

CHARTERED INSTITUTE OF ECOLOGY AND ENVIRONMENTAL MANAGEMENT



Sally Hayns CEcol MCIEEM | Chief Executive Officer, CIEEM
T: 01962 868626 / Email: Enquiries@cieem.net



THE BREXIT CHALLENGE

Following the outcome of the UK referendum on the 23rd June there has been a period of intense activity as we try to assess what it means for nature conservation, environmental management, higher education, research and the careers of our members. Two things became clear very quickly. The first is that, although the outcome was not the one that CIEEM felt was the best one for the protection of the natural environment in the future, we must seize the opportunity to work towards improved domestic environmental legislation that delivers both biodiversity protection and sustainable development. Second, if we are to be successful then it is vital that organisations such as CIEEM, BES, NGOs and others work collaboratively and sensibly to help governments across the UK develop their thinking and find solutions.

That is our priority post-Brexit. The future is uncertain but change will not happen overnight. We must use this time to articulate a common vision and identify the most effective means to deliver it.

A TIME TO CELEBRATE

CIEEM's annual Awards Luncheon in June provided an excellent opportunity to acknowledge and celebrate some really high quality ecological and environmental management practice. The Birmingham Botanical Gardens was, once again, an excellent venue and over 120 guests enjoyed an excellent

presentation from Stephanie Hilborne OBE, Chief Executive of The Wildlife Trusts followed by a superb luncheon prior to the awards presentation.

The CIEEM Medal is the Chartered Institute's highest accolade and is awarded annually in recognition of an outstanding single or life-long contribution to the field of ecology and environmental management. This year the prestigious Medal went to Professor Roger Crofts CBE FCIEEM in recognition of his significant contribution to environmental conservation, governance and management in Scotland in particular but also globally. Roger has an exceptional record of leadership at both national and international levels.

Among his many achievements, Roger has been Chair of the IUCN UK Committee and of its World Commission on Protected Areas (WCPA) European Region and is now one of only six WCPA Emeriti globally. Roger led the development of the key outcome statements of the 5th World Parks Congress in Durban, South Africa. These provided the plan of action for the next decade for the Convention on Biological Diversity (CBD) Programme of Work on Protected Areas and the work of the IUCN World Commission on Protected Areas.

Roger's main legacy in Scotland is his leadership and vision on natural heritage. He was instrumental in the production of a highly regarded White Paper, *Scotland's Natural Heritage: The Way Ahead*. The ideas were accepted and Roger led the drafting of the Bill that became the Natural

Heritage (Scotland) Act 1991. Roger then founded, led and managed a new statutory body, Scottish Natural Heritage, over the next decade, putting in place governance structures and management schemes for nature protection and presiding over the implementation of Natura 2000 in Scotland which has given rise to extensive networks of Special Protection Areas (SPAs) and Special Areas for Conservation (SACs). Roger is a very popular recipient of the CIEEM Medal.

There were twelve other individual and organisational awards winners and full details can be found on our website (www.cieem.net) but special mention should be made of the Ecosystems Knowledge Network which not only won the Best Practice Award for Knowledge Sharing but was also awarded the Tony Bradshaw Award. This Award, given in recognition of CIEEM's former founding President and one of the most inspirational UK ecologists of the last 50 years, is only presented when a project or initiative had demonstrated an outstanding impact in its area of activity.

Our congratulations go to all of the winners and finalists and our thanks to the judges.

FORTHCOMING EVENTS

Autumn Conference, Nottingham, November 1-2 2016: 'Skills for the Future'

FROM OUR SOUTHERN CORRESPONDENT



Richard Hobbs | University of Western Australia

Most people have heard Benjamin Disraeli's famous quote:

"THERE ARE THREE KINDS OF LIES: LIES, DAMNED LIES, AND STATISTICS."

Particularly during election or referendum campaigns, it's often difficult to tell the difference.

We have a Federal election looming in Australia that doesn't quite match the US election for scariness and weirdness, but has its own special elements of comedy, tragedy and Disraeli's three kinds of lies. The election results will be long out by the time this article hits the press, as will the outcome of the Brexit poll. Here in Australia, climate change and the Great Barrier Reef have been hot topics in the election. Both have had important science back-stories that Disraeli would have been proud of.

Discussions relating to climate change have included: (a) debate over whether the extraordinary fires in Tasmania in February could be pinned at least partially on climate change (yes, they can, says Dave Bowman of the University of Tasmania: <http://www.abc.net.au/news/2016-02-24/study-links-tassie-fires-to-human-induced-climate-change/7193830>); (b) whether the massive storms knocking expensive houses into the ocean in Sydney are related to climate change (even current Prime Minister Malcolm Turnbull seems to think there must be something going on here, but not something that requires a change in government policy); and (c) whether

Australia should be rethinking its fixation on fossil fuel extraction and making use of the obvious potential for renewables (the jury's out on that one, depending on whose marginal electorate you are in).

And in the background is the national tragedy of the systematic disembowelment of climate research in CSIRO (<https://theconversation.com/csiro-cuts-as-redundancies-are-announced-the-real-cost-is-revealed-59895>). In line with the troubling trend towards mindless managerialism and political agendas taking precedence over common sense and good judgment, Larry Marshall, the head of CSIRO recently imported from Silicon Valley, has initiated cuts to public good research, particularly relating to climate change. While CSIRO is no stranger to cutbacks and reorganisations, this current round of cuts has left the scientific world dumbfounded. And you don't need to be too much of a conspiracy theorist to see that cutting climate change research is part of a tacit agenda from a government that doesn't really want to acknowledge that climate change is an issue.

Climate change is also a factor implicated in documented declines in the Great Barrier Reef. Already a political hot potato because of threats from international bodies to start labelling the reef as in danger, discussions of the future of the reef have become an election issue. And, as with most issues in the public domain these days, arguments have surfaced over how serious the threats to the reef are, and how credible reports of extensive coral bleaching are. This has even led to accusations that leading reef scientists are distorting figures in order to exaggerate the problems. According to Graham Lloyd, reporting in *The Australian* newspaper (4 June 2016), "Activist scientists and lobby groups have distorted surveys, maps and data to misrepresent the extent and impact of coral bleaching on the Great Barrier Reef"

(<http://www.theaustralian.com.au/news/nation/great-barrier-reef-scientists-exaggerated-coral-bleaching/news-story/99810c83f5a420727b12ab255256774b>). It turns out that it is probably the media distorting things, but the willingness to implicate scientists in a stitch-up is worrying.

The stoush over the reef arose through different interpretations of figures presented in reports – a media statement intimating that 93% of the reef shows some sign of bleaching (<https://www.coralcoe.org.au/media-releases/only-7-of-the-great-barrier-reef-has-avoided-coral-bleaching>) was suddenly translated into 93% of the reef being completely dead. This is a fairly blatant misappropriation of a relatively simple statistic, and it made me think about the increasing difficulty of communicating information about ecological topics. Ecology, as we all know, deals with complex interactions among organisms and their environment. The reef example was simply a case of someone attaching the wrong language to a simple figure. However, often in ecology, we rely on increasingly complex statistics to be able to both tease apart what's important in any situation and to communicate the findings, particularly for publication in scientific journals. What appears in the media rests on the interpretation of complex data through the filter of statistics.

The mention of statistics sends some people into paroxysms of despair. I think there is a fairly dichotomous split in ecology between people who never really “got” statistics but struggle through because they have to, and others who love to immerse themselves in the mysteries of statistical methods and models. I've experienced both camps, being completely flummoxed by poorly-taught undergraduate statistics classes and then becoming a complete stats nerd during my PhD. I think I now straddle the divide, finding it increasingly hard to keep up with new techniques and developments (not helped by my decision to leave R to younger, more agile minds in my group).

I've just been reading a recent paper that calls for moves to develop what the authors call statistical fluency for ecologists (Ellison & Dennis, 2016). They point to the undeniable fact that the types and complexity of data collected, and the types of question being asked, have developed rapidly and require an increasingly diverse and complex

array of statistical techniques. The authors lament, however, that “Many ecologists lack appropriate background in probability theory and calculus because there are serious disconnections between the quantitative nature of ecology, the quantitative skills we expect of ourselves and our students, and how we teach and learn quantitative methods.”

As a counterpoint to this statement, a comment included in Rory Putman's 1994 book on community ecology has stuck with me ever since I read it: “Undergraduates have simple on/off switches. This is a protective device for use when any dangerous mathematics enters the field of vision. Concentration will, on seeing anything remotely resembling an equation, switch off until all signs of mathematical notation have gone and normal text has been restored” (Putman, 1994). Added to this inbuilt protective device is the fact that statistics continues to be generally very poorly taught in undergraduate courses. Ecology units become *de facto* statistics refresher courses because students have not learned the basics beforehand. It was thus when I was an undergraduate and the evidence from teaching in Ecology units indicates that it remains the case. The editors of a recent Ecological Statistics text commented that “... despite considerable efforts, learning statistics continues to be boring for many ecologists and more often than not, it feels a bit like having dental work done: frightening and painful but necessary for survival” (Fox *et al.*, 2015). In addition, the plethora of new techniques available makes it very difficult for even the most statistically-savvy ecologist to be across all the nuances, vagaries and pitfalls involved.

Fortunately, there are ways through this, and some of the issues to be dealt with are common to all statistical methods, old and new (Steel *et al.*, 2013). Nevertheless, successfully applying and reporting statistical approaches remains a scary quagmire to many people. It's made even more scary and quagmire-ish by disagreements over which methods are appropriate, which

assumptions are inviolate, which transformations are allowed and so on. These disagreements can occur anywhere along the process from initial study design to publication, but perhaps are becoming most obvious at the stage of the journal review process. It seems that virtually every paper submitted by colleagues or students these days comes back with reviewer comments along the lines of “I question the use of statistical technique x, which I think is invalid in this case”, or “Why did you not use statistical technique y, transform your data this way, etc.?” Such comments are quick and easy to make but can imply weeks of extra work in reanalysis, redrawing figures and so on. They also include the implicit assumption that the authors must have been remiss in their original decisions on design and analysis. And the frustrating thing is that, nine times out of ten, the reanalysis does not substantially change the interpretation of the results!

A feature of becoming an old fart is the feeling that you've seen all this before. While I was doing my PhD in the 1980s, a mini Game of Thrones was raging over the most appropriate ordination techniques to use. In the 90s there was a period of existential angst over the use of non-parametrics in preference to normal statistics. Violating assumptions was a sin punishable by beheading (well, maybe I'm exaggerating a bit here). At that time, I was deeply encouraged (and relieved) to see some commentary that suggested that the supposed rules were not as sacrosanct as the stats police made out. In a 1995 paper, Allan Stewart-Oaten went as far as to comment that: “Statistical analyses are based on a mixture of mathematical theorems and judgments based on subject matter knowledge, intuition, and the goals of the investigator. A folklore can develop, where judgments based on opinions become laws of what ‘should’ be done. This can intimidate authors and readers, waste their time, and sometimes lead to analyses that obscure the information in the data rather than clarify it” (Stewart-Oaten, 1995). In other words, perhaps there's more than one way to statistically skin a

cat. And perhaps we should be less ready to assume that our favourite approach is always going to be the only – or right – way to proceed.

Of course, we could, instead, heed the advice of physicist Ernest Rutherford, who said: “If your experiment needs statistics, you ought to have done a better experiment.” However, Rutherford wasn't thinking about the complexities involved in even simple ecological experimentation. It is probably true, however, that statistics often simply confirm the obvious: significant treatment effects can often be visually discerned, but the numbers are needed for the publication. Perhaps more appropriate is the statement from the American statesman, Henry Clay, who said: “Statistics are no substitute for judgment.” Careful design, open recognition of underlying assumptions and limitations, and appropriate caution in interpretation are essential in the use of any statistics. Statistical elegance can still conceal ecological nonsense in the absence of insight into the system being analysed. And when reviewing how other people have tackled statistical problems, perhaps another Disraeli quote is relevant: “How much easier it is to be critical than to be correct.” We need statistical rigour – and, indeed, fluency – in ecology, but we also need to get on with the job of making sure that statistically-sound ecological stories influence management and policy, and maybe even the outcome of elections.

REFERENCES

- Ellison, A.M. & Dennis, B. (2016) Paths to statistical fluency for ecologists. *Frontiers in Ecology and the Environment*, in press.
- Fox, G.A., Negrete-Yankelevich, S., & Sosa, V.J., eds. (2015) *Ecological Statistics: Contemporary theory and application 1st Edition*. Oxford University Press, Oxford.
- Putman, R.J. (1994) *Community Ecology*. Chapman and Hall, London.
- Steel, E.A., Kennedy, M.C., Cunningham, P.G., & Stanovick, J.S. (2013) Applied statistics in ecology: common pitfalls and simple solutions. *Ecosphere*, 4, 1-13.
- Stewart-Oaten, A. (1995) Rules and judgments in statistics: three examples. *Ecology*, 76, 2001-2009.

WELL DONE RICHARD

Regular readers of this column will be delighted to hear that Richard was awarded Honorary Membership of the Ecological Society of America at the recent ESA meeting in Florida. From the ESA website: “Honorary Membership is given to a distinguished ecologist who has made exceptional contributions to ecology and whose principal residence and site of ecological research are outside of North America. Richard Hobbs, a professor of restoration ecology at the University of Western Australia, is an innovative, collaborative scientist with proven capacity to bridge the fields of basic and applied ecology. He laid foundational work in the area of novel ecosystems, the theme of the forthcoming 2016 ESA Annual Meeting in Fort Lauderdale, Fl., and his research focuses on applying ecology in a rapidly changing world. He promotes ample, fruitful debate within our community and beyond.”

