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provide more opportunities for the importation of exotic species. The convergence of air routes from these growing economies to other climatically similar regions depends, however, on the time of the year of transport. The model predicts that climatically sensitive organisms travelling by air will find their destination airports most hospitable by June 2010. This study provides a first assessment of the transportation risk associated with air travel, and permits the scheduling of surveillance priorities in both space and time for preventing the entrance of exotic species.

Quantifying the levels of invasion and the potential invasion routes enables the identification of areas at risk of invasion, and therefore allows for targeted surveillance and control actions to prevent the movement and establishment of exotic species. The optimization of control operations is necessary to allocate the limited number of resources available in the most appropriate way, and assure the efficiency of surveillance systems in reducing the introduction and establishment of exotic species.

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book review

Science chic

Don't Be Such a Scientist: talking substance in an age of style, by Randy Olson

Island Press, Washington, 2009, 260 pp. ISBN 978-1-59726-563-8

<http://www.dontbesuchascientist.com/>

Public perception of the value of science and scientists is overwhelmingly positive in the USA (Pew-AAAS 2009). However, the standing of science as the nation's greatest achievement has declined significantly in the past decade. The most alarming aspect is that science's decline is not simply an artifact of the rise of other achievements; one-tenth of the population now recognize nothing as, or simply didn't know what was, instead of science, the greatest achievement of the last 50 years (Pew-AAAS 2009). Studies in Europe indicate similar trajectories, and although interest

in science is positively correlated with science literacy the relationship breaks down in highly literate industrialized nations (Bauer et al. 1994; Allum et al. 2008). These observations are consistent with perceptions that changing recreational habits (Kristof 2009) and the [US] news media are undermining public understanding of science (Pew-AAAS 2009). Half of US scientists believe the media oversimplifies scientific findings, half believe the general public expects results too quickly, and three-quarters believe the media doesn't distinguish between robust and tentative results. The

more popular visual media (TV) are considered worse transgressors than the embattled print media (Pew-AAAS 2009).

Randy Olson's book, *"Don't be such a scientist – talking substance in an age of style"*, is thus a wonderfully timed resource. In an amusing and light read (it took me only 3 connecting flights from Chicago, Illinois, to Merced, California, plus the usual several hours delay with United Airlines, to complete the book), Olson explains why scientists are unhappy with the media (particularly visual media), why the media doesn't represent our interests well, and why the public don't seem to mind. What it comes down to, he suggests, is that whereas scientists focus intensely on detail, the media needs to arouse interest (usually quickly) and the general audience is engaged by a small subset of simple storylines without too much complexity. Bridging this gap, and halting the slide of science's standing, is the burden that falls to communicators of science, who increasingly are scientists (Anon 2009).

Olson structures the book around four general rules for better communication, gleaned from his years in Hollywood. The first chapter, *Don't Be So Cerebral*, explains that while scientists typically engage intellectually with the logic and probability of events, most people connect through their 'hearts' (passion, heartfelt sincerity), 'gut' (bellylaughs, revulsion, intuition [gut-feeling], impulse), and 'gonads' (sex). Of course, all those trained in anatomy and physiology know these feelings are essentially in the brain, but, hey, don't be so cerebral and literal-minded!

Not by coincidence, the second chapter, *Don't Be So Literal Minded*, emphasizes that people get and remember examples that aren't boring and direct; would the Blackberry be as hip and successful if it had retained its prototype name "PocketLink"? Would Olson's *Shifting Baselines* project (www.shiftingbaselines.org) have been as long-lasting if it had been called "The Oceans Are in Trouble"? His answer is 'no' because that name wouldn't distinguish it from other similarly or unimaginatively named projects (such as the short-lived "Less Than One" campaign). In contrast, Blackberry and Shifting Baselines are easy to re-

member and initially intriguing, leaving people with the ability and desire to find out more after hearing only scant details and the name; it's like a whodunit.

This approach to engagement, or in Olson's terms "arousal" that generates a desire in the audience to find fulfilment, is the first part of storytelling, and he encourages each of us *Don't Be Such a Poor Storyteller*. Fortunately, in this respect, he argues we already have a foot in the door. A scientific paper approximates the classic formula of a three-act story: Act One, the introduction, sets the scene and raises a question; Act Two, the methods and results, provides details and allows the audience to guess for themselves what is happening; Act Three, the conclusion, places the evidence in the setting and, for the most part, finishes by satisfactorily answering the question raised at the end of Act One. Olson claims this arc of a captivating story is so simple that one can understand the principle plot of most major movies without any dialogue.

The fourth, and final piece of advice, *Don't Be So Unlikeable*, is perhaps the most important and hardest to overcome. The modern scientific method is built on the Popperian foundation of falsification. Thus, scientists become, after years of training, very comfortable with criticism, negativity, raising ideas and having them knocked down. This is how science advances. Unfortunately, this counter-intuitive approach to the creative process, and those who practice it, can be easily misinterpreted as the destroyers of dreams that suck dry life and leave only the ashes and bones of a once beautiful idea.

Don't Be Such A Scientist encourages us to have greater empathy with the general public, to understand their needs, wants, and desires, and to tell them stories about the wonder of science to which they can relate. In doing so, they will also be stimulated to learn more for themselves. Notably, this is how scientists learn science. Olson does not advocate fabricating stories, but does promote practicing a more acceptable voice; encouraging and enabling people to know more while not making obvious what they don't know yet. "This is the burden that science communicators

face” and Olson suggests through many examples that it won’t be easy to overcome. It took him 15 years to become “scientist-turned-filmmaker”, one-third of students think the Scripps Institution of Oceanography communications workshops in which he participates are “a total waste of ... time”, and popularisers of science are commonly perceived as weaker scientists. But without better communication, science may slip further in the public’s perception, scientists may be perceived less favourably, and research may become harder to fund publicly (as is currently the case in California).

These issues already concern us as biogeographers. The divide between the public’s and the scientists’ perceptions is great on issues within our purview. Less than a third of the US public considers evolution a fact (cf. 87% of scientists), only 49% believe the Earth’s climate is warming (cf. 84% of scientists), and people who hold these scientifically unsupported views, i.e. the majority, have lower opinions of scientists (Pew-AAAS 2009). In contrast, majorities favor health issues such as vaccination (69%) and even controversial embryonic stem cell research (58%; Pew-AAAS 2009). Biogeographers have a great burden to lift. Yet, a majority of scientists (97%) and public (76%) support involvement of scientists in debates about science and, for the most part scientists are not considered politically biased by the public (64%; Pew-AAAS 2009). The public want us to communicate, the scientific establishment is encouraging us to communicate (e.g. NSF 2008; EU 2007), and Olson has provided us with a few tips on how to do it successfully. If you’re not convinced he’s got something useful to say, then next time you’re on a plane, try turning on the movie, turning off the sound, and spending 5% of your time watching the movie and 95% of your time reading this book; you’ll understand the plot and outcome of the movie and might not even care you missed the details in the dialogue – Q.E.D.

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