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#### Decision Point

*Decision Point* is the monthly magazine of the Environmental Decisions Group (EDG). It presents news and views on environmental decision making, biodiversity, conservation planning and monitoring. See the back cover for more info on the EDG. *Decision Point* is available free from <http://www.edg.org.au/decision-point.html>

#### Plus

What makes a good ecological index?

Poor decisions by not urinating

EDG news, workshops and babes

**Welcome to the new bigger *Decision Point*!**

# DECISION POINT

Issue #56 / February 2012

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*Decision Point* the newsletter has come of age and we now want you to start thinking of it as a magazine! Don't worry, it's still the same basic beast. You'll still find stories on our valuable science (for example, in this issue we explore evidence on which landscape management options save houses from fires, sea level rise and ecosystems, and triage). You'll still be stirred, stimulated and frequently irritated by our editorials (for example, in this issue we discuss good and bad ecological indices). And in each issue you'll still discover some little decision-making oddment (that might be the wee story on the back cover).

However, now that the Environmental Decision Group has weathered its establishment year, we'll be ramping up our activities and outputs. We're expecting more science, more news and more activities to report on. So we've decided to produce a slightly bigger *Decision Point*, and this is its first issue.

Things to immediately note are greater coverage of EDG workshops and EDG news towards the end of each issue. We've also added a page of research briefs on EDG papers that you should be aware of but which we haven't had the space to cover in greater detail. In this issue, for example, we serve up papers on program evaluation, weighing up trade-offs between biodiversity and ecosystem services, and action versus learning in searching for invasive fire ants (see page 3).

And something to remind you about. While the bulk of each issue is on research being done by CEED and NERP researchers (together which add up to EDG, see *DPoint* #52, p2 if you want that explained in greater detail), we welcome and indeed encourage contributions from all quarters. *Decision Point's* primary aim is to improve environmental decision making by connecting policy makers, researcher and practitioners. If you think you're involved in research or activity that can contribute to this then send us your ideas.

And if you have any ideas on other things you'd like included in *Decision Point*, I'd be interested in those, too. 🍷

David Salt  
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# DECISION POINT

*Decision Point* is the monthly magazine of the Environmental Decision Group (EDG). The EDG is a network of conservation researchers working on the science of effective decision making to better conserve biodiversity. Our members are largely based at the University of Queensland, the Australian National University, the University of Melbourne, the University of Western Australia, RMIT and CSIRO. *Decision Point* is available free from: <http://www.edg.org.au/decision-point.html>

If you would like copies of any of these papers please visit

<http://www.edg.org.au/edg-communication/edg-peer-reviewed.html>



## Barriers to evaluating conservation efforts (a Samoan case study)

This study conducted a country-wide evaluation of terrestrial-based conservation programs in Samoa. The benefit of evaluating multiple projects at the same time is that it highlights factors that are persistent and influential across the entire conservation sector.

It found mixed success in achieving goals among conservation programs; yet this result is surrounded by uncertainty because of the quality of existing evidence on project outcomes. The study explored the role of different components of the conservation management system (context, planning, inputs, processes and outputs) in facilitating and/or constraining collection of data on project outcomes, and thereby assessment of whether projects were successful.

The analysis identified a number of direct and indirect barriers that affected the capacity of projects to carry out informative evaluations and generate knowledge on conservation progress in Samoa. These include the availability and management of data, design and planning of projects, and systems for reporting among donors and proponents. To overcome these barriers to evaluation it is recommended that a shift in institutional approaches to reporting outcomes is needed, from a reflective way of thinking to a more prospective outlook. 🍄

**More info:** Madeleine Bottrill [m.bottrill@conservation.org](mailto:m.bottrill@conservation.org)

### Reference

Bottrill MC, M Hockings & HP Possingham (2011). In pursuit of knowledge: addressing barriers to effective conservation evaluation. *Ecology and Society* 16: 14.

URL: <http://www.ecologyandsociety.org/vol16/iss2/art14/>



## Trading off biodiversity & ecosystem services

There are growing calls that ecosystem services *and* biodiversity are integrated into the design of conservation interventions. This study sought to investigate the synergies and trade-offs in safeguarding ecosystem services and biodiversity in the Little Karoo region, a semi-arid biodiversity hotspot in South Africa. It used data on three ecosystem services—carbon storage, water recharge, and fodder provision—and data on biodiversity to examine several conservation planning scenarios.

First, it investigated the amount of each ecosystem service captured incidentally by a conservation plan to meet targets for biodiversity only while minimizing opportunity costs. It then examined the costs of adding targets for ecosystem services into this conservation plan. Finally, it explored trade-offs between biodiversity and ecosystem service targets at a fixed cost.

At least 30% of each ecosystem service was captured incidentally when all of biodiversity targets were met. By including data on ecosystem services, we increased the amount of services captured by at least 20% for all three services without additional costs. When biodiversity targets were reduced by 8%, an extra 40% of fodder provision and water recharge were obtained and 58% of carbon could be captured for the same cost. The opportunity cost (in terms of forgone production) of safeguarding 100% of the biodiversity targets was about US\$500 million.

These results show that with a small decrease in biodiversity target, substantial gains for the conservation of ecosystem services can be achieved within our biodiversity priority areas for no extra cost. 🍄

### Reference

Egoh BN, B Reyers, J Carwardine, M Bode, PJ O'Farrell, KA Wilson, HP Possingham, M Rouget, W deLange, DM Richardson & RM Cowling (2010). Safeguarding Biodiversity and Ecosystem Services in the Little Karoo, South Africa. *Conservation Biology* 24: 1021–1030.



## Trading off action against learning when searching for invasive pests

Strategically searching for invasive pests presents a formidable challenge. Limited funding means choosing between cursorily surveying many sites, or focussing intensively on fewer sites. Existing knowledge may help to target more likely sites, but this knowledge is not flawless and improving it also requires investment.

This study examines how to best combine search coverage and accuracy (and its future improvement) within a single optimisation framework. It's a rare example of trading-off action against knowledge gain.

More specifically it examines under which circumstances managers should adopt one of two search-and-control strategies (cursorily or focussed), and when they should divert funding to improving knowledge, making better predictive maps that benefit future searches.

The study demonstrates the framework by linking quality-of-search-effort maps to a logistic model of invasive spread such as that for the red imported fire ant *Solenopsis invicta* in south-east Queensland, Australia.

Cursorily widespread searching is only optimal if the pest is already widespread or knowledge is poor, otherwise focussed searching exploiting the map is preferable. For longer management timeframes, eradication is more likely if funds are initially devoted to

“For longer management timeframes, eradication is more likely if funds are initially devoted to improving knowledge, even if this results in a short-term explosion of the pest population.”

improving knowledge, even if this results in a short-term explosion of the pest population.

This framework can improve the efficiency of any ecological management that relies on predicting occurrence. 🍄

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### Reference\*

Baxter PWJ & HP Possingham (2011). Optimizing search strategies for invasive pests: learn before you leap. *Journal of Applied Ecology* 48: 86–95.

\*Note: This paper was the Editor's Choice story in this particular issue of the *Journal of Applied Ecology*. The Editor commented: "Baxter & Possingham's results are counter intuitive in that the best emergency response is, in most cases, to 'do nothing' and to focus instead on developing high quality predictive maps to maximize the efficiency of future management. By learning first and even tolerating some initial worsening of the invasion, eradication is more likely in the long run. In the words of the authors, it might feel like 'fiddling while Rome burns' but this can be a very pragmatic approach."



# Ecological indices behaving badly

## What makes a good index?

Michael McCarthy (Deputy Director, CEED)

Indices are everywhere. For example, the UV index identifies times of day with dangerously high UV levels, and correlates with the amount of damaging incident UV radiation. The consumer price index indicates the average price increase of Australian retail goods and services. These and other indices have important roles in public policy, and frequently influence how we behave.

Ecological indices are pretty common, too. They are used for environmental monitoring, setting management priorities, and evaluating management actions. These roles mean that ecological indices are fundamental to a wide range of our activities in CEED and NERP. They also abound in basic ecology (see Table 1). However, while some ecological indices are very helpful, others are built and used in dubious ways. Let me explain with an example.

A little while ago, I reviewed a manuscript that developed a particular index. The details are not important here, except to say that the authors hoped that the index correlated with a standard error\* as a measure of the performance of a monitoring program. The index included some important aspects of the problem, such as the number of survey sites, the number of monitoring sessions each year, and the area over which the monitoring was conducted. But the index combined these in essentially an arbitrary way.

In reviewing the manuscript, I stated that indices should not be arbitrary combinations of variables. The authors responded along the lines of: "But ecological indices are arbitrary combinations of variables!" They are correct, of course. In ecology, indices are commonly just that. They are typically ad hoc combinations of variables that the author thinks are important. But should this be the case? I think not. I am concerned that such arbitrary indices are so common in ecology.

An index should in some way approximate a quantity that we care about. In this particular case, the index should somehow approximate, or at least be correlated with, the standard error. At least in this case it is clear how we would evaluate the index – by seeing how strongly it correlated with the actual standard error.

In another sphere, the various indices that are used to measure vegetation condition or quality in Australia (eg, Habitat Hectares, Biometric, etc; <http://www.dse.vic.gov.au/conservation-and-environment/vegetation-quality-assessment-manual>; <http://www.environment.nsw.gov.au/projects/BiometricTool.htm>) are essentially arbitrary combinations of variables. They measure important attributes of vegetation to which particular animals respond (eg, tree cover, occurrence of large trees, logs) and other attributes that inform the condition of the vegetation (eg, presence of weeds, understory cover), assign points for each attribute, and then sum the points.

How do we know if such an index of vegetation quality is meaningful? Well, to answer that, we would need to answer "What is 'vegetation quality', and how is that measured?" We might then simply plot, for a range of values of the index, a precise measure of vegetation quality versus the index, and examine the strength of the relationship.

But indices of vegetation quality have the inherent problem of not being developed as indices of a measurable quantity. It is not clear what quantity should be measured to evaluate them, because 'vegetation quality' is not clearly defined. If we find that butterfly species richness does not correlate with the index, does that mean the index has failed, or simply that it is not meant to be related to butterflies? It is unclear how the indices could be improved with accumulation of knowledge. In fact, these indices cannot be proven

**“These indices cannot be proven to be poor or good, because it is not clear what they are meant to be indices of. This lack of clarity about these indices is alarming because decisions worth millions of dollars are based on them.”**

## An index of gravity, ecology style

The gravitational force between two objects depends on their masses and the distance between them. Gravity increases with the masses, and declines with distance. The rate of reduction in gravity with distance becomes less at larger distances. Faced with this information, an ecologist might create an index of gravity that is equal to  $m_1 + m_2 - \log d$ , where  $m_1$  and  $m_2$  are the masses of the two objects, and  $d$  is the distance between them. As an index of gravity, it has the same elements as Newton's Law of Universal Gravitation which states that the force of gravity is proportional to  $F = m_1 m_2 / d^2$ . But the ecological index wouldn't be much use if you wanted to work out the orbit of planets, how to get a rocket into space, or even how to catch a ball. Which is just a simplified example demonstrating that it's not enough to just have the right elements in an index. It's all about how that index relates to the thing you are interested in. (Image NASA)



Indices for monitoring	
Index of stream condition	A combination of five different sub-indices to represent river health ( <a href="http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/stream_cond_index">http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/stream_cond_index</a> ).
SIGNAL score	A component of the index of stream condition, based on a weighted mean of scores for different taxonomic groups of freshwater macro invertebrates. The scores depend on the relative sensitivity of the taxa to degradation of water quality ( <a href="http://www.waterwatch.org.au/publications/module3/signal.html">http://www.waterwatch.org.au/publications/module3/signal.html</a> ).
Living Planet Index	Relative geometric mean abundance of a set of monitored species ( <a href="http://www.zsl.org/science/research-projects/indicators-assessments/index,134,ZI.html">http://www.zsl.org/science/research-projects/indicators-assessments/index,134,ZI.html</a> ).
Indices for prioritisation and evaluation of management	
PPP efficiency	An index that measures the expected benefit of undertaking a particular conservation project, expressed in terms of the reduction in the risk of extinction within a specified time frame. It essentially measures how well management options perform relative to each other (Joseph et al. 2009; <a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.01124.x/abstract">http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.01124.x/abstract</a> ).
Habitat hectares	Amalgamations of vegetation attributes that aim to describe vegetation “quality” ( <a href="http://www.dse.vic.gov.au/conservation-and-environment/vegetation-quality-assessment-manual">http://www.dse.vic.gov.au/conservation-and-environment/vegetation-quality-assessment-manual</a> ).
Abundances of arboreal marsupials	The density of arboreal marsupials in Victoria’s tall eucalypt forests ( <a href="http://fennerschool-research.anu.edu.au/cle/vchstudy/longtermmon.php">http://fennerschool-research.anu.edu.au/cle/vchstudy/longtermmon.php</a> ).
Indices in ecology	
Shannon diversity index	The entropy of the species-abundance distribution in an ecological community ( <a href="http://www.loujost.com/Statistics%20and%20Physics/Diversity%20and%20Similarity/EffectiveNumberOfSpecies.htm">http://www.loujost.com/Statistics%20and%20Physics/Diversity%20and%20Similarity/EffectiveNumberOfSpecies.htm</a> ).
All those landscape indices from FRAGSTATS	A diverse range of indices that are commonly used in landscape ecology. Few can be easily related directly to ecological processes, except through heuristic models ( <a href="http://www.umass.edu/landeco/research/fragstats/fragstats.html">http://www.umass.edu/landeco/research/fragstats/fragstats.html</a> ).

Table 1: Some examples of indices used in ecology and environmental management. You can decide for yourself whether they are indices of measurable quantities, and whether they can be evaluated and improved.

to be poor or good, because it is not clear what they are meant to be indices of. This lack of clarity about these indices is alarming because decisions worth millions of dollars are based on them.

So, how would one go about developing an index of vegetation quality? To start, we would need to define what we want our index to measure. Let’s assume that we only cared about birds that depend on remnant vegetation. We might then relate the species richness of these selected birds to attributes of the vegetation. This could be done through expert elicitation, by using data and statistical modelling, or perhaps a combination of both. Regardless of how the index was developed, we would know immediately how it should be evaluated – by seeing how well it predicted species richness of these birds. And those evaluation data could be used to improve the index.

But, I hear you say, vegetation is important for more than birds. For example, it is also important for maintaining water quality in streams. Immediately we see another index – one that seeks to be related to water quality. Now we have two indices, or perhaps more if different aspects of water quality or biodiversity are considered.

**“Indices should be models, with plausible links to processes. Otherwise, we are left with an index that is very difficult to evaluate or improve.”**

These indices could be combined into one, but doing so implicitly assumes that they are tradable (an increase in one compensates for a reduction in the other). A single index might be needed, but such a trade-off should be explicit, not hidden in an arbitrary combination of variables.

The consumer price index and the UV index aim to predict particular attributes; the percentage increase in prices and the amount of damage to sun exposed skin. These are based on models. The assumptions underpinning these models can be evaluated, as can the overall predictive performance of the indices. It is clear what the indices are attempting to predict, so their performance can be evaluated empirically. Any data used in the evaluation could conceivably assist in improving them. Ecological indices should be constructed similarly.

I suggest that indices used in environmental management should aim to approximate quantities that people care about: aspects of biodiversity, ability to influence water quality, aesthetics, etc. The particular components should be stated explicitly, so that we also know what it is not an index of. In short, indices should be models, with plausible links to processes. Otherwise, we are left with an index that is very difficult to evaluate or improve. 🍎

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\* The standard error is a measure of how uncertain an estimate is. It is a standard statistical quantity, so at face value, the need for an index in this case is not clear when an actual measurement already exists. An index might be useful in this case if the standard error was difficult to calculate with the available data, while a useful index could be calculated.



# Opinion under fire

## Evidence vs opinion: What really protects houses from wildfires?

By Phil Gibbons (EDG, ANU)

January saw the publication of a fiery piece of research in PLoS ONE on factors correlating with house loss during the Black Saturday fires in 2009. It was led by EDG researcher Phil Gibbons and was sparked by his interest in the claim and counter claim that followed the catastrophe. Here he explains what has emerged from a robust consideration of the evidence. While this research is focussed on fuel reduction for the protection of homes and lives, there are several emerging themes connected to the core areas of the Environmental Decision Group. The most obvious is the connection between different fuel reduction treatments and their impact on biodiversity values of the broader landscape. The trade-offs between fire management for biodiversity conservation and asset protection are discussed in DP #39 and DP #42. Just as significant is the importance of using evidence (as opposed to opinion) in forming policy and prescriptions for landscape management.

When a big bushfire hits a community resulting in loss of life and property you can be sure emotions will be running high in the aftermath. You can also be sure a range of strongly held opinions will be expressed on what should be done in future to prevent such disasters happening again. What you rarely see, however, is a long hard examination of the evidence of what factors in the landscape are contributing to the loss of homes and lives. Do strongly argued opinions on appropriate land management fit with the available evidence? This was the question we sought to answer when we examined the evidence left in the aftermath of the Black Saturday

**“Evidence isn’t as black and white as opinion. And while opinion is delivered with confidence and certainty, evidence must be presented with caution and uncertainty.”**

*Does widespread prescribed burning provide effective protection to homes and lives? According to the evidence it’s not the first thing we should be looking at. (Photo by Geoff Cary)*

fires in Victoria. And what we found should have managers, politicians and the general public questioning the validity of ‘commonly held truths’.

So, what’s being claimed and what’s at stake? Following a big damaging fire the general debate is usually on how appropriately to manage vegetation. There is almost always strident calls from some quarters demanding more prescribed burning. Others claim we should increase general levels of logging or clearing. Some, however, believe that during episodes of extreme fire weather, as was experienced on Black Saturday, it doesn’t matter what is done.

### What’s at stake?

What’s at stake is the very security of our peri-urban communities, both here and around the world. Peri-urban communities in fire-prone regions everywhere are at increasing risk from wildfires because of population growth and climate change. The potential consequences of these factors were illustrated by recent major wildfires in California (26 deaths, 3361 houses lost), Russia (54 deaths, around 2000 houses lost) and, of course, the Black Saturday event in Victoria costing 173 deaths with 2133 houses lost.

The behaviour of wildfires is primarily determined by three things: weather, terrain and fuel. Of these, fuel load (in terms of the surrounding vegetation) is usually the easiest to manipulate. So, in a general sense, there have been moves to increase the area of fuel reduction in many fire-prone regions. Common fuel-reduction treatments employed are clearing, prescribed burning, grazing and mechanical removal of biomass (eg, thinning). These treatments are often undertaken at broad-scales and quite a distance from peri-urban communities.

Fuel reduction can be very expensive, and it can have undesirable environmental impacts. Fuel reduction can also undermine the aesthetics that attract residents and tourists to bushland environments. And, it's not without risk, something amply illustrated recently by the loss of 40 houses in Margaret River due to an escaped prescribed burn. So, given that these treatments are expensive, damaging and risky, you'd think there would be compelling evidence demonstrating their effectiveness. However, evidence that these treatments mitigate impacts on peri-urban communities from wildfires remains extremely limited.

There are many reasons why the relative effectiveness of different fuel treatments in protecting houses has not been examined empirically. Wildfires are a difficult phenomenon to study. Large, destructive fires cannot be lit experimentally, house loss during wildfires is often aggregated, preventing replication of landscape-scale variables, and adequate pre- and post-fire data are not always available.

But this is where the Black Saturday fires in Victoria in 2009 provide us a rare opportunity to examine and compare the many factors at

play. This event destroyed a large population of houses in landscapes with a mix of housing densities, terrains and fuel types, and occurred in landscapes where there were adequate pre- and post-fire data.

## Opinion vs evidence

In the days after Black Saturday, commentators, experts and politicians offered their opinions to the media on who, or what, was to blame for the 173 lives lost and 2133 houses destroyed in these bushfires. Opinions on tragedies like Black Saturday get a good run in the media. For example, statements by Germaine Greer that Australian authorities were "arsonists" were widely reported, despite Dr Greer having no expertise in land management or fire science.

These opinions came at a time when people wanted answers and politicians wanted to act, so were influential in shaping public debate. For example, the Victorian Government increased resources for prescribed burning even before the Bushfires Royal Commission delivered their recommendations. However, opinion should not be confused with evidence, which is much harder to assemble.

*Continued on page 8*

## What they claimed vs what we found

**Prescribed burning:** Prescribed burning was identified by many commentators after Black Saturday as the key fuel reduction measure that should be increased in our forests. David Packham, a bushfire specialist from Monash University, was quoted in *The Australian* as saying, "The green movement is directly responsible for the severity of these fires through their opposition to prescribed burning." Prescribed burning was the fifth most effective fuel reduction measure on Black Saturday, suggesting it is not the silver bullet as sometimes portrayed.

Importantly, our research indicated that the proximity of prescribed burning to infrastructure was more important than the total area of prescribed burning in the landscape. However, the recommendations of the Bushfires Royal Commission focus on increasing the area of prescribed burning rather than where it should be conducted.

**Logging:** Three days after Black Saturday, *The Sydney Morning Herald* reported that Wilson Tuckey, a former federal minister for forests, said policies that locked up forests created excessive fuel loads. Mr Tuckey said that logging is an appropriate way to reduce forest fuels. Mr Tuckey's opinions are not supported by our data. Houses that were close to national park were at the same risk as houses that were close to state forest. And there was no statistically significant association between house loss and the amount of logging in the landscape.

**Vegetation clearing:** Another controversial issue after Black Saturday was vegetation clearing laws. A councillor from the Yarra Ranges Shire was reported in the *Lilydale and Yarra Valley Leader* as saying there was no evidence to prove clearing trees made houses any safer in a bushfire. In contrast, we found that clearing within 40m of houses was the most effective form of fuel reduction on Black Saturday, being two times more effective than prescribed burning. However, there was less risk posed by vegetation in maintained gardens compared with vegetation in remnant native bushland.

**Fuel reduction does make a difference:** Soon after Black Saturday, Professor David Karoly, a climate scientist from The University of Melbourne, was reported in *The Australian* to say, "Climatic conditions experienced before the Black Saturday bushfires were so extreme that fuel reduction would not have made any difference." This statement was not supported by our data. We found that 76-97% fewer houses were destroyed on Black Saturday where fuels surrounding them were at minimum levels.

So, fuel reduction can make a difference, but do communities living in bushland settings really want to clear all native vegetation, and conduct frequent prescribed burns, around every house?

*Images before and after Black Saturday. Careful measurements on a sample of 499 homes has produced real evidence on what factors contribute to house loss. Copyright © The State of Victoria, Department of Sustainability and Environment, 2011.*



## Opinion & evidence under fire

Continued from page 7

The evidence I and my colleagues (a collaboration between 10 fire-, landscape- and statistical- scientists from Australia and the US) have collected was recently published in the international journal *PLoS ONE*. It's taken nearly three years to collect and analyse, and then undergo peer review. It's based on 12,000 measurements at 499 houses.

### So says the evidence

So, what does the evidence show? Our analysis suggests six factors have the potential to make a big difference. They are in order of importance: (1) the cover of trees and shrubs within 40m of houses, (2) whether trees and shrubs within 40m of houses was predominantly remnant or planted, (3) the upwind distance from houses to groups of trees or shrubs, (4) the upwind distance from houses to public forested land (irrespective of whether it was managed for nature conservation or logging), (5) the upwind distance from houses to prescribed burning within 5 years, and (6) the number of buildings or structures within 40m of houses.

All fuel treatments were more effective if undertaken closer to houses. For example, 15% fewer houses were destroyed if prescribed burning occurred at the observed minimum distance from houses (0.5km) rather than the observed mean distance from houses (8.5km).

In essence, we found that prescribed burning is not the most effective way to protect houses in severe bushfires. Prescribed burning helps protect houses, particularly when it is undertaken closer to them, but clearing vegetation close to houses was twice as effective.

And whether your house was near a national park or a logged forest didn't make that much difference. On Black Saturday, houses were at similar risk whether they were adjacent to National Park or State Forest.

“In the days after Black Saturday, commentators, experts and politicians offered their opinions to the media on who, or what, was to blame for the 173 lives lost and 2,133 houses destroyed in this tragic bushfire. Opinions on tragedies like Black Saturday get a good run in the media.”

Similarly, logging native forests does not reduce the risk of house loss. We found no significant relationship between house loss and the amount of logging.

### “I know which I'd rather use...”

Fuel treatments do play an important role in saving homes (and lives). Our research predicted that minimising several fuels could theoretically reduce house loss by 76%-97%, which would translate to considerably fewer wildfire-related deaths.

However, to achieve anything near this level of protection we need a shift in emphasis away from broad-scale fuel-reduction to intensive fuel treatments close to property.

While our results indicate that fuel reduction reduces risk, it cannot guarantee protection to houses, particularly in extreme fire weather, which is when most houses are destroyed by bushfires in Australia. It is therefore critical that other measures, such as architectural solutions, safer places and early evacuation, are considered by every resident in fire-prone areas in addition to, or instead of, fuel reduction.

Evidence is not as timely as opinion. Evidence is not as entertaining as opinion. Evidence isn't as black and white as opinion. And while opinion is delivered with confidence and certainty, evidence must be presented with caution and uncertainty.

But, I know which I'd rather use to protect my house and my family from bushfires. 🍷

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#### Reference

Gibbons P, L van Bommel, AM Gill, GJ Cary, DA Driscoll, RA Bradstock, E Knight, MA Moritz, SL Stephens, DB Lindenmayer (2012). Land Management Practices Associated with House Loss in Wildfires. *PLoS ONE*  
Available online at <http://dx.plos.org/10.1371/journal.pone.0029212>



Why are some houses at greater risk during bushfires? Copyright © The State of Victoria, Department of Sustainability and Environment, 2011.



# Throwing out the rat with the bath water

## Sea level rise and other threats for mangroves and their creatures

By Lochran Truill

Sea level rise is nothing new. At one point in time it was possible to walk from Queensland to the Papuan highlands. Climate change isn't new either; it's the pace of change that's different. It's also a different landscape over which species and ecosystems need to move in order to adapt to the impacts of climate change. We recently undertook an analysis of what this means for species and ecosystems in south eastern Queensland and our results suggest we can't afford to ignore these factors if we don't want to lose more species.

Prior to human influence, systems and species' populations may have adapted to phenomena such as sea level rise. But everything is different now. Wetland habitats are threatened by numerous and interacting factors. Habitat loss through sea level rise is the most obvious of these. But this impact is compounded by urban and agricultural development because wetland ecosystems such as mangroves no longer have the capacity to migrate inland as ocean levels increase. Pollution, introduced animals and plants and (projected) shifts in rainfall and temperature regimes will make wetland conservation particularly challenging.



The false water rat, *Xeromys myoides*.  
(Photo: Alex Dudley, Wikipedia Commons)

All of these factors will likely play-out across tropical Australia and beyond, but is particularly relevant to south east Queensland, where continued urban expansion, introduced species and projected sea level rise will force the contraction of already small and isolated pockets of wetland.

*Under moderate forecasts of sea level rise mangroves are winners, sedgelanders are losers. Everything loses under rapid rise scenarios.*  
(Photo by Johan Emilson)

Any model that helps us predict outcomes from climate change for species and ecosystems will go some way towards helping manage for their conservation. But care needs to be exercised in working with these predictions. Importantly, management should not forget about other threatening processes that might be at play, and that are likely to interact with climate change. Wildlife populations in south east Queensland provide an ideal example of this.

According to scenarios developed by the Intergovernmental Panel on Climate Change (see [www.ipcc.ch](http://www.ipcc.ch)), global sea level rise could be as much as 0.64 metres by 2100 (this is their A1FI scenario). An average increase in sea levels by that much will cause substantial change in wetland community structure and composition across south east Queensland, as well as inundate urban areas. Some scientists project ocean rise may be as much as 1.8 m (Vermeer & Rahmstorf 2009 *PNAS*, 106, 21527-32). We adopted this prediction as a worst-case scenario.

Of course, it takes time for sea level to rise, and it is possible that sedimentation can keep-up with rising oceans allowing some wetland communities to adapt. Most sea-level-rise models based on elevation (within GIS frameworks) don't account for this. They are sometimes referred to as bathtub inundation models and simply plot what land disappears as levels rise. There is, however, a software package called SLAMM that gives modellers the ability to account for accretion, erosion and wetland shifts following changes in saline water conditions. SLAMM stands for the Sea Level Affects Marshes Model (see [www.warrenpinnacle.com](http://www.warrenpinnacle.com)). It's a spatial package that allows simulation of multiple sea-level-rise scenarios. The software is based principally on wetlands typical to North America, but these can be adapted to local wetland conditions with some local knowledge. And it's free.

Continued on page 10

## Sea level rise and other threats

Continued from page 9

As a first attempt to develop the methods for tropical Australia, we adapted SLAMM to wetland types typical to south east Queensland, and based transition decisions on both expert opinion, and field data. These included accretion, erosion and sedimentation rates. Once parameterised, the SLAMM is fairly simple to run. Unfortunately, the elevation data required to successfully determine wetland shifts is costly to acquire (it involves using the LiDAR laser-ranging system) and requires considerable computing power. We ran SLAMM simulations using both low-resolution and then high-resolution LiDAR elevation data, based on the A1FI and worst-case sea-level rise scenarios. What we found was quite interesting.

First, based on our interpretation of Australian wetland transitions, mangrove communities will undergo range expansion (see table 1) given the saline tolerance of plants in the communities. However, rapid sea level rise will outstrip the ability of even mangroves to adapt.

If mangrove are winners (in some situations anyway), sedgeland are losers. As sea levels rise, sedgeland will experience overall decline, losing out to mangroves in most cases. This has implication for the vast tracts of native sedge wetlands across north Australia, and the numerous dependent waterfowl. This includes the iconic magpie goose (*Anseranas semipalmata*).

The loss or expansion of wetland communities naturally has consequences for the fauna that depends on them. To explore this

“Rapid and worst-case sea level rise will outstrip the ability of mangroves to adapt and so even mangroves will be lost.”

A. Sea level rise of 0.64 metres			
Wetland communities	Area (km <sup>2</sup> ), 2010	Area, 2100	Percent shift
Fresh/brackish communities with emergent vegetation	4.0	2.2	-46
Paperbark (Melaleuca) communities	10.0	4.9	-51
Mangrove	111.4	150.0	35
Sedgeland communities	16.2	7.8	-52
Grasslands	1.4	0.3	-81
Saltmarsh (marine clay, samphire shrub communities)	4.9	3.7	-24
Ocean facing beach	6.5	6.7	2
B. Sea level rise of 1.8 metres			
Wetland communities	Area (km <sup>2</sup> ), 2010	Area, 2100	Percent shift
Fresh/brackish communities with emergent vegetation	4.0	1.7	-57
Paperbark (Melaleuca) communities	9.4	1.6	-83
Mangrove	111.1	90.8	-18
Sedgeland communities	16.6	3.3	-80
Grasslands	1.1	0.0	-97
Saltmarsh (marine clay, samphire shrub communities)	4.9	0.1	-98
Ocean facing beach	2.8	5.3	93

Table 1: Percent change in main wetland communities for Moreton Bay, from 2010 to 2100. Scenarios represented are (A) upper estimates of SLR (0.64 m) for the IPCC SRE Scenario A1FI, and (B) the upper estimate of 1.8 metre as predicted by Vermeer & Rahmstorf 2009.

further, we developed a metapopulation model for the endangered false water rat (*Xeromys myoides*). These critters are one of the few native placental Australian mammals. Although widespread across the Australian tropics, they are generally considered to be in decline. The species provides an ideal case study because not only are they threatened by introduced predators, especially cats, but the rats are also entirely dependent on wetland habitats. They build nests at the base of mangrove trees, and forage for molluscs, crustaceans and insects.

We linked the capacity of mangrove communities to be suitable for false water rats with changes in sea level and found there was a general increase in the rat population for the A1FI sea level rises (fig 1a). So far so good, but when we considered additive threats, such as increased feral cat predation and urban expansion (fig 1b), then we find that false water rat populations are threatened with localised extinction. There's an important point here, and that is, as conservationists, we can't simply focus on the impacts of climate change alone. If we do we could lose species simply by neglect.

As for the conservation of native wetland species such as false water rats, we need to prioritise habitats that will likely persist under increasing sea levels, and direct resources to counter interacting threats. 🍷

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### Reference

Traill LW, Perhans K, Lovelock CE, Prohaska A, McFallan S, Rhodes JR and Wilson KA (2011). Managing for global change: wetland transitions under sea level rise and outcomes for threatened species. *Diversity and Distributions* 17: 1225-1233.

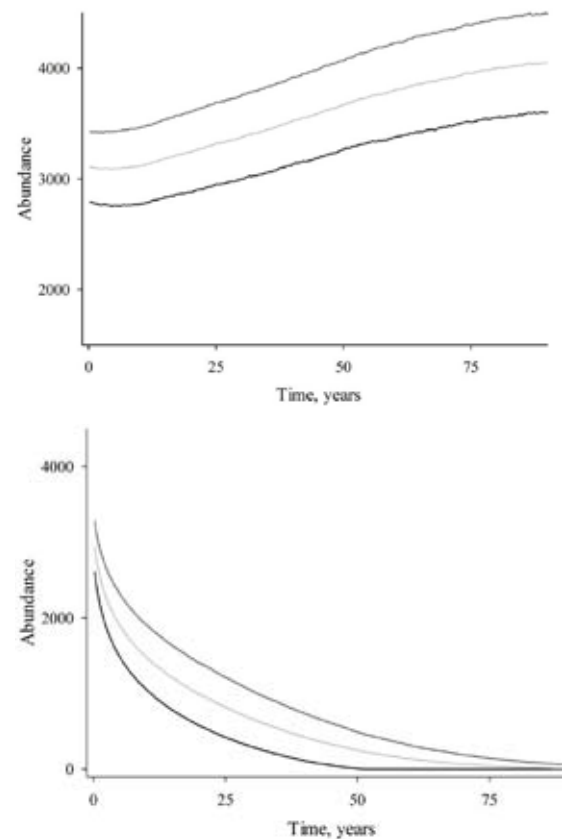


Figure 1: Mean metapopulation size from 2010 to 2100 (with 1 SD) for *Xeromys myoides*. Projections are for (a) the baseline model where K is linked to annual change in the extent of mangrove habitat and (b) the baseline model modified to include habitat loss due to urban expansion and levels of cat predation.

# When should we try to save critically endangered species?

## Short-term fire fighting vs long-term preventative conservation

By Howard Wilson (Uni of Qld)

It seems self-evident that we should try to save highly endangered species. Preserving the greatest number of species on the planet is surely part of the *raison d'être* for conservationists. When these endangered species are also iconic or charismatic then governments and NGOs are often willing to allocate relatively large amounts of money to help them. For example, approximately US\$35-\$40 million has been spent on the Californian condor over a 30-year period; US\$50 million has been expended on the whooping crane over 70 years; and many millions of dollars have been spent on mountain gorillas, the giant panda and the US ivory billed woodpecker over time.

But are these rational choices? Conservation budgets are limited and grossly inadequate to conserve much of the world's biodiversity. The consequence of spending an unequal proportion of a constrained budget on a relatively small number of highly threatened species is that management actions for other species are not funded. A large number of species could be individually managed with the money that has been allocated to a few.

Furthermore, there is no agreement yet about the particular objective of species conservation among conservation practitioners, let alone among society more generally. Legislation commonly emphasizes the avoidance of extinction (eg, the US Endangered Species Act 1973, European Union's Habitats Directive 92/43), but declines of species are also of concern in some jurisdictions (eg, European Union's Birds Directive 79/409, New Zealand's Conservation Act 1987, Australia's Environmental Protection and Biodiversity Conservation Act 1999).

Conservation practitioners and the public alike are often polarised as to what constitutes the wise use of a limited budget. On one side, proponents of triage, the process of prioritising the allocation of limited resources to maximise conservation returns, claim that resources are limited and the threatened species problem is sufficiently large that, to maximise the number of species that we save, the management of species must be prioritised based on concepts of cost-efficiency. This may, under certain circumstances, result in the decision to not invest in managing some highly endangered species. Failing to do something to prevent an endangered species moving to extinction is, however, socially and politically unpalatable. The adversaries of the triage philosophy propose that focusing on the most urgent species now will maximise our chances of saving the greatest number of species in the long-term. As the philosophy of species conservation matures, the issue of triage and cost-efficient resource allocation for threatened species frequently emerges as a polemic and emotionally-charged topic of discussion.

And yet these two philosophies are not mutually exclusive. Researchers from the University of Queensland and Melbourne University have been using decision-analytic frameworks to explore when focusing on the most urgent species may also be the most cost-effective strategy. We built a model in which species are characterised by two key parameters: the probability of extinction, and the expected total cost of a successful recovery (which included both cost and the likelihood of success). These parameters were estimated for 32 endangered species from New Zealand and they spanned a range of values from species that are highly endangered but expensive to recover to a smaller probability of extinction but less costly to recover.

Also included in the model is a small probability that a species may recover by chance. This can represent a multitude of different possibilities; including a reduction of anthropogenic pressures on that species, technical advances or evolving immunity to a disease.

*Continued on page 12*

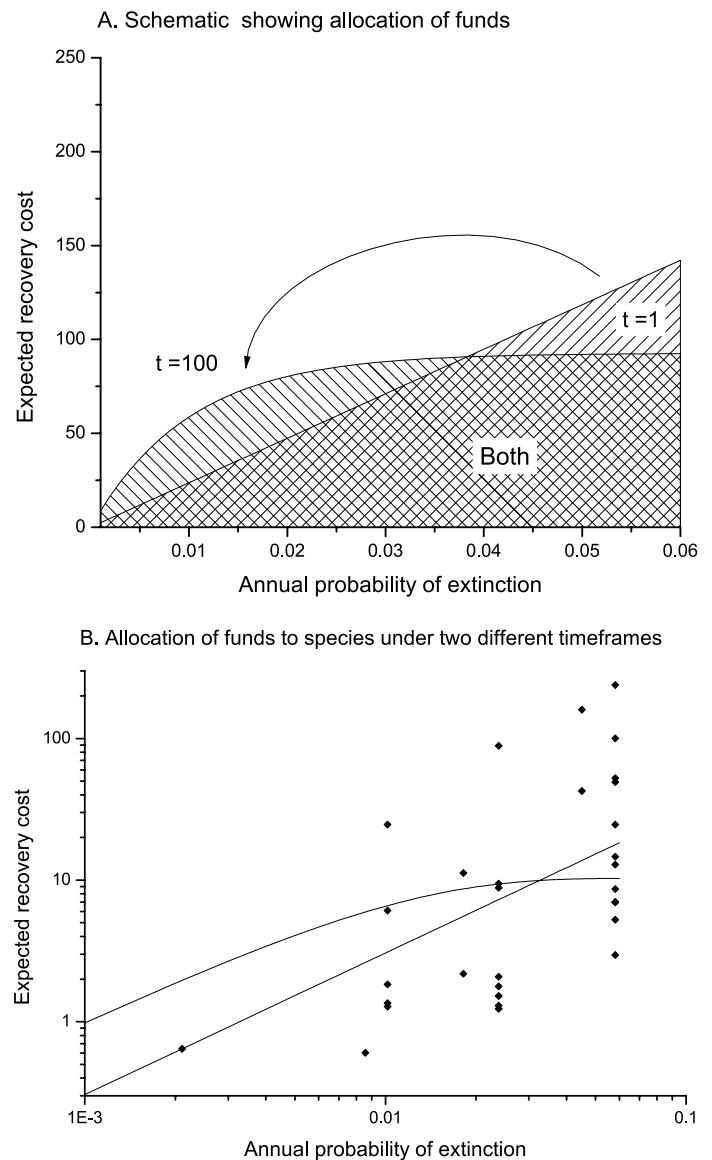


Figure 1. A: schematic showing how the allocation of funds moves from more endangered but expensive to recover species when only a short timeframe is considered (the area under the straight line) to less endangered but cheaper to recover species when a longer timeframe is considered (the area under the curve).

B: The allocation of funds for two different timeframes and a fixed budget of \$80M. The points are 32 endangered species from New Zealand and all points (species) below the lines are allocated funding. The diagonal line is for  $t = 1$  (i.e. we are only interested in how many species are extant in the next year), the curved line is for  $t = 100$ .

Comparing the two, if we considered only a short time horizon (straight diagonal line) then 2 species with a high probability of extinction and high cost would be funded and 3 species with a lower probability of extinction and lower cost would not be funded as compared to the short time horizon.

“Allocating resources to the most endangered of all threatened species, regardless of cost, may be a logical consequence of short-term thinking.”

## Saving critically endangered species

Continued from page 11

This has been proposed as one argument for focusing resources on highly endangered species, namely that urgency is a catalyst for scientific innovation and that scientists should retain hope for breakthroughs that could lead to recovery.

So, this model aims to determine how to allocate resources between these species solely to maximise the number of species extant at the end of a specific management timeframe, for a given budget.

When the management timeframe was short, the optimal strategy was to allocate resources to species that have high extinction probabilities and low expected recovery cost. Even for short time horizons, when the cost of recovery differs between species, allocating resources based on risk of extinction alone will not maximise the number of species extant.

As the management timeframe increased, the optimal strategy was to allocate resources to the species with the lowest expected cost of recovery, as for long timescales even species with a low probability of extinction had a significant risk of becoming extinct. So that as the management timeframe increased, species with a high probability of extinction but also high cost became relatively less cost effective.

There was a switch to spending on less endangered and easier to recover species, and a focus on maximizing the total number of recovered species as opposed to minimizing the number of short-term extinctions. Spending on less endangered species meant a short-term loss for a long-term gain; in the short-term there would be relatively fewer species extant as compared to spending on more endangered species, whereas at longer time periods there would be relatively more species extant.

When there was optimism about the future, for long timeframes there were benefits to keeping as many species extant as possible in the hope they will recover. The result is intermediate between short and long timeframes.

Our results highlight two basic strategies: for short timeframes, minimize the number of extinctions in the short term by allocating resources to the species with the highest ratio of the probability of extinction to cost; for long timeframes, recover as many species as

“Spending on less endangered species meant a short-term loss for a long-term gain.”

possible by allocating resources based on the lowest expected cost of recovery. Allocating resources to the most endangered species will not typically maximize the number of species saved, but will be closer to optimal when: (i) the time-period considered is short; (ii) we are optimistic about the future conditions for management of biodiversity; and (iii) if the conservation resources are large relative to the number of threatened species. Conditions (i) and (ii) do not act synergistically though, as optimism over future conditions is only beneficial when considering long time-scales.

More generally, these conditions are unlikely as (i) long time-frames must be considered if species are to be conserved in perpetuity, (ii) the threats to biodiversity are increasing and conservation efforts for threatened species are not sufficient, despite major gains in conservation spending and international targets for protected areas, and (iii) resources for conservation are grossly inadequate.

Conservation funding tends to be shorter-term in nature, which biases for allocations to more endangered species. However, these results show that, as in medicine, more emphasis should be placed on long-term ‘preventive conservation’ rather than short term fire-fighting. Allocating resources to the most endangered of all threatened species, regardless of cost, may be a logical consequence of short-term thinking and great optimism about the future. 🍎

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### Reference

Wilson HB, LN Joseph, AL Moore & HPP Possingham (2011). When should we save the most endangered species? *Ecology Letters* 14: 886-890.

### Related DPoint stories

Saving biodiversity in a time of triage

DPoint #24: [http://www.aeda.edu.au/docs/Newsletters/DPoint\\_24.pdf](http://www.aeda.edu.au/docs/Newsletters/DPoint_24.pdf)

Dial PPP for robust allocation for threatened species

DPoint #29: [http://www.aeda.edu.au/docs/Newsletters/DPoint\\_29.pdf](http://www.aeda.edu.au/docs/Newsletters/DPoint_29.pdf)



The helmeted honeyeater (left), orangutan (centre) and bumphead parrotfish (right) are all listed as endangered. Which species should get priority when resources are inadequate to save them all? (Honeyeater image by Ian Smales, orangutan image by Daniel Muriyarso and parrotfish by Maria Beger.)

## EDG Workshops

### CEED resilience workshop

UWA, October 2011

By Richard Hobbs (EDG, UWA)

Resilience is recognized as a complex concept, with many different usages and interpretations. Its current usage in policy and management documents is often vague and does not relate clearly to measurable outcomes. There is considerable research activity around various aspects of resilience, particularly from groups such as the Resilience Alliance. Nevertheless, there is a niche for CEED to develop a research theme that is complementary to these efforts and that meshes with current management and policy initiatives within Australia and elsewhere. Many of the policy/management questions will also be of direct interest to government and hence also have a NERP element.

The workshop aimed to frame the questions, projects and potential outputs from the Resilience Theme in CEED. Participants included CEED researchers, natural resource managers, representative from the WA Department of Environment and Conservation and two invited US researchers with an interest in resilience (Brandon Bestelmeyer, USDA and Stephen Jackson, Uni of Wyoming).

Each participant presented their perspective on resilience, either in relation to their own work or more generally. From the presentations, a list of frequently-encountered and emergent issues was developed for further discussion and a set of research priorities identified. An outline for further development of the research theme was discussed and short- and longer-term outputs were identified. Short-term outputs have identified leaders and participants and the longer-term elements will form the starting point for research for one or more postdoctoral positions. Contact me if you're interested in following up on any of the following themes. 🍕

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- **Key issues for research**
- 1. Use of state and transition models to operationalize resilience
- 2. Harmonizing resilience thinking with decision theory
  - a. Structured decision-making workshops, etc
  - b. Inclusion of decision theory in S&T models
- 3. Developing 'SMART' resilience targets and associated measures
- 4. Managing FOR resilience versus managing in a Resilience Thinking framework
- 5. Examination of use of resilience concepts in other fields
  - a. Resilience as a boundary concept
  - b. Useful constructs/methods from other disciplines
- **Opportunities/case studies:**
- 1. Fire-driven landscapes as a case study system
- 2. Periurban areas as a case study system
- 3. Investigating and synthesizing outcomes of current resilience assessment exercises
- 4. Potential overseas linkages
  - a. US development of S&T approach nationally
- 5. Potential linkages in Australia
  - a. Avon resilience assessment exercise
  - b. Great Western Woodlands, especially fire & mining
  - c. WA Forest Management Plan revision
- **Short-term activities/outputs**
- 1. Submit manuscript on resilience in ecology for *Ecology Letters*
- 2. Review/critique use of resilience concepts in policy (for *EMR*)
- 3. Decision theory/resilience harmonization paper
- 4. Resilience as a means versus an end in management: for *EMR*
- 5. Follow up workshop planning: NERP workshop for metrics etc
- 6. Establish linkage with other resilience researchers in Australia

## The Inaugural CEED conference

UMelb, Nov/Dec 2011

By Mick McCarthy (EDG, UMelb)

After almost a year of planning, meeting and reflecting, CEED was officially kicked off with an Inaugural Conference at the University of Melbourne. And what a grand and intense affair it turned out to be involving over 100 scientists, 65 talks, two training workshops and much free flowing conversation over two days.

Part of the conference involved a gathering of our International Science Advisory Panel (ISAP) who heard all about our activities and then discussed with us where we might focus our energies.

CEED operates over five nodes with leading researchers and excellent students. But it aims to be more than simply the sum of its parts. To achieve that, everyone needs to know what's happening in the other nodes so that collaborative opportunities can be identified. With appointments of new research staff now in train, the CEED conference was a perfect opportunity to refine topics and focus our research agenda of optimal management and monitoring of biodiversity. We took the philosophy that anyone who wanted to speak could do so, and that talks could range from descriptions of new ideas, overviews of research programs, reports on completed research, or any combination of these.

The CEED conference also provided opportunities for training, with a two-day workshop of Bayesian methods for ecology, and a two-hour discussion of effective presentations. Judging from the very high quality of the talks, ideas about how to give effective presentations are very well entrenched.

For people staying on there was the opportunity to visit Greening Australia's native grassland restoration site at Moolapia, and then a predator-free reserve at the Mount Rothwell Biodiversity Interpretation Centre. Restoration and optimal control of introduced predators are important parts of CEED's research, so the field trip provided perspectives of the on-ground challenges that are faced when managing and monitoring biodiversity.

While CEED builds on existing vibrant collaborations and has been officially operating since last July with various workshops and meetings, the CEED conference was our first centre-wide activity. It was wonderful to see the enthusiasm of the participants. I'd like to thank everyone for contributing to the success of the conference. It has helped consolidate a foundation for our research over the next seven years. 🍕

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CEED Director, Hugh Possingham, welcomed delegates to the Inaugural CEED Conference by leaping on top of a desk (in the style of Dead Poet's Society), exhorting everyone to seize the day with the opportunity that CEED has provided. He then pointed out that anyone who had eaten a piece of pizza provided at the opening meal (paid for by CEED) was officially indentured to the Centre for the next seven years!

**EDG workshops**  
Continued from page 13

## Multi-actor decision workshop UQld, August 2011

By Jonathan Rhodes (EDG, Uni of Queensland)

In recent decades significant advances have been made in systematic approaches for deciding how to allocate scarce conservation resources, but these approaches generally assume that there is only a single decision maker present. In the real world, however, it is almost never the case that conservation decisions are made and implemented by a single organisation or individual. Even in cases where decisions are made by a single organisation, these are rarely made in isolation of the actions of other organisations or individuals. For example, decisions about how and when to control weeds on private lands are made by multiple individual landholders, the conservation of threatened species is often conducted by multiple NGOs, and the conservation of wide ranging species can depend on decisions made across multiple countries.

The presence of multiple actors in the conservation decision making arena can introduce both opportunities and constraints, but we currently lack a clear understanding about how this drives conservation priorities and effectiveness. To explore this issue a CEED workshop on conservation by multiple actors was run at the University of Queensland in August last year.

It brought together a multi-disciplinary team of ecologists, economists and social scientists to explore research priorities for biodiversity conservation in the presence of multiple actors.

During the workshop we developed CEED's research directions in this area and a range of research projects that we will be working on within CEED over the next few years. These projects include:

- understanding the implications of landholder behaviour for weed control,
- the value and costs of collaboration,
- optimising conservation decisions for systems of multiple actors and multiple species,
- predicting the behaviour of large social networks from their individual components,
- understanding to what extent social network structure drives conservation trade-offs, and
- whether/when it is better to learn about social or ecological systems.

Within these there are a wide range of projects suitable for postdoctoral researchers and PhD, Honours and Masters students. If you would like to discuss any potential research projects, please get in contact. ☛

**More info:** Jonathan Rhodes [j.rhodes@uq.edu.au](mailto:j.rhodes@uq.edu.au)

“In the real world it is almost never the case that conservation decisions are made and implemented by a single organisation or individual.”

## ☛ Dbytes

Information & resources for decision makers

### State of the Environment 2011

Written by an independent committee of experts, SoE 2011 includes graded 'report-card' style assessments of environment condition and trends, pressures and management effectiveness. It covers nine aspects of the Australian environment – atmosphere, inland water, land, marine environment, Antarctic environment, biodiversity, heritage, built environment and coasts. <http://www.environment.gov.au/soe/>



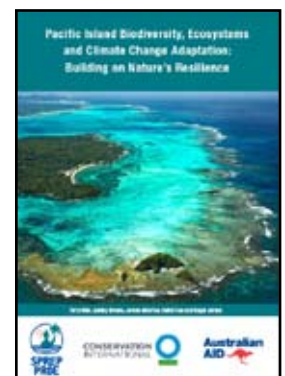
### Science-to-Action Guidebook

Produced by Conservation International, the Science-to-Action Guidebook includes two "guides" in one publication. One guide is intended for scientists, and the other for decision-makers. It is geared toward the perspective of scientists and decision-makers working in tropical developing nations and focusing on marine resource management issues.

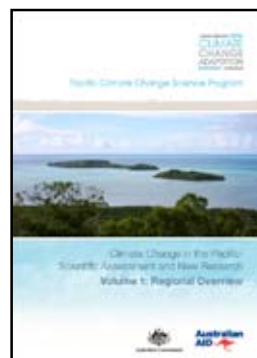
<http://science2action.org/files/s2a/s2a-guidebook-low-resolution.pdf>

### Pacific Climate Change

Climate Change in the Pacific: Scientific Assessment and New Research is a rigorously researched, peer-reviewed scientific assessment of the climate of the western Pacific region. Building on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, this two volume publication represents a comprehensive resource on the climate of the Pacific.



<http://www.cawcr.gov.au/projects/PCCSP/publications.html>



### Pacific Island Biodiversity and Climate Change

The Pacific Island Biodiversity, Ecosystems and Climate Change Adaptation: Building on Nature's Resilience report, and an associated toolbox on CD, is the result of collaboration between the Pacific Regional Environment Program, and Conservation International. .

[http://www.sprep.org/att/publication/000931\\_PIBioEcoCCAdaptation.pdf](http://www.sprep.org/att/publication/000931_PIBioEcoCCAdaptation.pdf)

## EDG News

### Over the EDG, behind the scenes

**Ayesha takes 1st:** EDG students at UQ have done well (again) at the recent International Conference in Conservation Biology (ICCB). Last year's event took place in Auckland in December. One hundred and twenty students from around the world gave presentations, from which 12 were selected as finalists for giving the best presentations. Of those 12, four came from the EDG at UQ. They were Takuya Iwamura, Chrystal Mantyka-Pringle, Rocio Ponce-Reyes and Ayesha Tulloch (pictured). And, of those four, Ayesha took out first prize! Well done, Ayesha. She spoke on the selection of appropriate species for monitoring outcomes of conservation actions (which you can read about in DPoint #36, p4-6). It should be pointed out the EDG-associated students at the University of Queensland have a proud track record of performance in presenting at meetings of the ICCB. Previous UQ winners include Tara Martin and Oscar Venter, plus there have been many finalists.

And the plaudits aren't just to UQ, Sacha Jellinek, one of the Uni of Melbourne's EDG students, won an outstanding spoken presentation prize at ESA meet in Hobart in November.



**EDGy babes:** The EDG 'made' three baby girls and one baby boy in the final quarter of last year. The three girls were delivered courtesy of UQ researchers Carissa Klein, Josie Carwardine and Yvonne Buckley. Carissa commented: "All the while, their mums have gotten promotions, grants, and published papers!" The token boy came courtesy of Sarah Bekessy (RMIT) and Brendan Wintle (UM). Pictured above is Carissa (on the left) and Josie with the three UQ EDG babies.

**CEEDy scenes:** The ARC Centre of Excellence for Environmental Decisions (CEED) formally kicked off in December with its Inaugural Conference at the University of Melbourne (see p13 for details). Pictured below are a few moments. The top image shows CEED executive officers with members of our International Scientific Advisory Panel, who met face to face for the first time. The middle image has Mick McCarthy welcoming delegates at the pre conference drinks.



And Peter Kareiva from The Nature Conservancy is pictured below addressing conference delegates. Peter was just one in a stellar line-up of speakers from Australia and around the world.



## EDGy Conversations

While EDG researchers are proud of our network's scientific outputs, the group is also keen to participate in and contribute to the broader public debate. One example of this is our many contributions to The Conversation by individual scientists. The Conversation is an independent, web-based source of information, analysis and commentary from the university and research sector. It aims to stimulate and inform debate on all of the big issues facing the nation. Check it out yourself at <http://theconversation.edu.au/>

In recent months EDG members have made a number of important contributions to The Conversation. Thanks to Megan Evans at UQ for providing us with the following list:

**Megan Evans** on 'When a protected area is not really protected'  
<http://theconversation.edu.au/no-refuge-when-a-protected-area-is-not-really-protected-3363>

**Eve Macdonald-Madden and Tara Martin** on 'Species affected by climate change: to shift or not to shift?'  
<http://theconversation.edu.au/species-affected-by-climate-change-to-shift-or-not-to-shift-2995>

**Mick McCarthy and Hugh Possingham** on 'One thing we can learn from the Alpine grazing trial: scientists must speak up'  
<http://theconversation.edu.au/one-thing-we-can-learn-from-the-alpine-grazing-trial-scientists-must-speak-up-2329>

**Georgia Garrard and Libby Rumpff** on 'Science the loser in Victoria's alpine grazing trial'

<http://theconversation.edu.au/science-the-loser-in-victorias-alpine-grazing-trial-3>

**Ascelin Gordon** on 'Biodiversity offsets: solving the habitat-saving equation'

<http://theconversation.edu.au/biodiversity-offsets-solving-the-habitat-saving-equation-4035>

**Phil Gibbons** on 'A tree for a tree: can biodiversity offsets balance destruction and restoration?'

<http://theconversation.edu.au/a-tree-for-a-tree-can-biodiversity-offsets-balance-destruction-and-restoration-3682>

**Mick McCarthy** on 'Alpine grazing: let's research fires where they pose most threat'

<http://theconversation.edu.au/alpine-grazing-lets-research-fires-where-they-pose-most-threat-3264>

**Brendan Wintle** on 'Spending to save: what's the best use of our conservation dollar?'

<http://theconversation.edu.au/spending-to-save-whats-the-best-use-of-our-conservation-dollar-3453>



**Oh what a feeling!** Delegates jump for joy after a gruelling three day CEED workshop at UWA discussing resilience. (See page 13 for the workshop report.)

## What's the point?

### Taking the piss (out of decision making)

Last year researchers demonstrated (for the first time) that delaying the need to urinate might impact on mental processes and impair decision making!

The research involved eight healthy young adults consuming 250 ml of water every 15 min until they could no longer inhibit voiding. Performance on standardized measures of cognitive function was measured at hourly intervals.

What they found was that in a situation where people can't void their bladder for any length of time, their attention to detail and ability to manipulate information is equivalent to someone with a .08 blood alcohol level.



"One possible explanation for the results is the amount of pain felt by someone with a full bladder," observed Dr David Darby, a co-author on the study. "Another explanation is that the brain function involved in inhibiting urine flow is located in the inner frontal part of the brain, in close proximity to the areas responsible for motivation, attention and

working memory. The final possibility is that people simply become obsessed with holding on and can't think of anything else."

Dr Darby believes the study has serious workplace implications:

"If people are forced to stay on the job when they need to go, there can be safety and other ramifications," he said.

The research was awarded an IgNobel Prize last year by the Harvard-based Annals of Improbable Research.

#### Reference

Lewis MS, PJ Snyder, RH Pietrzak, D Darby, RA Feldman & P Maruff (2011). The effect of acute increase in urge to void on cognitive function in healthy adults†. *Neurology and Urodynamics* 30: 183-187.



## ENVIRONMENTAL DECISIONS GROUP

The Environmental Decision Group (EDG) is a network of conservation researchers working on the science of effective decision making to better conserve biodiversity. Our members are largely based at the University of Queensland, the Australian National University, the University of Melbourne, the University of Western Australia, RMIT and CSIRO.

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*Decision Point* is the monthly magazine of the EDG. It is available free at: <http://ceed.edu.au/dpoint-news/>. If you would like to contact *Decision Point*, see page 2.

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