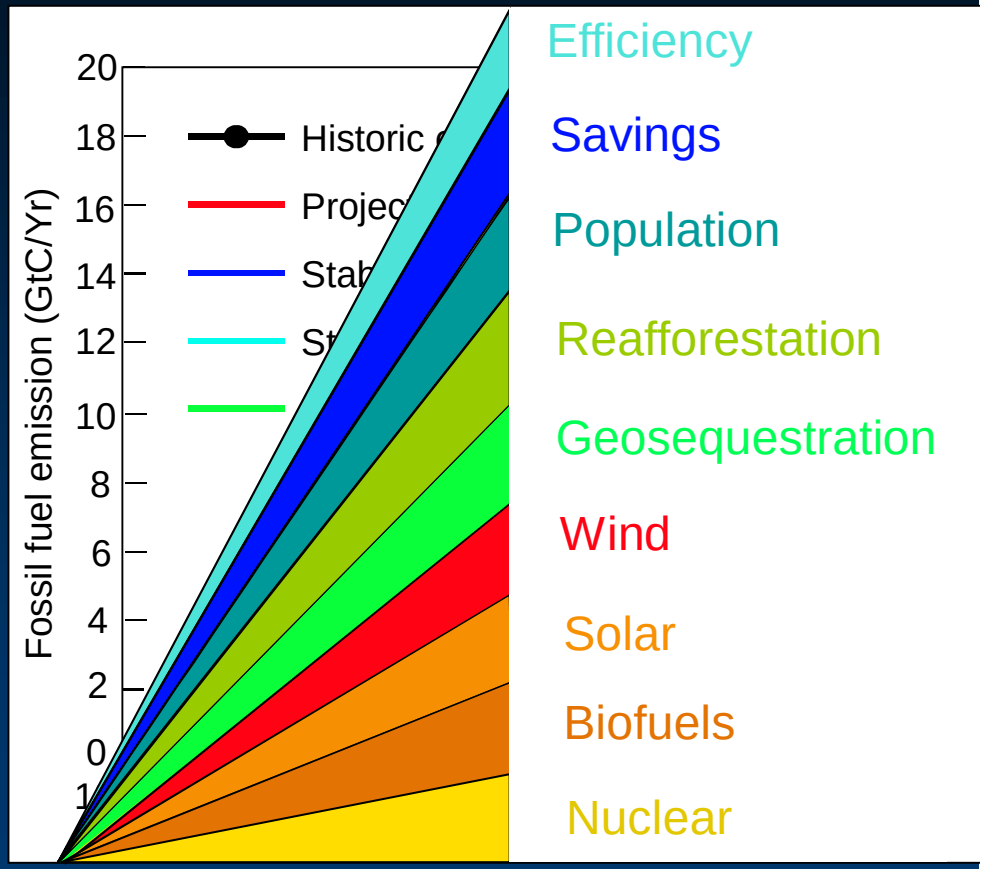

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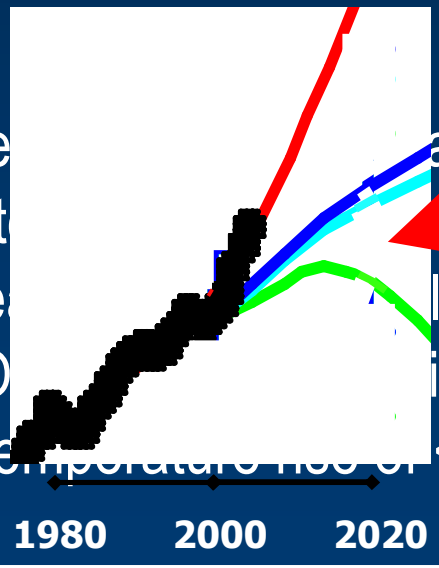

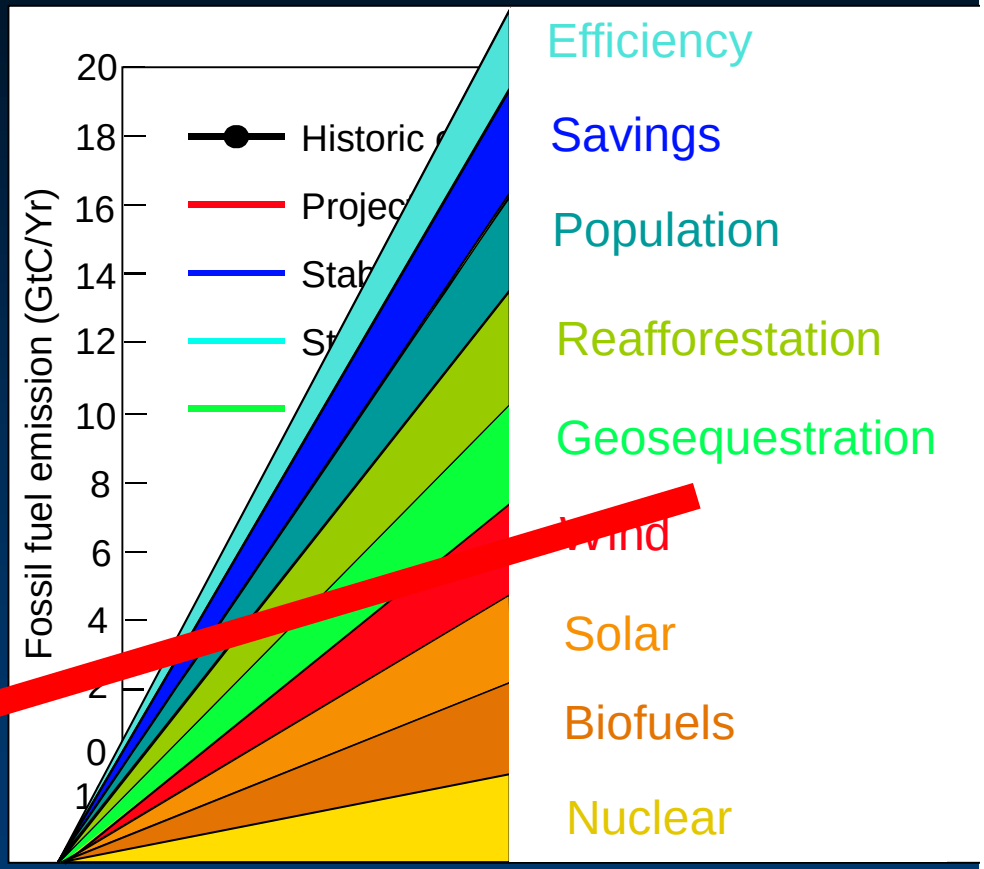

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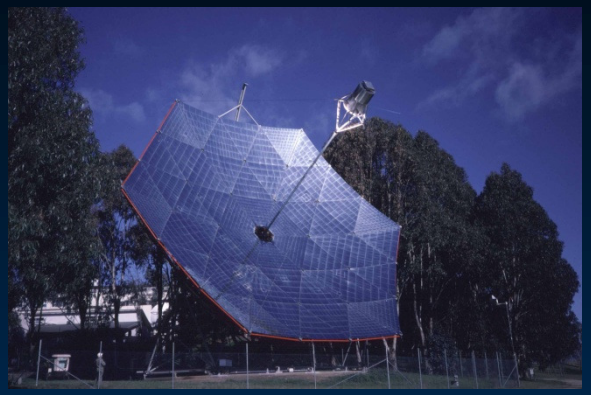
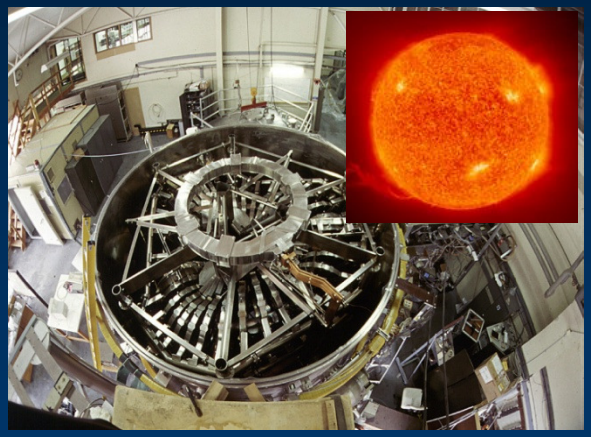
Emerging Energy Sources

- Physical energy sources (grid):
  - Solar photovoltaic
  - Solar thermal
  - Wind
  - Geothermal
  - Wave and tide
  - Nuclear
  - Fusion Energy – decades in the future
- Bio/chemical energy sources (transport):
  - Biofuels
  - Hydrogen fuel cells
  - Artificial photosynthesis
  - BioSolar





Claims for priority

- All sources require research. Some come online immediately and become cheaper through research, while others require more investment in research to make them viable
- Fusion may be the ultimate energy source, but we need interim sources to fill the gap in the coming decades
- Researchers in individual energy fields often claim the holy grail
- The truth is, we'll need research in all of them to meet emissions targets
- We need to the right decisions by putting all the scientific evidence on the table – and make decisions based on that science

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The economics of climate change

Prof. John Quiggin
School of Economics
University of Queensland

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