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THE DREW LAB AT COLUMBIA UNIVERSITY

ECOLOGY, EVOLUTION AND CONSERVATION OF CORAL REEFS

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Fire in the Top End: Coupled Human/Natural System Conservation

One of the things I am really enjoying about this semester is teaching my graduate seminar in conservation biology. It has been fun going back and reading the [classics](#) and also expanding out into the newer literature. Since I am also teaching a class in marine conservation I am trying to pay special attention to non-marine topics for regular flavor conservation biology

There are few topics I consider more 'non-marine' than fire ecology, and this recent paper by [Trauernicht et al.](#) in [Ecology and Evolution](#) does a great job of looking at a conservation issue with multiple moving points. In this paper "**Cultural legacies, fire ecology, and environmental change in the Stone Country of Arnhem Land and Kakadu National Park, Australia**" they look at the interactions between (pay attention now) Aboriginal cultural practices including both 1) fire management via prescribed burning and 2) incorporation of Water Buffalo (*Bubalus bubalis*) and 3) Australian government prescribed fire management across two areas. Get all that? Right, it's a complex story.

The story takes place in [Arnhem Land](#), a *one billion* year old piece of land on the top end of Australia. While there's active debate about how long Aboriginal people have inhabited these areas, it's safe to say they have been there for ballpark **40,000 years**. During this tenure the Aboriginal people have had a long and adaptive cultural practice of small-scale patch burnings. This practice lowers the fuel load (particularly the grass *Sorghum brachypodum*) and prevents large scale, intense late season burnings that have greater [environmental impacts](#). These burnings create a mosaic of burnt and non-burnt areas, which provide opportunities for plants that are fire adapted and non-fire, adapted to thrive.

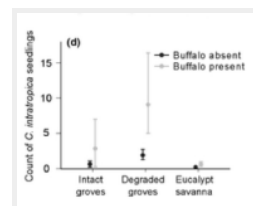
Coupled with this long history of burning is an adaptive cosmology, which can incorporate introduced species. The water buffalo was introduced into the top end in the mid 1800s and has become naturalized. Ecologically the buffalo mirrors the impacts of the fire by preferentially eating the grasses such as *S. brachypodum* that can fuel catastrophic fires.

Within Arnhem Land lies Kakadu National Park, which is a magnificent and beautiful area. The Australian government manages this national park with practices that differ from the Aboriginal people. First, while there is human generated burning, there is one ranger and one helicopter to cover >5000km², so the extent is limited and not as patchy. Second buffalo are actively culled with densities <.01km⁻² (densities outside the park were not reported but presumably they are greater).

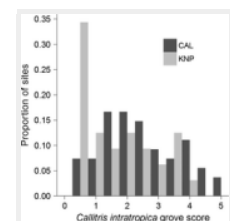
With me so far?

Callitris intratropica. Using a combination of on the ground and in the air surveys, they found that the groves in the Aboriginal managed land had a higher incidence of big and healthy *C. intratropica*. Moreover, these groves held a higher proportion of fire sensitive species, increases structural complexity and a refuge for at least one bird species. Additionally they found that in plots that had buffalo present the count of *C. intratropica* seedlings were higher, showing that the buffalo were correlated (but not necessarily facilitating) a patchy landscape.

So what does this mean? **Well my reading is that the Aboriginal fire practices and the buffalo were working together to help remove the fuel load and prevent the catastrophic fires that will eliminate *C. intratropica* groves from flourishing.** The presence of *C. intratropica* is strongly correlated with a unique community of non-fire adapted plants, and these areas probably survive in a metapopulation colonizing the patches opened up by human/buffalo interactions. In Kakadu National Park where the practices are less patchy, and the buffalos are at lower density, the patches are not as prevalent and the *C. intratropica* community tends to be of lower quality.



IMPACTS OF BUFFALO ON C.



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This is a great example of human/natural-coupled conservation and there is a lot on the social science side we could impact. The traditional owners of Arnhem Land have formed several cooperative institutions to serve as rangers and guides, providing employment for the owners that is both culturally appropriate and that celebrates their traditional ecological knowledge.

I like this paper because it does a great job of dealing with several moving parts in an elegant fashion, highlights the value of integrating people (and their ecological knowledge) in conservation management regimes, and highlights the complexities that real world conservation practitioners face.

Feb 1, 2013 Update

Bret Murphy, the second author on this paper, highlighted this great video about buffalo in the Top End. Bonus, I LOVED Mutual of Omaha Wild Kingdom as a kid:

And a blog post by the first author about doing field work in the [Top End](#)

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BY LABROIDES IN UNCATEGORIZED ON JANUARY 30, 2013.

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Jude Keyse

JANUARY 30, 2013 AT 8:43 PM

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What would make this story even cooler is if the human burning and buffalo grazing created mosaics at different scales so the heterogeneity could be heterogeneous...

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JANUARY 31, 2013 AT 1:08 AM

Metagenity?

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