Researcher helps develop new way to predict climate change impacts on estuaries

September 26 2014, by Rebecca Tucker

A research team lead by Deakin University has developed a world-first model to help scientists predict the impacts of climate change on estuaries in one region based on what occurs in another waterway in a different corner of the world.

Centre for Integrative Ecology researcher Dr Rebecca Lester headed the team that has devised a unique formula for anticipating the likely response to an estuary as a consequence of climate change using data and information gathered at another site.

Dr Lester's method of modelling means that, for the first time, scientists and researchers will be able to forecast and manage climate-related threats by transferring information from an area that naturally has conditions that mimic likely future change to areas currently under threat.

Her research, the first of its type anywhere, is expected to contribute significantly to international efforts to both predict and react to climate change.

"Climate change has the potential to threaten ecosystems around the world but predicting what will happen ecologically in any given area is often challenging because of the lack of data," Dr Lester said.

"Many ecologists have been reluctant to predict future change and have done so with so many cautions and caveats attached as to be impossible

to apply generally.

"For the first time, we have demonstrated the utility of a method that transfers known responses from well-studied areas to data -poor ecosystems where predictions had previously been difficult.

"This allows us to prepare and shape appropriate mitigation strategies to likely future climate change across a gamut of ecosystems."

CIE researchers, in collaboration with researchers from the University of Western Australia, examined estuaries in Western Australia where there is a natural gradient from high rainfall to low rainfall to then work out what changes occurred in the flows, salinity and fish found in those estuaries.

"Because WA estuaries are much drier than the Victorian estuaries, we are able to then compare WA with poorly documented Victorian waterways to predict and demonstrate similar patterns in Victoria as the climate changes and they also become drier," she said.

"For many ecosystems, climate change represents one of the most important modern day risks to ecosystem function.

"But understanding and predicting those risks is problematic due to the lack of data, with many research and management decisions currently made based on a rule of thumb.

"Our research will address a fundamental challenge in modern ecology of developing general theory and predictive capacity," Dr Lester said.

Dr Lester is a senior lecturer in freshwater biology and researcher whose work on this new model has generated international interest.

Her paper, "Predicting the likely response of data poor ecosystems to climate change using time-for-space substitution across domains," has been published in the high-impact journal *Global Change Biology*.

Ecosystems world-wide responded to climate-forced changes in the physical and chemical structure of biological communities, Dr Lester said.

"We have developed a robust and flexible method for transferring predictions from well-studied ecosystems with gradients that mimic predicted climate change to data- poor ecosystems of interest elsewhere.

"This is the first time anyone has demonstrated that you can use a gradient in one location and apply it successfully to another location. This provides a good scientific basis for managing those systems which previously relied on guesswork.

"This project will lead to opportunities to apply this model to terrestrial and aquatic ecosystems world-wide and contribute significantly to our ability to predict ecological responses to climate change," she said.

More information: Lester, R. E., Close, P. G., Barton, J. L., Pope, A. J. and Brown, S. C. (2014), "Predicting the likely response of data-poor ecosystems to climate change using space-for-time substitution across domains." *Global Change Biology*. doi: 10.1111/gcb.12634

Provided by Deakin University