

Climate change adaptation research

- Causes
- Impacts
- Mitigation
- Adaptation

From the NCCARF Website:

There are many different types or categories of **adaptation** which vary in:

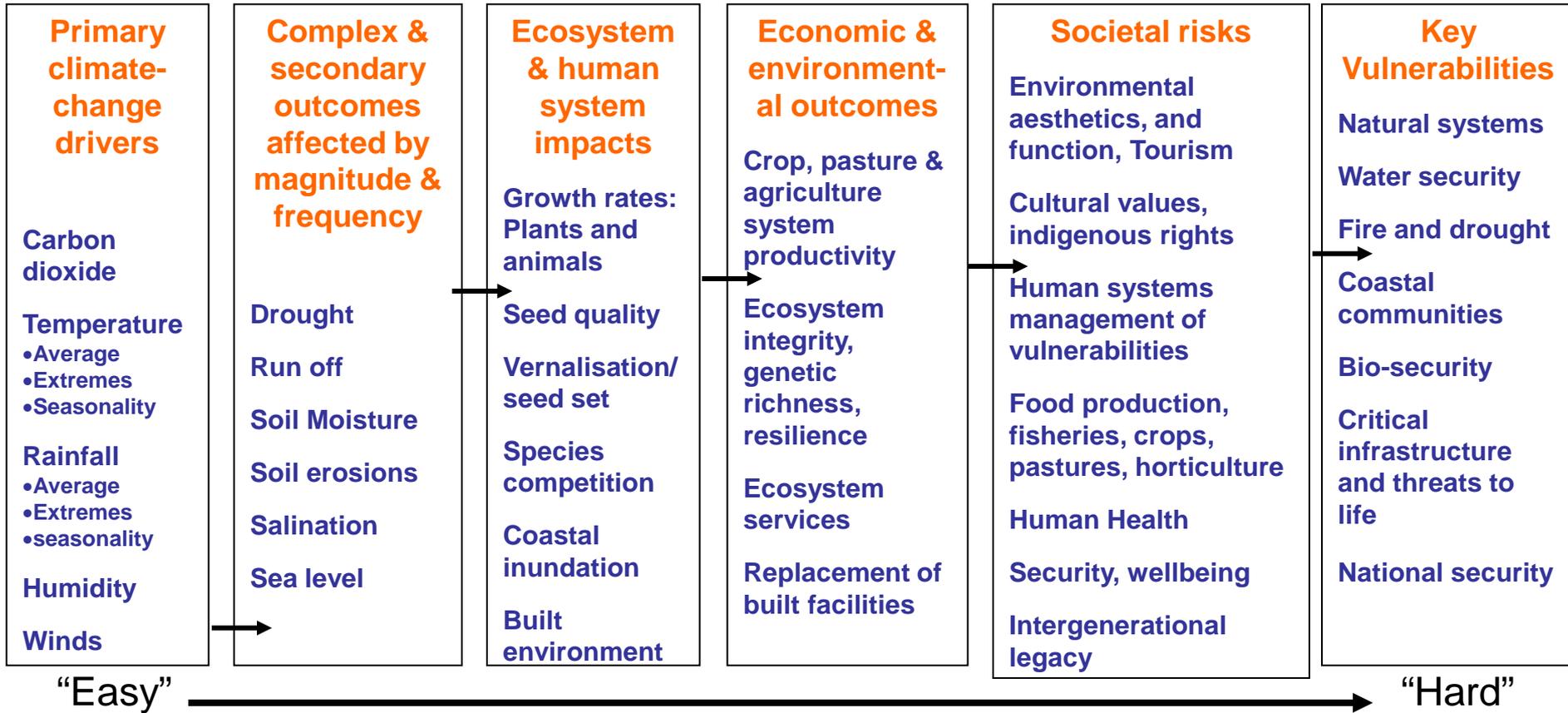
- **Timing:** *proactive* adaptation if it is done in anticipation of an impact, *reactive* if it is done in response;
- **Temporal and spatial scope:** short term as opposed to long term, localised as opposed to widespread;
- **Purposefulness:** *autonomous* if it is done unconsciously, *planned* if it is the result of a policy decision;
- **Agent:** public or private; government, industry, business or individual.

These different characteristics demonstrate the range of actions that are classified as adaptations.

BUT there's no off the shelf way to do adaptation business

Complexity and confidence

(for illustrative purpose only)



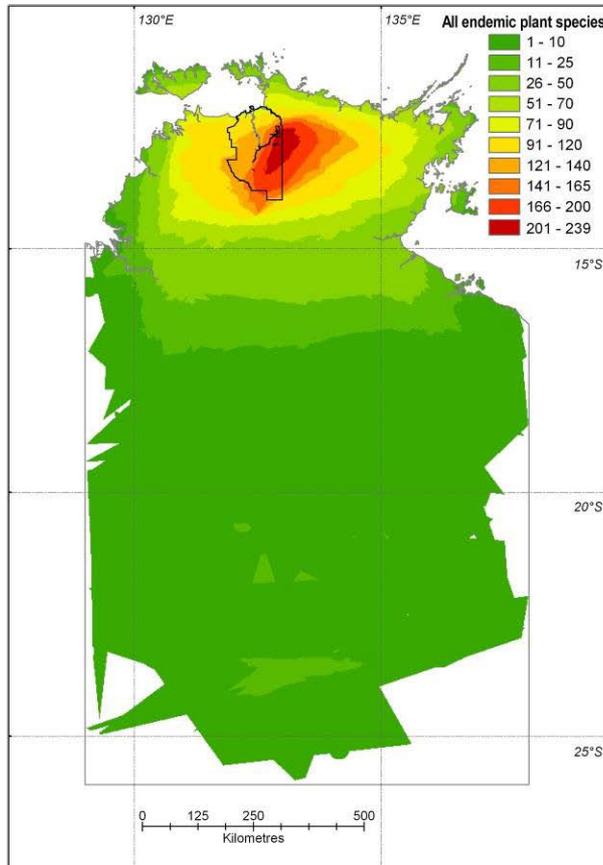
- Increasing complexity of systems
- Decreasing confidence of regionality of change projections
- Increasing opportunity of adaptive changes to nullify effects
- Increasing opportunities for extraneous forcing to influence future
- Increasing identification of nature/magnitude of impacts
- Decreasing confidence in probability of occurrence

Lessons from a neighbour

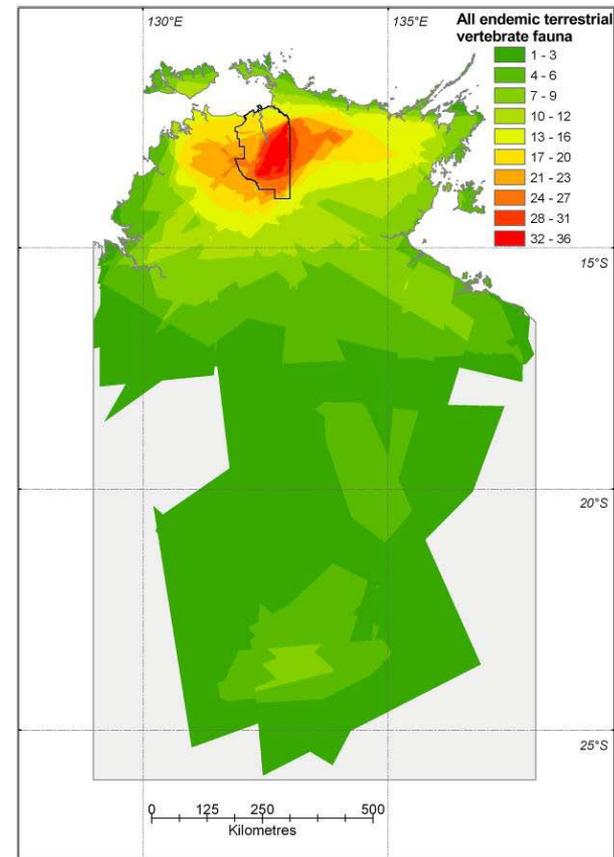
- Continental and global reviews have identified areas of **Queensland** at particular risk from climate change impacts; the Wet Tropics of Queensland (Hughes 2010), high altitude and montane regions (Hilbert et al. 2001; Steffen et al. 2009; Williams et al. 2003) **and areas of high endemism** (Thomas et al. 2004). Other work has identified particular taxa at high risk; amphibians (Pounds et al. 2006; Steffen et al. 2009), reptiles (Kearney et al. 2009), and endemic fauna of montane regions (Williams et al. 2003). The majority of Queensland west of the Great Dividing Range, composed of tropical and subtropical grasslands, savanna and shrublands, is expected to have among the **fastest 'velocities' of climate change** owing to its low relief (Loarie et al. 2009), indicating species will need to respond relatively more rapidly to keep pace with climate change than in areas with slower velocities such as mountainous areas. **In addition, the Cape York and Gulf regions are predicted to experience novel climates** (i.e. climates not currently existing) as well as the disappearance of some extant climates (Williams et al. 2007).

A tale from the Top End

Figure 8.3. Contour maps showing the richness of Northern Territory endemic (a) plant species, and (b) terrestrial vertebrate species, with the boundary of Kakadu National Park superimposed. (Source: Woinarski *et al.* (2006) for plants; Woinarski and Hempel *unpubl.* for vertebrate species.)

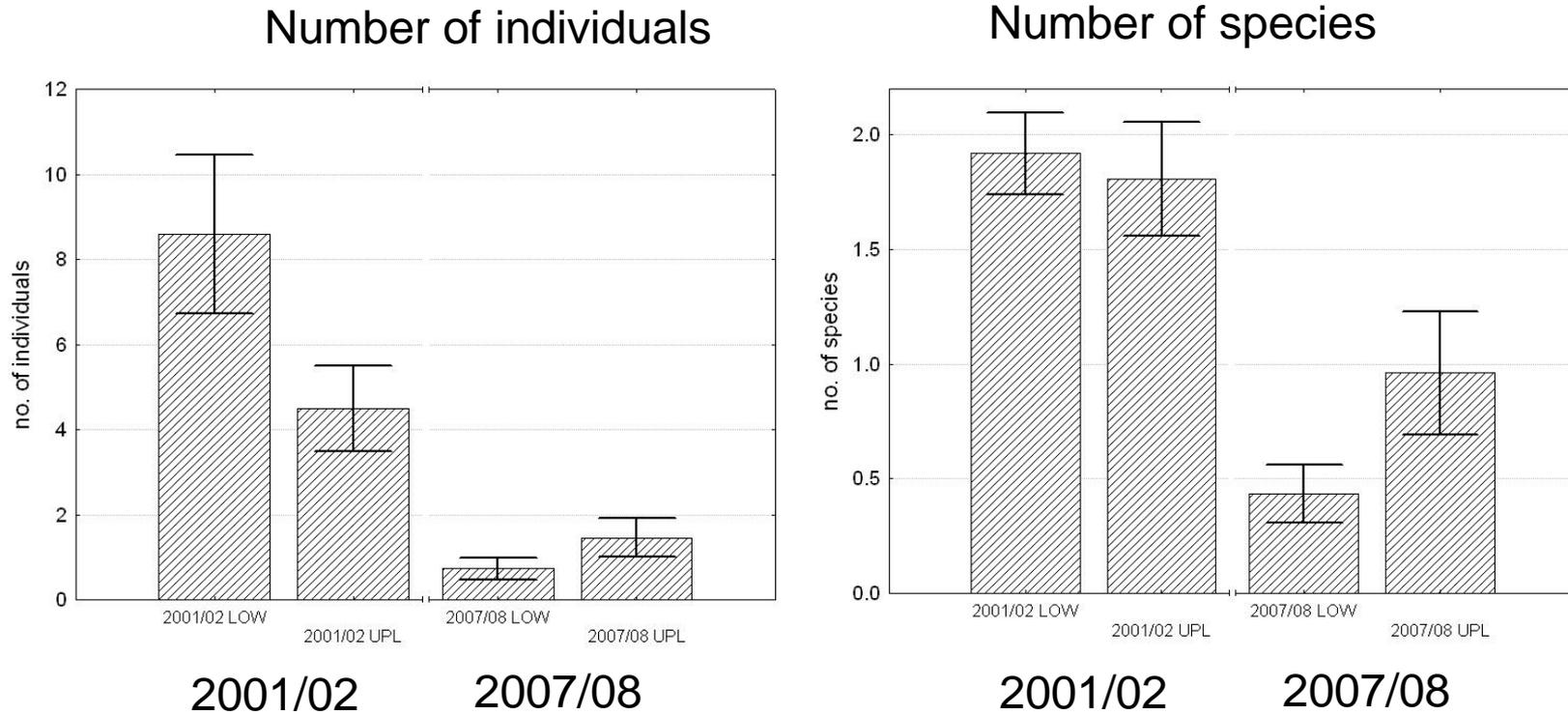


Plants



Animals

Figure 8.5. Trends in native mammal populations (left – number of individuals; right – number of species) in Kakadu National Park, derived from repeat sampling at 63 fixed monitoring plots. Columns represent means, whiskers represent standard errors; “LOW” indicates lowland sites; “UPL” indicates upland sites.



No regrets adaptation in the NT – reduce frequency

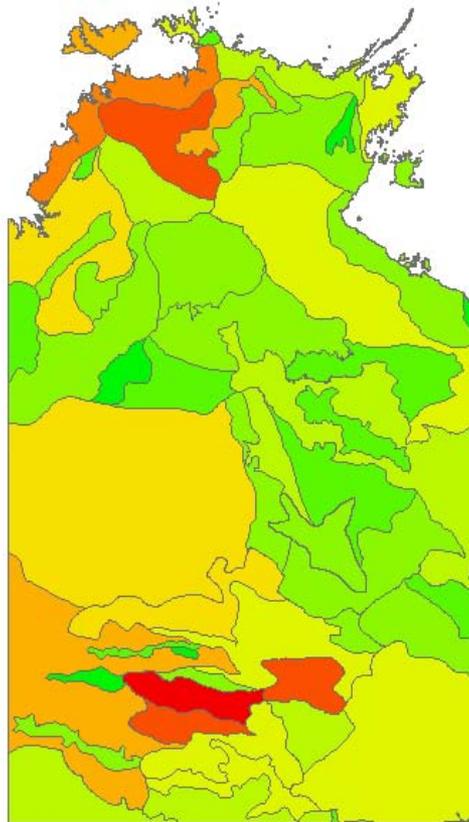


Figure 8.6. The number of threatened species for which fire is a recognised threat, for Northern Territory IBRA subregions (tallied from information in Woinarski *et al.* 2007).

No regrets adaptation in the savannas

- Do something about gamba grass and other invasive grass species
- Do this regardless of climate change
 - Likely bigger/more pressing threat to biodiversity via changed fire regimes and that climate change itself



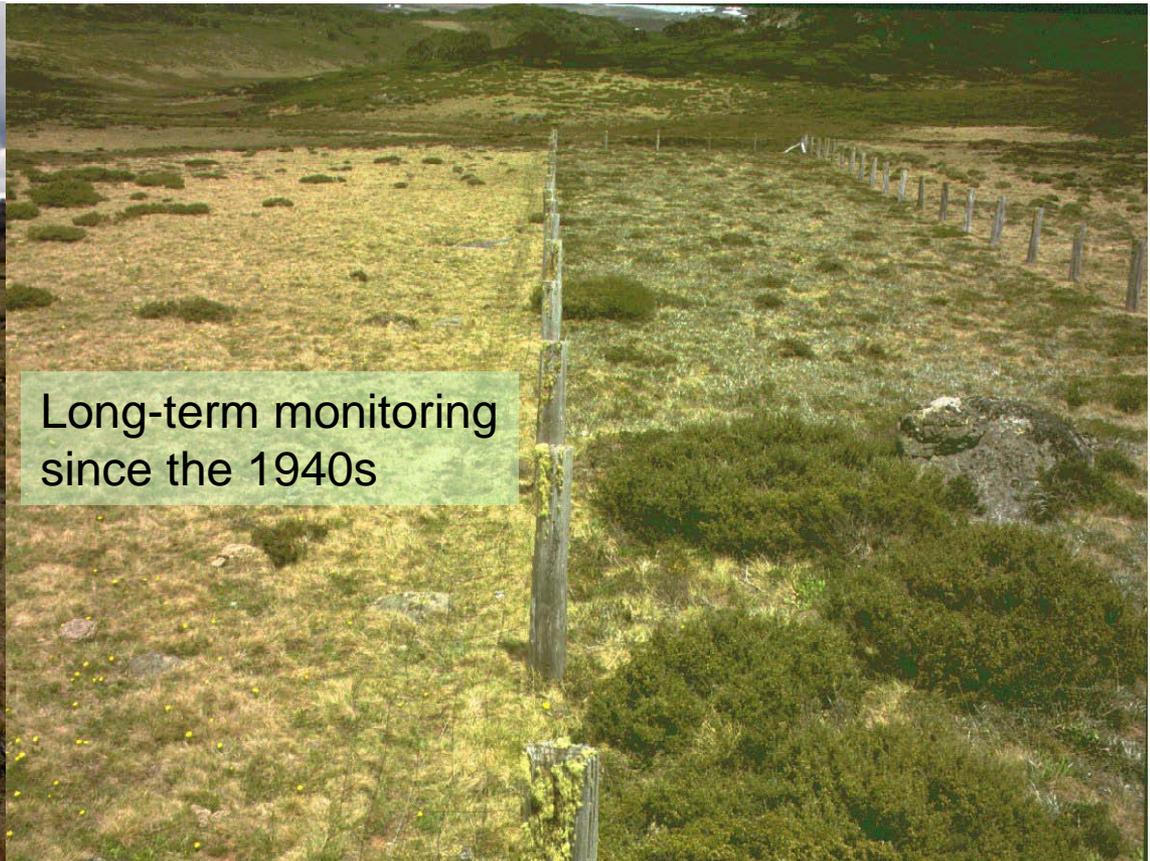
Adaptation and multiple co-benefits in the savannas

- NT leading the way here with WALFA type projects
 - Reduced fire frequency brings reduced GHG emissions, enhanced carbon sequestration, and benefits for biodiversity and remote communities
- A model for successful adaptation??

Lessons from The Roof of Australia



International Tundra
Experiment 2003-2011



Bogong High Plains, Alpine National Park, NE Victoria
Elevation 1750m

Take home message

- Not necessarily a bad-news story
 - Resilience = ecological insurance = room to move for managers
 - A million dollar conclusion
- How know what to be concerned about?
 - Native shrubs; weeds
 - Hang in there and Monitor!

So, agencies and governments

- Be bold
 - climate change and implications for adaptation is real
- Things are gonna change
- Hard decisions will be needed
 - Triage?

Now, after Adam, over to you mob

- Contestable space
- Ideas
- Imagination
 - Cross-hemispheres
- Be on the look out for the transformative, challenging idea