Interview with James Kerry

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1. What inspired you to pursue a career in coral reef and marine biology research?

I was working in the UK Parliament (2006-2010) but was already a keen diver, I kept reading about climate change and how vulnerable coral reefs were to global warming. I decided to get involved directly, and that began by moving to Australia and studying marine biology. The opportunities that unfolded after that were quite surprising.

2. Can you explain the importance of coral reefs to the ocean ecosystem and to human society?

Coral reefs are a highly biodiverse and productive part of the tropical ocean ecosystem, in that sense they are valuable in their own right as many of the species found here (corals, algae, sponges, fish, invertebrates) are not found anywhere else. For humans, they provide several important ecosystem services including coastal protection by reducing wave impacts, fisheries (in some cases they are the primary food sources for local, often indigenous communities) and tourism. Approximately 500 million people globally benefit from these ecosystem services.

3. How have coral reefs been impacted by human activities, such as climate change and overfishing?

Overfishing and climate change are very different impacts. Overfishing tends to be localised but can be very damaging especially where local populations are fished to extinction or blast fishing is used which can completely destroy a section of reefs (this also occurs in some marine construction such as blasting a channel through a reef). Climate change acts on regional and even global scales, it can gradually shift conditions, for example promoting algae dominance over corals and lead to a degradation of reefs, or it can cause significant impacts such as intense rainfall periods that severely affect water quality (and hence coral health) or lead to mass coral bleaching, where huge areas of coral can die off. See this article for example.

4. What are some of the most pressing threats facing coral reefs today?

Climate change is overwhelmingly the biggest impact. It is estimated that at a temperature rise of 2 degrees above pre-industrial average we could lose 99% of coral reefs due to coral bleaching and ocean acidification (where the calcium carbonate that corals used to build their skeletons is at too low a concentration in the seawater). Climate change is also implicated in severe extreme weather events such as extreme rainfall events, which can lead to freshwater runoff on reefs and reduce water quality. Cyclones and hurricanes are also thought to be strengthened by climate change, and these can smash coral reefs causing severe mechanical damage over a wide area. But most impactful of all is coral bleaching.

5. Can you discuss any recent research or findings related to coral reefs and their impact?

I have published a lot of recent research on coral reefs in relation to coral bleaching. I'm attaching one of these papers that I think is particularly interesting, here we looked at different bleaching responses of coral reefs across multiple bleaching events. It shows a phenomenon called 'ecological memory' where essentially, we observed that reefs which had bleached previously, were less badly affected in subsequent bleaching events. The mechanism for this is not yet clear, it is either because the sensitive species had died off and could therefore not bleach a second time, or that surviving corals had managed to boost their resilience to bleaching (something they have been shown to in lab studies). It's probably a bit of both in reality.

6. In your opinion, what can individuals and communities do to help protect and preserve coral reefs?

The most impactful thing that we can all do as individuals is to push our governments, industries and local communities to cut their greenhouse gas emissions in line with the Paris Commitments, without this we will not limit global warming to 1.5 degrees- we are currently way short of our commitments globally. As individuals we all have to play our part in reducing emissions, but it is governments and industries that are the key to solving this problem.

7. What do you see as the future of coral reef conservation efforts, and what role do you think science will play in that future?

I am sceptical about the impact of coral reef conservation efforts in the face of climate change. Coral reef restoration, for example, has not been very successful to date, it is expensive, operates at small scales and often works with monocultures, for example, growing single species of fast-growing corals that are not very useful from an ecological perspective where a diversity of corals is essential for a healthy ecosystem. Even if coral reef restoration techniques were to improve, until we solve the problem (climate change) we are just throwing money away as these corals will eventually die. A colleague of mine had a good quote in this regard, "if you came home to find that you left the tap on and water was flooding everywhere, the first thing you would do is turn off the tap, rather than grab a mop and bucket!"

8. What message would you like to share with the public about the importance of coral reef conservation?

The above one!

9. What methods do researchers use to study coral reefs, and what are some of the challenges associated with studying these ecosystems?

Coral reef research has three major strands. Laboratory which tends to involve controlled experiments with small sample sizes. Field research (my favourite as you get to go out on to the reef!) where you are observing species and interactions, these can occur over large scales, for example, our research flights in 2016 covered 10,000 km of coral reef on the Great Barrier Reef. There is a third growing body of research in microbiology and virology in relation to coral reefs, looking at very fine scales as to how corals function, and protect themselves. This is yielding important insights into how corals might adapt (at least to some extent) to increasing temperatures or temperature shocks during bleaching events (for example, my comment under question no. 5)

10. Can you talk about any success stories or positive developments in coral reef conservation efforts?

This is a big topic and would be better addressed by further study. The Australian Government is investing heavily in reef restoration and adaptation solutions and this would be a good place to start: https://gbrrestoration.org/

There are three major themes: prevention, adaptation and restoration, and they all have some interesting and even quite bizarre ideas- see for example "cloud brightening" under "Prevention“.

11. How can we balance the needs of human communities (e.g. fishing, tourism) with the need to protect and conserve coral reefs?

In my view, if we can keep population levels under control then we can live sustainably with reefs from the perspective of fishing and tourism. There is lots of good research into how both fishing and tourism can be carried out in a way that does not lead to an overall decline in coral reefs, such as using "no take marine reserves", which have important spillover effects of fish stocks into fished areas.

Again, to reinforce my primary message, these are not the primary threats to coral reefs. If we don't get climate change under control quickly, there won't be much left to fish or visit, sadly.