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Climate adaptation: think globally, act locally

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Biologists should not over-commit time and effort in establishing broader climate change links to local ecological impacts, say an international team of United States, Spanish and Australian researchers. Instead, biologists should aim to achieve a balance between identifying and understanding climate change impacts, and planning for the consequences¹



Credit: Bruce Miller, CSIRO

'There is little point in focusing on fully identifying the climate impacts while losing species,' says co-author Dr Elvira Poloczanska, an environment scientist with CSIRO's Climate Adaptation Flagship.

'Biologists have already shown globally that the flowering and breeding times and distributions of plants and animals are changing. This is consistent with universal atmospheric warming and elevated greenhouse gas emissions likely arising from human activity. But if you scale this down to the local level with individual species, the application is questionable,' explains Dr Poloczanska.

Co-author Dr Anthony Richardson, from CSIRO and the University of Queensland, says that to improve estimates of future biological

impacts, researchers need to focus on how other human stressors – such as fishing, pollution and habitat destruction – increase the impacts of climate change.

'Fortunately, from a conservation standpoint, these other stressors are more easily managed on local scales than climate itself, and are crucial factors in constructing adaptation programs to cope with human-induced climate change,' he says.

Dr Poloczanska says several Australian regional examples show interactions between human stressors and climate variables such as temperature.

'We know from work off Tasmania that as the seas have warmed, the long-spined sea urchin has moved from mainland Australia down to temperate Tasmania,' she says. 'This urchin is eating the kelp forests ... with consequences for rock lobster and abalone fisheries.

'However, if the urchin's major predators – such as large rock lobsters – are present, urchin numbers could be potentially kept in check. Large-scale harvesting of rock lobster in the region could have played a role in the urchin population explosion.

'Putting research effort into understanding the complex interactions between kelp, urchins and lobster is important to identify potential adaptation responses for kelp forests under a warming climate.

'This is a clear example of where we can achieve better conservation outcomes by focusing on deeper understanding of processes and climate interactions, rather than spending considerable research effort trying to estimate the proportion of kelp decline that is due to human carbon dioxide emissions,' urges Dr Poloczanska.

¹ Parmesan C, Duarte C, Poloczanska E, Richardson AJ and Singer MC (2011). Overstretching attribution. *Nature Climate Change* 1, 2–4, doi:10.1038/nclimate1056

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