Sight set on tracking threatened species

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Professor Kerrie Mengersen combines Avatar-style technology and statistics to help protect the world's threatened species. Credit: Erika Fish, QUT Media.

Ever wanted to track a rock wallaby in the rugged Australian bush or watch an orangutan swing past you in the wild jungles of Borneo but without the dangers of being there?

To better protect threatened habitat, [wildlife experts](#) and QUT researchers have combined to create an "immersive environment" to predict, locate and track species, through virtual reality.

Professor Kerrie Mengersen, from QUT's School of Mathematical Sciences, said the information gathered from field trips she headed enabled a virtual platform to monitor critically engangered animals like rock wallabies, koalas, cheetahs, Sumatran orangutans and sun bears.

"It's expensive, time consuming and sometimes dangerous to physically obtain data describing these elusive creatures," Professor Mengersen said.

"Habitat suitability maps are very sketchy and the potential conservation areas are huge.

"Our project aims to fill the gap in the evidence for deciding which areas to preserve."

Professor Mengersen and a team of scientists use high-resolution, 360-degree cameras with sound recording equipment to provide real-time panoramic displays of the species' environments.

The 2015 ARC Laureate Fellow and her QUT and CSIRO colleagues demonstrated the model worked in a small case study that predicted the whereabouts of rock wallabies in remote areas of Queensland and northern New South Wales.

"These wallabies live in inaccessible places and are rare. However, working with ecologists' data, we built a predictive model into a [virtual reality environment](#) and used it to locate where the habitat exists across a broad landscape," Professor Mengersen said.

She said a century ago there were hundreds of thousands of the brush-tailed rock wallabies but the habitat had dwindled to below 30,000.

Dr Ross Brown and Professor Peter Bruza from the Science and Engineering Faculty helped develop the virtual world software system for the wallaby trial, using available terrain maps.

"The game engine interface uses a helicopter metaphor: that is, flying through the air in predefined lines, mimicking the experience of environmental modellers when assessing sites," Dr Brown said.

QUT researchers trained wildlife experts to use 3D [virtual reality](#) with a head-mounted display (Oculus Rift) and the results of the trial were submitted to publication in research journal Spatial Statistics.

Professor Mengersen said a major problem when using complex mathematical systems was the visual quality of the information presented to the ecologists.

"It depends greatly on the ability to recall important information and to articulate clearly their estimate of wildlife population locations," she said.

"By giving the wallaby population experts in the trial a way to see across a broad area - through computer generated imagery of the landscape - they were able to determine the likelihood of wallaby habitat."

For the past five years Professor Mengersen had worked to protect crticially endangered cheetahs in southern Africa and orangutans in Indonesia, tapping into local knowledge and building statistical models to guide conservation efforts.

The technology is also being further developed to help in the

management of other iconic species in South Africa, Asia and South America, as well as Australia.

Professor Mengersen said the landscape is visualised in 'real time' so as an expert gives opinions while traversing the transect, the probability map across the larger landscape is being produced and changing as the information accumulates.

"It allows us to engage with wildlife experts from around the world by essentially bringing them to the environment," she said.

"It's like looking at the film but doing more than looking. It's extracting information and feeding it into a model that can be used to analyse, predict and conserve."

Professor Mengersen, who is Deputy Director of ACEMS, the ARC Centre for Mathematical and Statistical Frontiers, was recently awarded ARC Laureate Fellowship valued at $2.4 million over five years to translate statistical knowledge to challenges in industry, environment and health.

Professor Mengersen was a key speaker at the International Conference in Statistics, Mathematics, Teaching and Research at the State University of Makassar, South Suawesi, Indonesia on October 9-10.

She discussed the results of the rock wallaby pilot study with the paper titled: "The power and promise of immersive virtual environments: extracting expert information to support rare or unseen spatial events."

Provided by Queensland University of Technology

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