Shark Ecotourism and the Effects on Coral Reef Ecosystems

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Introduction

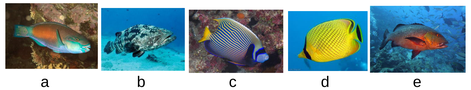
In my project, I will investigate the effects of no-take Marine Protected Areas(MPAs) on coral reef biodiversity in Fiji as well as the influence of marine ecotourism and the food provisioning associated with shark ecotourism on the protection and sustenance of coral reef ecosystems. I hypothesize MPA's with ecotourism will have higher biomass and richer species diversity, linking shark diving to a healthier ecostystem. Not only could this support the implementation of MPA's but it could also have direct benefits for local Fijians by boosting economy and restoring old cultural traditions.

Materials and methods

I will be taking measures **of biomass and species richness** through the use of visual censuses and belt transects, as delineated in Lirman et. Al. (2007), in three areas of Fiji:

1) Beqa (est. 2004): an MPA with Shark Diving
2) Namena (est 1997): an (MPA) without shark diving
3) Nigigi: a control area under no protection

Biomass will be recorded based on counts of parrot fish[a], grouper[b], angel fish[c], butterfly fish[d], and snappers[e]. These species are all heavily affected by overexploitation and will provide a good indication of whether or not the reefs are benefitting from human involvement. Species richness will be estimated using belt transect videos to count the number of species we can spot for both flora and fauna.



a b c d e

To measure the **effects of food provisioning** on the ecosystem I will take five water samples at each site, differentiating 5 samples before chumming and five samples after chumming in Beqa. I will also videotape two shark dives with Beqa Adventure Divers (BAD) to quantify how much of the food is consumed and how many non-shark species are directly consuming the chum. Additionally, BAD, who video tape all shark dives run through their business, has offered to make their catalog of videos available to us. This will enable us not only to look at long term changes to the area but also to compare seasonal variations at this particular site.

Research Question:

Does shark based ecotourism have impacts, either good or bad, on the health and sustainability of nearby coastal ecosystems?

Figure 1. A group of tourists on a dive with Beqa Adventure Divers taken summer 2014 by Joshua A. Drew

Thesis Statement:

H_0: There will be no difference in the species abundance of fish or biomass inside and outside no-take MPAs.
H_1: There will be greater fish species abundances and biomass inside no-take MPAs than in non-protected areas.
H_2: There will be greater fish species abundance and biomass inside reserves that also practice food provisioning for shark dives than in areas that do not practice food provisioning for ecotourism.

Predictions:

I suspect that there will be the greatest species abundance and biomass inside reserves that also practice food provisioning for shark dives than in areas that are neither protected reserves nor provisioned shark dive sites.

Implications:

MPA's conservation efforts have been proven effective ways to restore coral reef ecosystems. However, it requires lots of time and space (Mumby, 2006). If I can provide additional support for this there may be more enforcement of this legislature and/or more MPA's put into practice. This will ideally help restore many of the extant species around Fiji and other tropical marine areas that have been over exploited. Additionally, this locally founded business helps Fijians provide for their families without continuing the fishing tradition that has caused such major damage to their local ecosystems. Finally, the cultural impact of restoring Fijian reefs to even a fraction of what they once were is immeasurable.

Figure 2. A healthy bull shark spotted on a dive with Beqa Adventure Divers during the summer of 2014. While it is evident that these sharks are plumper and more prevalent than those who do not benefit from food provisioning, there has been little research to investigate the effects of chumming on other fish species.

Figure 3. A Map of the main Fijian Islands with arrows indicating the approximate locations of the three test regions I will be observing.

Literature cited

Lirman, Diego, et al. "Development and application of a video-mosaic survey technology to document the status of coral reef communities." *Springer Link* 125.1-3 (2007): 59-73. Print.

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Acknowledgments

We thank Erin Eastwood, Elora Lopez and Molly McCargar for their valued suggestions, and Beqa Adventure Dives for allowing us to conduct this research in their waters. Funding for this project was provided by the Columbia University Dept. of Ecology, Evolution, and Environmental Biology, The Earth Institute Summer Travel Grant, and the Mindlin Foundation Undergraduate Research Grant.

For further information

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