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Understanding climate science supports adaptation in indigenous rangeland management

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Introduction

We report on a collaborative project about climate change and adaptation. The project's overall goal was to find good ways to build desert Aboriginal people's understanding of climate change and their capacity to adapt to it. Although Indigenous people observations are contributing to global knowledge of climate change, they often have little understanding of climate science. Hence they can find it difficult to assess climate change information or decide how they could best respond to it. The psychosocial impacts of 'knowledge uncertainty' range from apathy to elevated stress; these can inhibit effective planning and reduce adaptive capacity (Lertzman 2012).

This project made knowledge of climate change more accessible to desert Aboriginal people. It has started to help Aboriginal community rangers recognise how climate change contributes to landscape change. The Ltyentye Apurte (Santa Teresa) ranger group, several other staff from Central Land Council's Land Management section, four CSIRO scientists and a Tangentyere Council science educator were involved in the project part time over 18 months.

The project aimed to develop the understanding of rangers in the project about climate science and share this understanding with other residents of Santa Teresa and traditional owners of the Santa Teresa Aboriginal Land Trust (ALT). It also aimed to identify changes to the ranger's work program that adapt to climate change. During the project, our approach and methods evolved and refined in response to the reflections and priorities of those involved. Everybody learnt a lot, both the rangers and the scientists. Although it was originally thought only a few rangers would be involved all nine rangers contributed keenly to the project. Various elements of the project are described below.

Observations of change by Aboriginal people

Some senior Arrernte people spoke of environmental changes they have observed that seem mixed-up, confused or different to the past e.g bush medicine plants are 'weaker' and animals are behaving differently. People speculated on the causes of these changes. Before this project their knowledge about climate change, was fragmented. It came from popular media and word of mouth, and was dominated by coastal and polar region imagery quite unlike their own desert country. The rangers had few ideas about the causes of climate change but had also experienced and observed many changes to country and to weather events.

Scientific understandings of climate change

Scientists on the project team used graphs of temperatures and rainfall from three locations in central Australia to explore changes over time visually. For example, Alice Springs records show a steady increase in the number of days over 40°C since the 1970s; average temperatures have risen by 1.0 °C in summer and by 1.5 °C in winter; and rainfall has become more variable. Scientists discussed causes of climate change with the rangers.



Figure 1. Records of change: Ltyentye Apurte rangers and scientists on the project team discuss graphs of historical weather data from central Australia.

The learning processes

Science learning built on the rangers' knowledge of weather from their own life experience. We talked about big events that people remembered, like floods, droughts and snow on Uluru, and made a historical time line from their life events with some photographs. The rangers saw that these events aligned to the meteorological records. They became more confident in their own knowledge and keen to learn further. Younger rangers learnt from the longer life experience of older rangers.

We learnt in different places and with different tools including videos, photos, graphs and hand-drawn diagrams. Practical activities on country helped to make the science-derived knowledge relevant, understandable and useful to the rangers. Scientist, Ashley Sparrow, demonstrated how an infiltrometer is used to record the rate that water soaks into soil. This helped the rangers understand how rainfall influences erosion on different soil surface types.

Rangers share their learning

During the project in 2014, the rangers gave four presentations about climate change to a total of about eighty Santa Teresa residents and other Arrernte people. Afterwards, audience members discussed how climate change could affect Santa Teresa, what adaptations that they could make themselves and other actions that were needed but were outside their control. We developed a 'big book' (Mooney et al. 2014) for desert Aboriginal people based on the presentations.

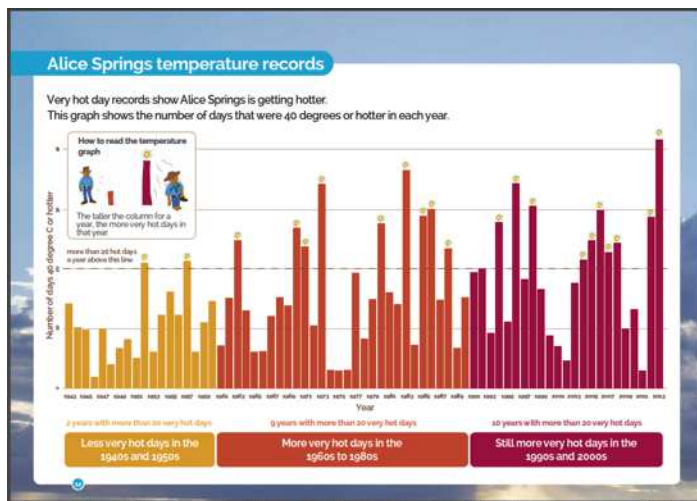


Figure 2. Sharing the learning: One page from the ‘big book’ developed during the project from presentations by the project team.

While preparing the presentations with Meg Mooney, a science educator, the rangers discussed how to communicate climate science concepts in Arrernte. They considered how their new knowledge could cause worry in the community because climate change will make life harder. They decided that climate change should not be kept secret. Presenting in Arrernte, as well as in English, encouraged senior Arrernte people to also share observations of changes to country. The rangers heard how these different kinds of knowledge ‘all lined up’.

Practical activities to adapt to climate change

Project activities needed to be practical because the rangers are ‘hands-on’ people. We focused on soil erosion because erosion control was already a priority for rangers and of concern to traditional owners. In 2011, traditional owners had worked with Hugh Pringle on Ecosystem Management Understanding (EMU) planning. Then the rangers had built 40 km of fences to protect important areas from feral cattle, horses and camels and make a paddock for traditional owners’ horses.

A very large erosion gully on Yam Creek worries the rangers and residents because it threatens the only access road to Santa Teresa. We saw this gully grow longer, wider and deeper during the project. Previous stabilisation efforts have not been effective. Ashley Sparrow demonstrated how gully erosion results from land degradation in the catchment. Ranger Coordinator, Shannon Lander, suggested before trying to stabilise the large gully that rangers could develop their skills at smaller scales in less eroded areas.

Scientists Ashley Sparrow and Fiona Walsh arranged a field visit with the rangers to Woodgreen Station to learn how the Purvis family had restored degraded land over the past 40 years. Bob Purvis showed the rangers different erosion control stages. The group learnt to better recognise water flow patterns and eroding surfaces. They learnt more about constructing erosion control banks and integrating erosion control with stock management. The rangers said that being present on that land was better than just looking at photos or hearing accounts because the landscapes are so vast they need to be seen at a wide scale. The group learnt that trial, error and careful, consistent effort for a long time is needed to slow erosion and improve soils, plants and land condition. The rangers were inspired to do works on the lands for which they are responsible.

On return to Santa Teresa, the rangers, CLC and CSIRO staff toured five areas with different erosion patterns. Two areas were chosen to survey and three erosion control banks were constructed with a grader. Future monitoring in these areas will help rangers, CLC and others to continue learning about catchment repair.



Figure 3 Doing practical activities: Ltyentye Apurte rangers and scientists inspect an erosion gully before starting erosion control works on the Land Trust.

Adaptation

Climate change impacts will be particularly harsh for indigenous people in desert environments. Learning about climate change is a vital step so people can act and adapt. The Ltyentye Apurte rangers and Central Land Council are now planning further erosion control work to prepare the country they manage for further climate change impacts. Individuals and families might also modify houses for greater comfort in a hotter climate. Such adaptations would be easier for remote Aboriginal people if they had better access to good information and advice about how to do this simply, with available equipment and materials. They also need governments to take complementary action.

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