

Using **maths** to manage **weeds** and invasive species

Dr Jennifer Brown and her colleagues at the Biomathematics Research Centre at the University of Canterbury have recently started a three-year research programme, funded by the NZIMA, to investigate how current developments in mathematical and statistical research can help manage weeds and invasive species. Anna Meyer spoke to her.



From possums to dandelions, mice to didymo, New Zealand has more weeds and invasive species than almost any other country. Not only are they one of our most difficult conservation issues, they also cause widespread problems for agriculture and horticulture.

Fortunately, New Zealand is also a leader in conservation and weed management, with a variety of innovative techniques continually being developed to help keep these pests under control.

Says Dr Brown: "We have people doing a really good job at weed management, and we have mathematicians and statisticians who are developing mathematical and statistical tools which could be applied to this. But we needed to build that bridge between the two groups."

Consequently, a major part of the project is a five-day workshop, planned for April next year, which will bring together weed and conservation managers, and mathematicians and statisticians. "The idea is to put them in a room together for five days, and get them to talk to each other," says Dr Brown.

Weed and conservation managers will be encouraged to present the problems they are having, and mathematicians and statisticians will then be asked to suggest mathematical tools to help solve them.

This is the first time such an approach has been tried here. "Normally, it's been the mathematicians and statisticians providing methods and then leaving it for the biologists to figure out how to use them. But we've twisted it round. We're saying, biologists, you ask the questions, and as mathematicians, we'll provide the goods," says Dr Brown.

Until now, there has been limited use of mathematics in weed management, because of the difficulty involved in adapting generic mathematical tools for the specialist needs of conservationists and

weed managers. "In this programme, we want to make mathematical models more accessible to biologists," she explains.

Some of the problems in weed management that mathematics could help with include: how can you predict where a weed is going to spread? How can new weed invasions be detected? How do we model weed growth and dispersal? How can limited budgets best be spent? And what will a particular weed population look like in 10 years time after a particular management strategy has taken place?

As well as the workshop, the project will involve research into several areas of weed management over the next three years, which will be carried out by a team of six to eight mathematicians and statisticians. A postdoctoral fellow has also recently joined the team, and two PhD students are starting next year.

Long term, Dr Brown would like to see a closer working relationship between mathematicians and weed managers. "I hope that in 10 years' time, every university will have one or two mathematicians working on weed management," she says.

"I want the mathematical community to realise this is a really exciting area of research to be working on. New Zealand is a world leader in weed management, so there's a lot of planning ahead at the moment, and innovative management. We're doing the best in the world, and we're just going to make that better."



Dr Brown, centre, with colleagues David Wall and Alex James. Photo: Eve Welch