Climate Change & Biodiversity

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The Big Three

1) *Future Climate*

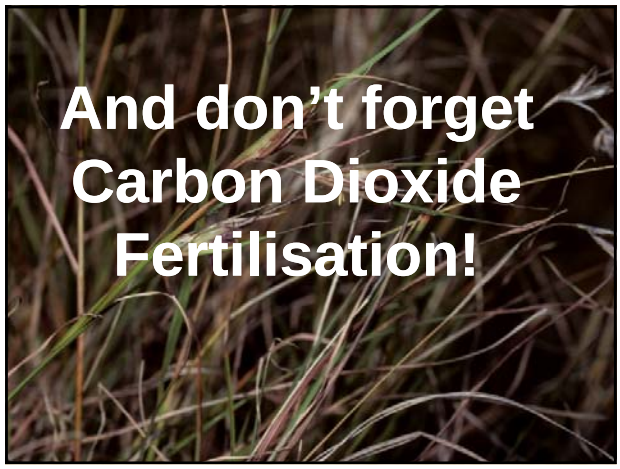
2) *Species Impacts & Responses*

3) *What to Do*

Future Climate

Predictions are provided by the CSIRO, Bureau of Meteorology, and the IPCC

But the predictions about sea level rise appear to be ***way too low***



The Big Three Qs

1) *Future Climate*

2) *Species Impacts & Responses*

3) *What to Do*

They are probably related

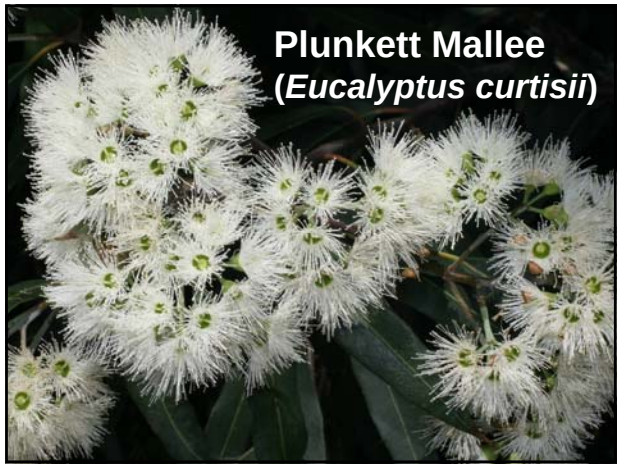
Anything around today is either:

1) **Sensitive to climate but mobile**

2) **Immobile but very climate tolerant**

3) **A bit of both**

4) **Or is up on a mountain and looking very worried**



You can work out something about tolerances and capacities by <u>interpreting the past</u>

The Past is a guide to the Future

What have Species been doing these last 5 Million years?


Notelaea lloydii

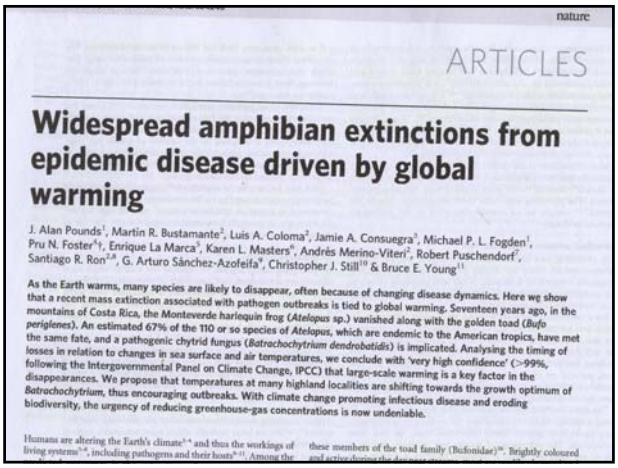

Coast Tea Tree (*Leptospermum laevigatum*)


"Species that make up a community are unlikely to shift together"
- IPCC 2002


But don't Forget Species Interactions!

"For some species, indirect impacts due to strong interactions with other species affected by climate in some way may be more significant than direct impacts on their biology."

- Dunlop and Brown



nature

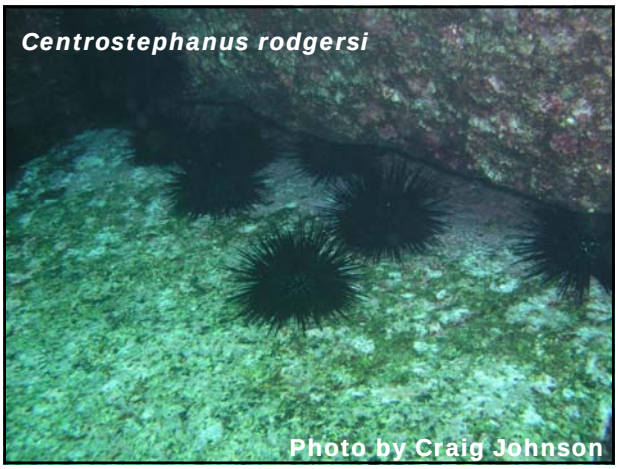
ARTICLES

Widespread amphibian extinctions from epidemic disease driven by global warming

J. Alan Pounds[1], Martin R. Bustamante[2], Luis A. Coloma[3], Jamie A. Consuegra[3], Michael P. L. Fogden[1], Pru N. Foster[4]†, Enrique La Marca[5], Karen L. Masters[6], Andrés Merino-Viteri[7], Robert Puschendorf[7], Santiago R. Ron[2,8], G. Arturo Sánchez-Azofeifa[9], Christopher J. Still[10] & Bruce E. Young[11]

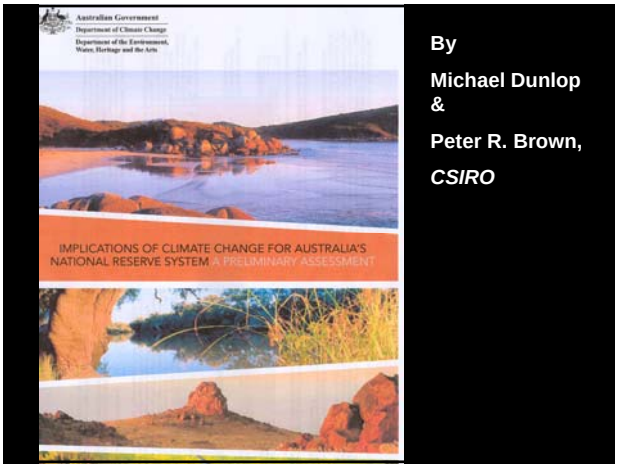
As the Earth warms, many species are likely to disappear, often because of changing disease dynamics. Here we show that a recent mass extinction associated with pathogen outbreaks is tied to global warming. Seventeen years ago, in the mountains of Costa Rica, the Monteverde harlequin frog (*Atelopus* sp.) vanished along with the golden toad (*Bufo periglenes*). An estimated 67% of the 110 or so species of *Atelopus*, which are endemic to the American tropics, have met the same fate, and a pathogenic chytrid fungus (*Batrachochytrium dendrobatidis*) is implicated. Analysing the timing of losses in relation to changes in sea surface and air temperatures, we conclude with 'very high confidence' (>99%, following the Intergovernmental Panel on Climate Change, IPCC) that large-scale warming is a key factor in the disappearances. We propose that temperatures at many highland localities are shifting towards the growth optimum of *Batrachochytrium*, thus encouraging outbreaks. With climate change promoting infectious disease and eroding biodiversity, the urgency of reducing greenhouse-gas concentrations is now undeniable.

Humans are altering the Earth's climate[1–4] and thus the workings of living systems[5–8], including pathogens and their hosts[9–11]. Among the these members of the toad family (Bufonidae)[10]. Brightly coloured


Centrostephanus rodgersi
Photo by Craig Johnson


Hills
Really matter
Every hill has a hot side and a cool side
A Future & a Past


Conserve
Heterogeneity



<u>On Adaptive Management</u>:

…the information feedback may be too slow (much management will have to have taken place without it), and the information itself may be out-of-date (as the climate and biota will have changed even more)"

- Dunlop & Brown (2007)