

## Guest Editorial

### Protecting the Ross Sea

Recently marine scientists have become increasingly interested in understanding how to mitigate the impacts of human activities on the world's oceans, thus preserving ecosystem functions - if that is possible. This research often assumes that we know what a healthy marine ecosystem looks like. In reality, we do not.

As National Geographic explorer-in-residence Dr Enric Sala has pointed out, the vast majority of marine research has taken place on ecosystems that had already been subject to intensive human disruptions. The Food and Agriculture Organisation estimates that over 75% of all fisheries are overexploited and the food webs damaged. Scientists need to be able to study the few relatively untouched parts of the ocean to develop a more profound understanding of how the marine environment functions. The Ross Sea in Antarctica is one of the few places left for this, but its future is in jeopardy.

In 2008, Benjamin Halpern *et al.* identified the Ross Sea as the least impacted large marine ecosystem on the planet. This low level of human disturbance means that a small slice of the Antarctic - the Ross Sea shelf and slope comprising *c.* 2% of the Southern Ocean - supports an astonishingly robust and complete ecosystem. Unlike most other marine ecosystems, the Ross Sea's food web and suite of top predators have changed little over the past several hundred years. Furthermore, the Ross Sea has a long history of scientific research, with some datasets going back 150 years. In recognition of the Ross Sea's value to science, over 500 scientists have signed a statement calling for the Ross Sea shelf and slope to be designated a marine reserve. Many scientists who have worked in the Ross Sea say that their research there could not be done anywhere else.

After making a bold commitment to establish a network of Marine Protected Areas (MPAs) in the Southern Ocean, CCAMLR is currently considering scenarios for MPAs in the Ross Sea region. Current proposals do not protect the entire shelf and slope, even though this area constitutes a single ecological unit. This is because the proposed marine reserve boundaries have been drawn to exclude most of the areas where fishing for Antarctic toothfish currently takes place.

The Ross Sea toothfish fishery is supervised by CCAMLR, which theoretically takes a precautionary, ecosystem-based approach to managing marine resources. Nevertheless, the fishery is expected to reduce the present biomass of toothfish by 50% over the next three decades. Toothfish in the Ross Sea occupy an ecological niche comparable to that of the shark in other ecosystems. Experience in other ecosystems has shown that reductions in top predator populations (even if within recommended scientific limits) can significantly alter those ecosystems and their food webs, and the Ross Sea is likely to experience similar changes.

The important question is not whether Ross Sea fishing is sustainable or profitable, but rather what level of protection for the Ross Sea will benefit the oceans and humankind the most through time. An intact and healthy Ross Sea provides what is now a unique opportunity to study a marine ecosystem in good working order. Since the world's other oceans will continue to experience serious human impacts, the Ross Sea is crucial in providing insights into how ecosystems are supposed to work so that we can mitigate and manage those disturbances most effectively. CCAMLR should designate the whole Ross Sea as a marine reserve, thus preserving its treasures for future generations. The most valuable resources of the Ross Sea are not the tangible ones that enrich a few. They are the intangible benefits of increased scientific knowledge and understanding, which enrich everyone.

JAMES BARNES AND CLAIRE CHRISTIAN  
ANTARCTIC SOUTHERN OCEAN COALITION