Beating poachers – with mathematics

26 February 2014

Environmental scientists have developed a new, low-cost way to save rare animals and plants from poachers and plunderers – using maths.

UQ researchers in the ARC Centre of Excellence for Environmental Decisions (CEED) are part of a study that used a cunning mathematical model to outwit poachers in central Africa.

Dr Richard Fuller of CEED and The University of Queensland said that by studying the poachers ' incursion patterns and prioritising patrols, the technology could improve protection of endangered animals and plants where they most need it, while minimising patrol and conservation costs.

" The great thing about this approach is that it can be applied anywhere in the world, " Dr Fuller said.

" For example we can use it to minimise disturbance of shorebirds in Queensland, or to tackle the weed invasion in Australia.

" The problem of patrolling to protect endangered animals and plants is that budgets are usually tiny.

" Patrol teams often consist of several rangers who have to cover a massive area.

" Our study in central Africa showed that patrols are usually carried out near patrol stations where rangers are based, and they aren ' t very effective at stopping illegal hunting beyond a few kilometres. "

The scientists carried out the research in Africa ' s Greater Virunga Landscape – one of the most biodiverse places on Earth, with 13 protected areas covering 13,800 square kilometres.

The team studied which areas had the most illegal poaching and logging, the impact on wildlife, and the cost of patrolling the threatened areas.

Dr James Watson of CEED and The University of Queensland said the researchers included all the information in a mathematical model that prioritised the location of patrols.

" For example, since the poachers know well where the patrol bases are, patrollers should target more remote areas – a hotspot for illegal poachers – by extending their patrols, " Dr Watson said

" The study showed that this reduced the cost of meeting all conservation targets in the landscape by as much as 63 per cent.

" By providing a big picture view of the entire landscape, the model enabled us to maximise conservation efforts on a limited budget. "

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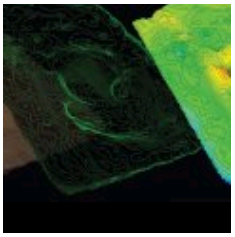

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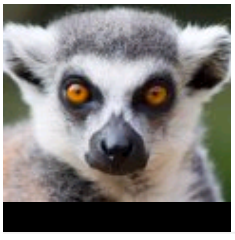

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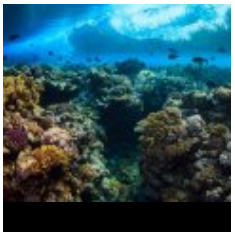

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Dr Fuller said that apart from deterring illegal poaching, the approach could also be used to prevent disturbance of threatened species by human activity, or to prevent major weed invasions.

Using migratory shorebirds in Queensland ' s Moreton Bay as an example, he explained that the State government could impose hefty fines on people whose pets and cars disturb the birds.

" They also set up patrols to enforce the rules, but it ' s exactly the same problem that we had in Africa – small budget, big area, " Dr Fuller said.

" The same goes for our growing weed problem – it ' s usually small teams of people trying to tackle the problem, but there are millions of hectares of Australia to be covered.

" With this model, we can help rangers target their routes and provide the best protection for our native wildlife and plants, even when they have a limited budget. "

Dr Watson said using maths in this way is smart conservation.

" It means we can protect and save more species for the same investment. "

" The same thinking can be used to target pandemic issues like illegal hunting for the Chinese medicine trade, feral animal control, or insect and weed or disease invasions. "

The Wildlife Conservation Society, Imperial College London and the Uganda Wildlife Authority was also involved in the study.

The study " Efficiently targeting resources to deter illegal activities in protected areas " by Andrew J. Plumptre, Richard A. Fuller, Aggrey Rwetsiba, Fredrick Wanyama, Deo Kujirakwinja, Margaret Driciru, Grace Nangendo, James E.M. Watson and Hugh P. Possingham was published in the Journal of Applied Ecology.

Media: CEED and UQ, Dr Richard Fuller 04 58 353 102. CEED and UQ School of Geography, Planning and Environmental Management, Dr James Watson, 0409 185 592.
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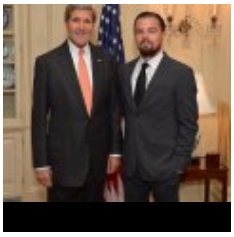

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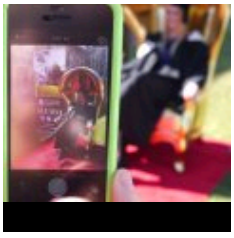

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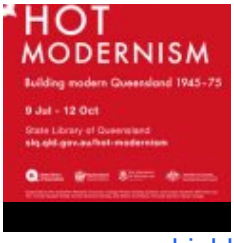

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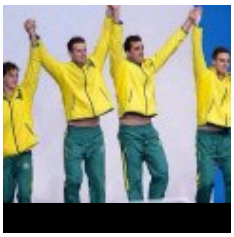

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