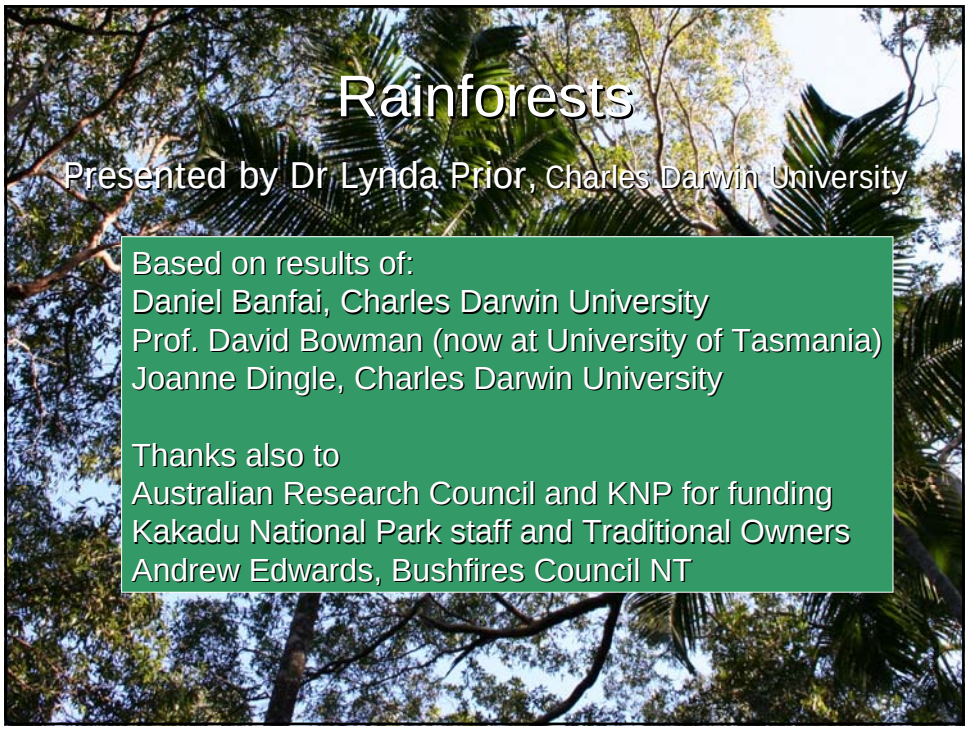


Rainforests

Presented by Dr Lynda Prior, Charles Darwin University

Based on results of:
Daniel Banfai, Charles Darwin University
Prof. David Bowman (now at University of Tasmania)
Joanne Dingle, Charles Darwin University

Thanks also to
Australian Research Council and KNP for funding
Kakadu National Park staff and Traditional Owners
Andrew Edwards, Bushfires Council NT

NT Rainforests Russell-Smith 1991

- Many small patches (typically < 5 ha)
- Surrounded by fire-prone savannas
- Two main types
  - Wet (springs and seepage areas)
  - Dry (protected from fire by cliffs, rocks, beaches, floodplains etc)

Rainforest trees (Russell-Smith & Setterfield 2006)

- Compared with savanna trees
  - More seedlings
  - Less resprouting
  - Fewer have lignotubers
  - Less clonal reproduction

→ More fire sensitive

Are Kakadu's rainforests changing?

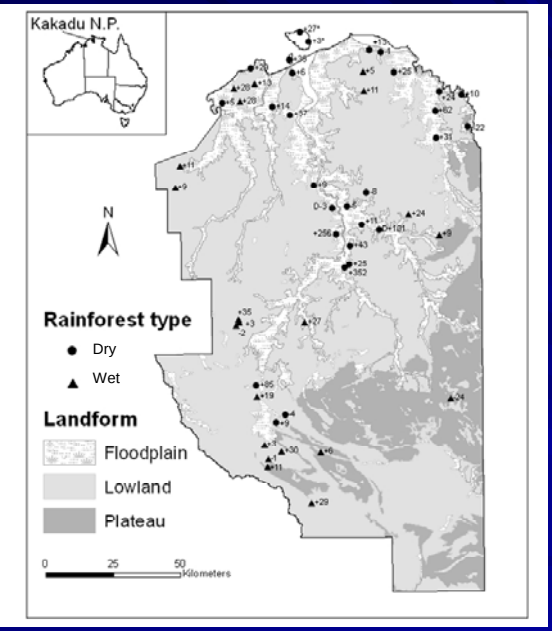
There have been changes in fire management in the Kakadu area over the last 40 years

How has this affected the size of rainforest patches?

1) Lowland rainforest
   - Daniel Banfai's PhD study used historical aerial photography to examine change in area
   - wet and dry rainforest patches

2) Allosyncarpia forest

- change in area of patches and % cover
- growth, survival, recruitment

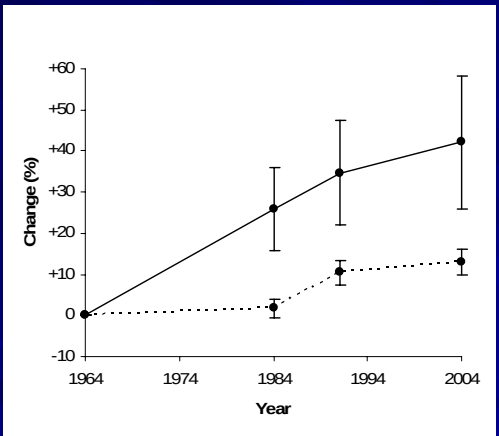


Lowland forest study

29 dry rainforests
21 wet rainforests

Banfai & Bowman 2006

Change in area of rainforest between 1964 and 2004



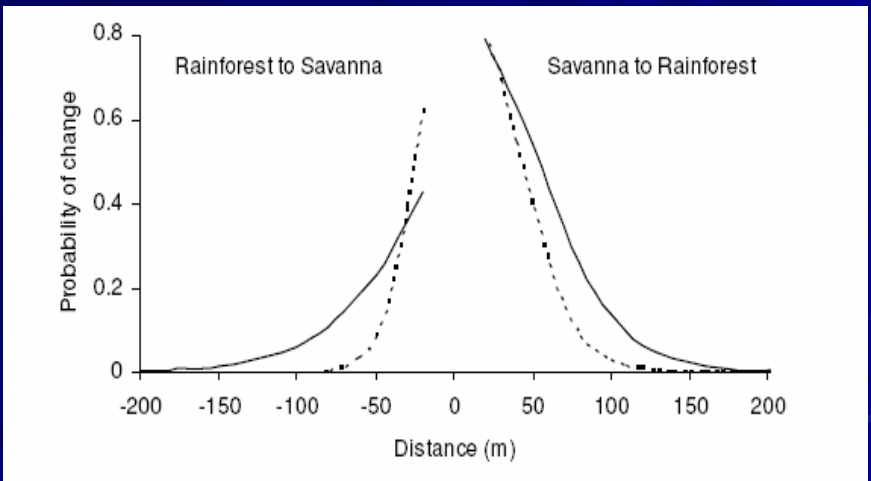
Steady increase in size:

Dry rainforest expanded by 42%

Wet rainforest expanded by 13%

Banfai & Bowman 2006

Most change occurs within 30 m of boundary



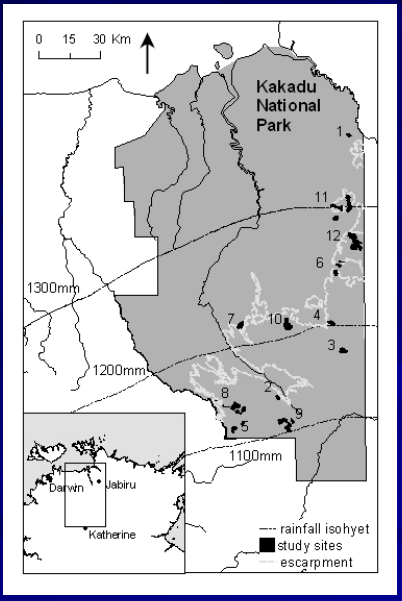
Banfai 2007

Aerial photography showed:

- Rainforest more likely to expand where buffalo impact was small
- History of patches indicates importance of fire and flammable weeds
- Consistent with findings in Litchfield and Gulf Country; therefore expansion seems driven by regional or global factors such as increasing rainfall and atmospheric CO_2

Allosyncarpia forest

- Found only on Arnhem Land plateau, including Kakadu NP
- Both on sites that are always wet, and some that are rocky and dry

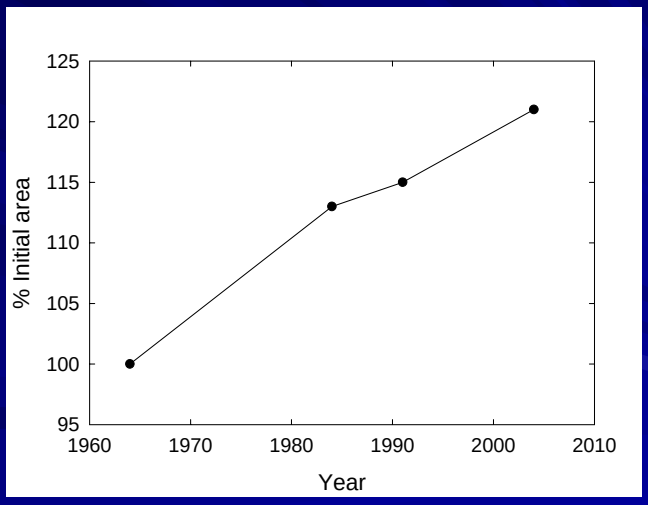


Bowman & Dingle 2006

used historical aerial photography to find out whether *Allosyncarpia* forests in Kakadu shrinking because of changes to fire regimes

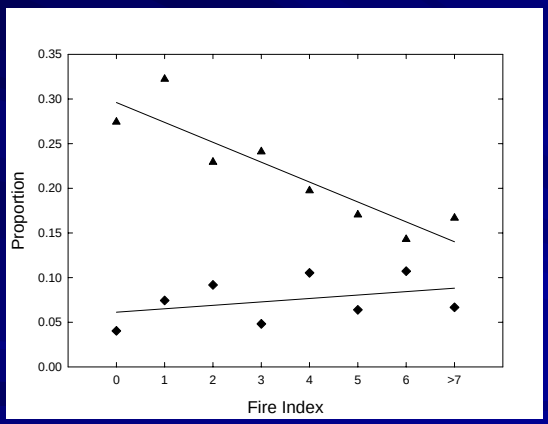
Allosyncarpia sample points

Area of *Allosyncarpia* forest has increased steadily since 1964



Likelihood of change vs. fire activity

triangles: sites with increasing *Allosyncarpia*
diamonds: sites with decreasing *Allosyncarpia*



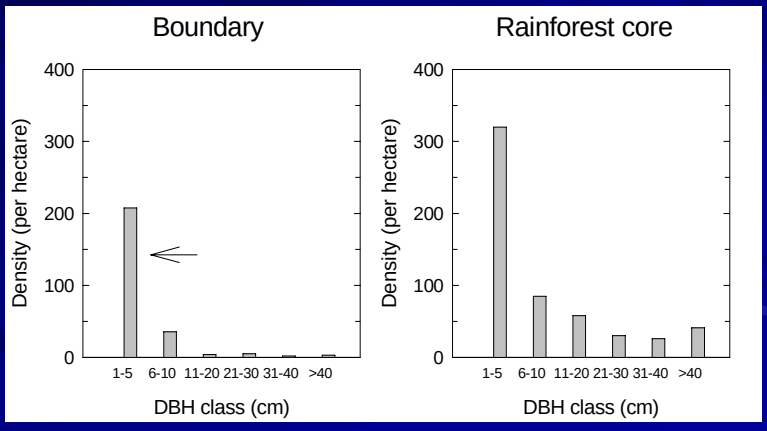
Increases in cover of *Allosyncarpia* associated with low fire activity

As well as producing many seedlings, *Allosyncarpia* can resprout after fire

Allosyncarpia stand structure
(Round Jungle)

Few large trees at the rainforest boundary

Many small trees on the boundary – enough to maintain the population



Prior, Bowman & Brook 2007

Large old trees are being killed by fire but are being replaced by many small ones (probably resprouts). Population is sustained, but

→ Change in stand structure

Conclusions

- Overall expansion of all three types of rainforest – lowland wet & dry, *Allosyncarpia*
- Seems driven by a factor that affects the whole region, such as increasing rainfall or CO_2
- The expansion appears modified by fire and feral animals; a few patches have contracted
- Change in stand structure at the boundaries

Management implications

- Current fire regime will probably allow rainforest patches to keep expanding
- Frequent late dry season fires would cause rainforests to contract, especially if lots of fuel on the boundary
- Need to manage grassy weeds around rainforest patches because they cause hot fires
- Need to keep buffalo numbers low because they trample vegetation