Do minor bleaching events matter?

Ecological observations from a localised event in Kenya, 2013

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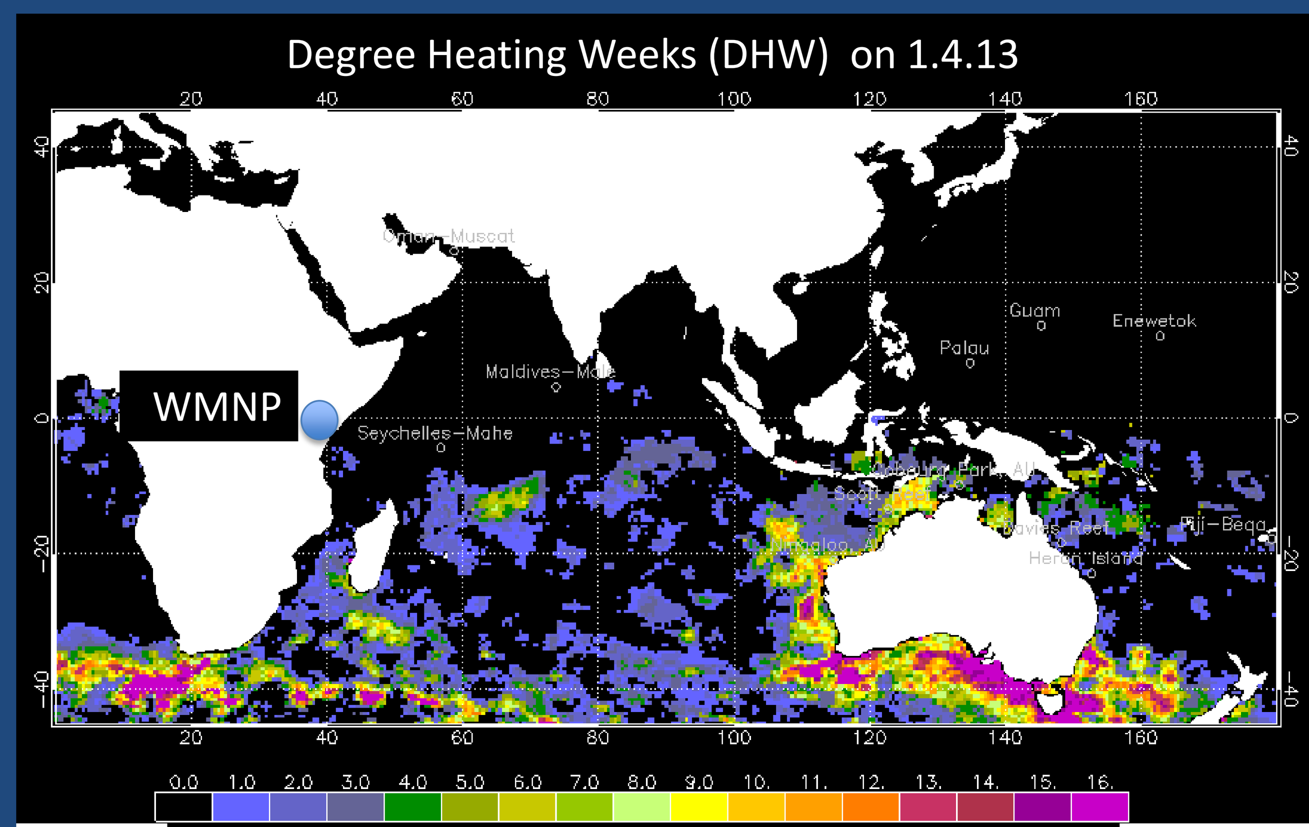
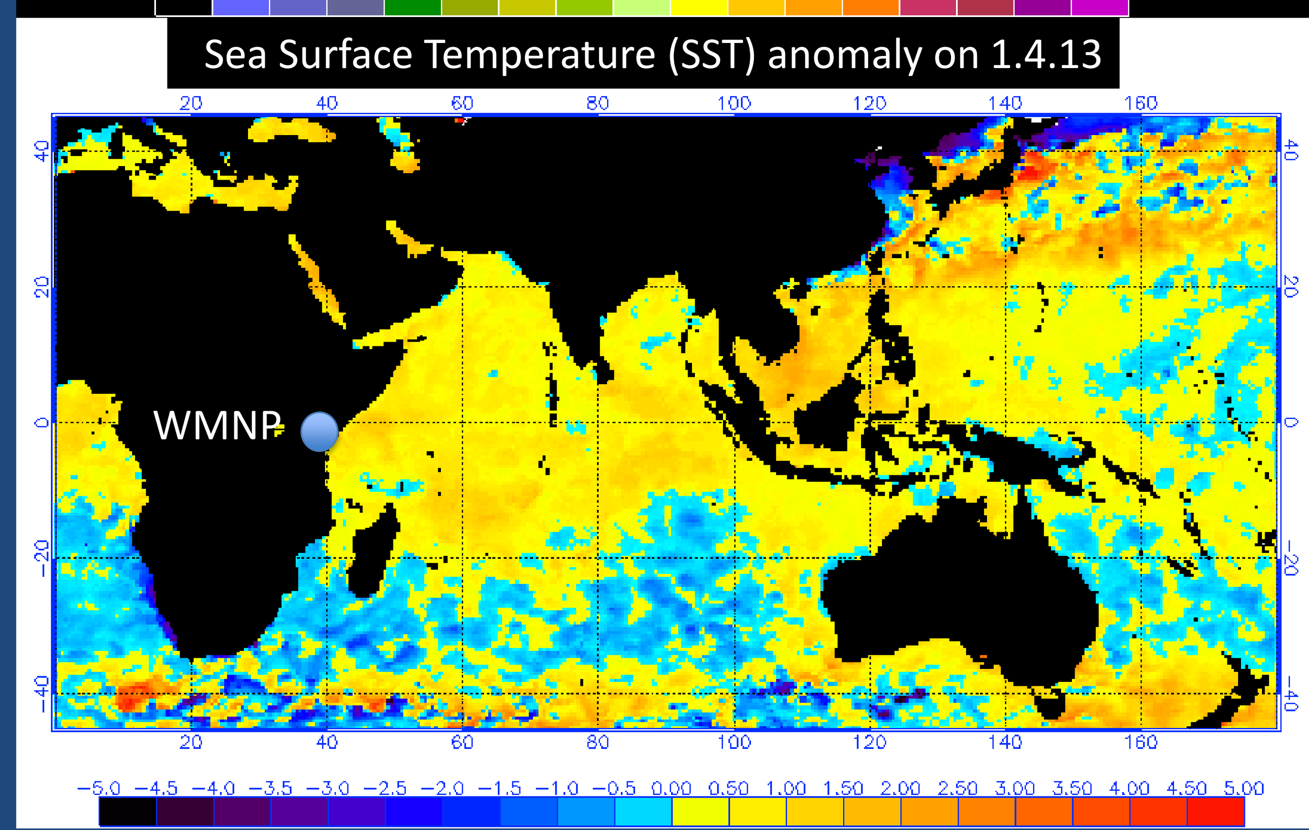
Introduction and aims

Watamu Marine National Park (WMNP), of the Western Indian Ocean, has a history of mass-coral bleaching and catastrophic mortality. In 1998 coral cover in Marine Protected Areas (MPAs) in Kenya declined from 42% to 11% (McClanahan 2002) and a subsequent event in 2005 also caused mortality.
This year in late March a minor warming event occurred, with 2 DHW and SST anomaly of 2 degrees, causing corals to bleach again. Monitoring commenced to observe how corals might recover or die. Specifically we investigated differences in initial bleaching and subsequent mortality of corals based on family and colony size.



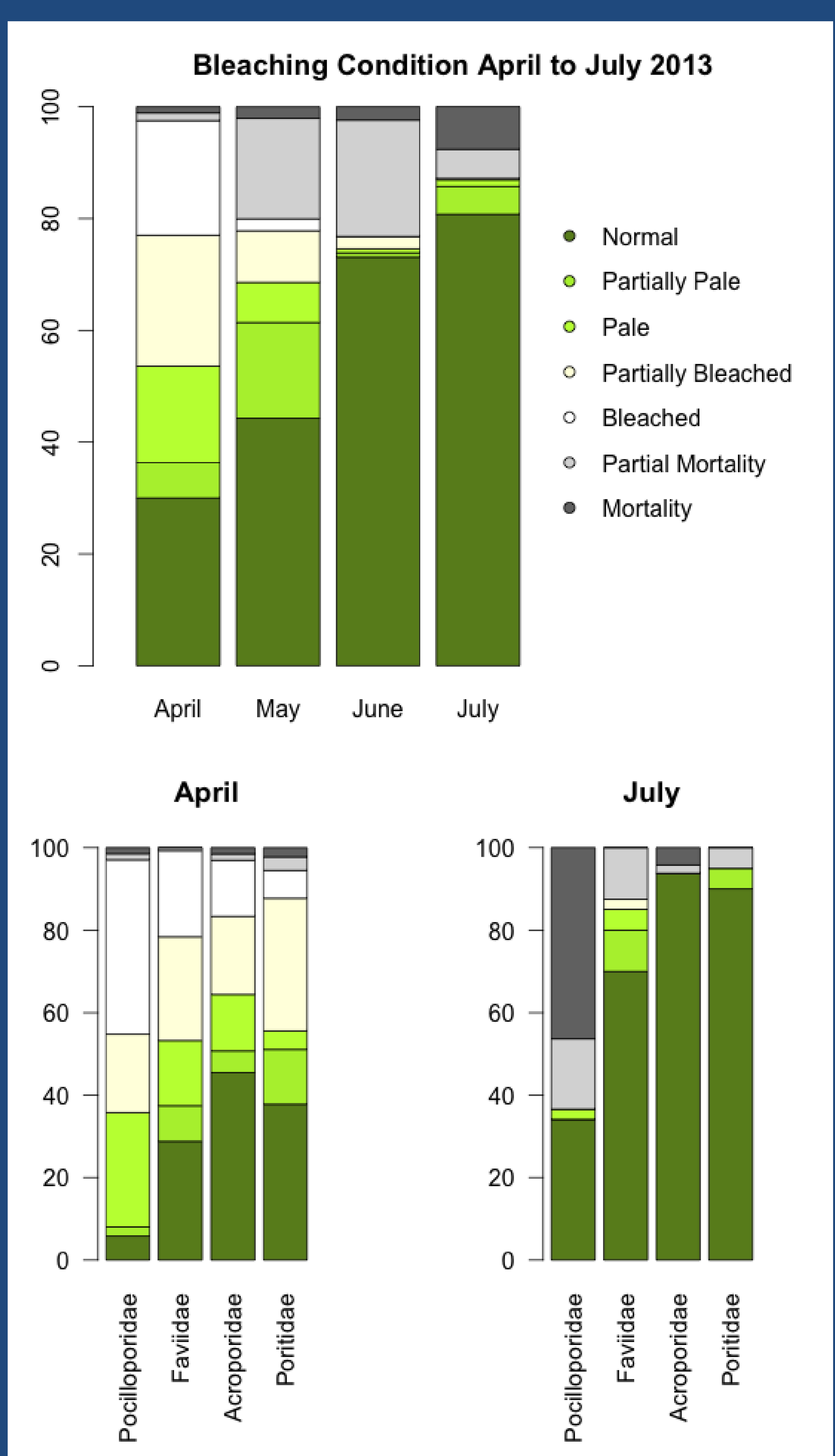


Methods and indicators

Belt Transects: 25-30 ten x one metre belt transects in April, May, June and July. All coral colonies were recorded and their genus, size class and bleaching condition noted.
Marked Corals: 168 haphazardly chosen coral colonies had their position marked and were measured in April and then July and their bleaching condition noted.
Permanent Photo Quadrats: 31 permanent quadrats were photographed in February and October. Benthic cover was calculated using Coral Point Count (CPCe) software.

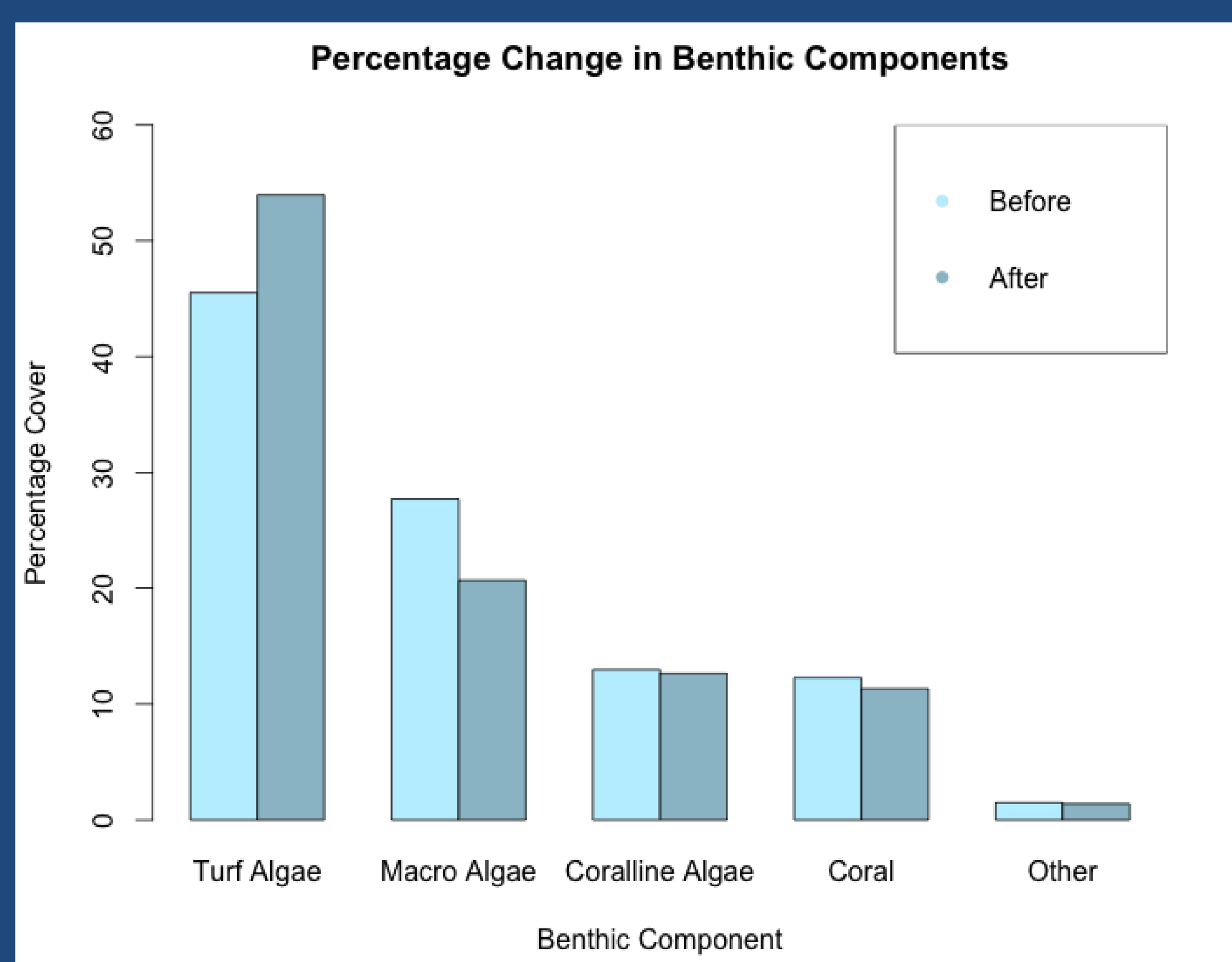
Results

- 70% of corals showed signs of paling of bleaching in April.
- 12% of marked corals died.
- Bleaching and mortality was greatest in Pocilloporidae
- Acroporidae had similar bleaching and mortality to Favids and massive *Porites*.
- Size of corals had no effect on bleaching or mortality.
- Average coral cover declined from 12.3% to 11.3% (paired t-test: p=0.17).



Discussion

Similar to other minor bleaching events, seemingly high bleaching levels did not result in high mortality levels (Harriott 1985). *Acropora* is usually highly sensitive to bleaching events (Loya et al. 2001), but in this case it showed levels of impact similar to resistant corals. This might suggest adaptation of these corals (Baker et al. 2004).
It appears that this particular bleaching event didn't matter to the coral community in WMNP, as the majority of colonies recovered. However Pocilloporids saw a significant reduction, which may have ecological effects. There are suggestions that minor events can help strengthen reefs to acclimatise to future events (Pratchett et al. 2013). However the thresholds of tolerance to the strength and regularity of bleaching events are not yet understood and this reef still faces an uncertain future.



Acknowledgements and References

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- Baker, A. C., Starger, C. J., McClanahan, T. R., & Glynn, P. W. (2004). Coral reefs: corals' adaptive response to climate change. *Nature*, *430*(7001), 741–741.
- Harriott, V. J. (1985). Mortality rates of scleractinian corals before and during a mass bleaching event. *Marine ecology progress series Oldendorf*.
- Loya, Y., & Sakai, K. (2001). Coral bleaching: the winners and the losers, 1–10.
- McClanahan, T., Maina, J., & Pet-Soede, L. (2002). Effects of the 1998 coral morality event on Kenyan coral reefs and fisheries. *AMBIO: A Journal of the Human ...*.
- Pratchett, M. S., McCowan, D., Maynard, J. A., & Heron, S. F. (2013). Changes in bleaching susceptibility among corals subject to ocean warming and recurrent bleaching in Moorea, French Polynesia. *PLoS ONE*, *8*(7), e70443.