

the
science chronicles

an unofficial monthly for the science conservationist

April 2010: volume 8 issue #4



all ideas and opinions are those of the authors and not of the nature conservancy.

Contact nancy_kelley@tnc.org to manage your subscription status
go to <http://conserveonline.org/workspaces/science.chronicles> for archives

On the cover: Photo by Marcel ter Bekke

Contents

Letter from your editor	2
Letters	2
Science, the Truth and the Press	2
Essays	4
Forgetting Our Roots: the Grassroots	4
A Measures Workshop: The Most Exciting Thing that's Happened to Me Recently!	5
Beyond Protected Areas	6
The Methods Forum	8
Problem: How Much is Annually Spent on Global Biodiversity Conservation?	8
Science Shorts	9
Changing Human Behavior as a Conservation Strategy	9
The Key Role of Human Nature in Conservation.	9
Missing the Obvious	10
Orgspeak and News	11
Coda Global Fellows Program Seeks Quantitative Monitoring Candidates	11
About the authors	11
TNC publications (2010)	12

Letter from your editor

Readers,

What is conservation about? The answer will be different depending on who you ask. We scientists often pretend it is science that reveals our goals. But that is a lie. Deciding to protect the last pandas and condors is less based on rational considerations than on emotive ones. What many conservationists see as obviously right might to others be irrelevant.

In my work I come across many conservationists who are unable to accept that conservation is not high on everyone's ethical agenda. They are morally outraged about the evil anti-conservationists in the world. I am beginning to believe this self-righteousness and intransigence interferes with getting conservation done.

For example, I recently did some work for a much criticized plantation company in Indonesia. To my surprise, I found indications that their management is having a positive impact on conservation, and it least in some places. But most of my conservation colleagues do not like to hear me tell this story. How could such an evil company possibly do something good?, they ask.

How open-minded are we as conservationists in looking for solutions. Our minds tend to operate in binary terms: forest conservation is good, deforestation is bad; you are either with us or against us. But reality is grey, and practical solutions require compromises. A working landscape with patches of protected forest, timber concessions and plantations, and agricultural plots might not quite give us that idealized sense of wildness, but it might be the most optimal conservation solution. We readily accept such landscapes in North America and Europe, but find it much harder in tropical Asia, Africa and South America.

Unless we find some shared bandwidth with others, we will remain vastly outnumbered by people that cannot afford to care about conservation, or simply have other priorities.

E Meijaard

Letters

Science, the Truth and the Press

Science was knocked off its pedestal with the various climategate scandals. But I would argue that it should never have been on that pedestal. Science isn't always about telling hard facts. It's about struggling towards establishing what those hard facts might be, and the journey is messy.

The mess of science isn't just in the hard work of sifting, finding, theorising and modeling. Scientists are also human, the same class of organism as lawyers or politicians, and used car salesmen. They

are "fed" by funders with political agendas. They advance their cause through journals that demand breathless claims of novelty and surprise.

So scientists do twist the truth and bias the results. Not all scientists, but enough to have an impact. And some very good scientists—for example, Gregor Mendel, catholic monk and father of modern genetics is widely believed to have fudged his data (they were too clean and clear-cut to be "honest").

Thankfully there is no cabal, no conspiracy, with all scientists working on a single agenda, in fact we do best by challenging the work of others. So we edge towards understanding through a slow process of gradually refined theories and rejected hypotheses.

Of course the errors and the dodgy science in the IPCC reports shouldn't have got in, but so what if they did—these were only a tiny fraction set against the tidal wave of truth in those same reports.

Thankfully there is no cabal, no conspiracy, with all scientists working on a single agenda, in fact we do best by challenging the work of others. So we edge towards understanding through a slow process of gradually refined theories and rejected hypotheses.

Why on earth are the press so naïve as to believe us, unquestioningly? And why do they never use the cautious, careful language of good scientists—correlation is not causality, likelihood is not certainty? For decades now, the press has fed the intelligent thinking public a strange diet of overblown truths or unjustified challenges, never getting the straight-line course towards understanding by argument, testing and consensus. How can we scientists close the gap—where can we meet the public?

I think the scientists must continue to speak as scientists. We need to press hard to make it clear when results are weak or indicative. I'd love it if the fields of funding and peer review gave less air time to politics and hyperbole.

But what I think we really need are a whole new class of champions who will take up our causes, with a bit of science and a lot of rhetoric. We need powerful speakers who can bring audiences with them. Maybe our best example is Al Gore. His climate change talk was only part science. He got some stuff wrong too. But it was good enough to get the talk-show hosts huffing. If we use charismatic spokespeople to take on the similarly charismatic class bullies in the playground, the press might get their "interesting stories". Then when there's a call for a more sane debate the scientists can be wheeled in.

M Spalding

Essays

Forgetting Our Roots: the Grassroots

TNC, CI, WWF and numerous other conservation organizations increasingly work “*inside the beltway*”, trying to influence the US Congress and Washington DC-based policy leaders. Climate legislation is the biggest focus. How is that working out?

We all know the answer. So what can we change to bring success to this high-leverage policy approach?

To me the answer is simple—invest more in a grassroots effort and directly promoting social change and conservation thinking. Rachel Carson created the modern environmental movement through her book *Silent Spring* and by speaking directly to the people on a Sunday evening television show that set records for viewership: *CBS Reports*. Earth Day began as a populist movement. TNC might never have been an advocacy group—but it has always relied heavily on its volunteer base for everything from annual donations, to voting for State bond issues, to Saturday work parties that remove invasive species from nature reserves. There is increasing evidence and speculation that the key to a happy conservation outcome is changing the public’s attitude and behavior. All of the policy wonkishness in the world will not gain traction without broad and deep public support.

Insofar as we cannot save the world by buying the world, conservation must stand on three legs—each necessary, and none sufficient by themselves. Those three legs are: policy work, partnership with business, and changing public behavior and attitudes. We have never really gotten all three of these efforts working well together.

Today we lack the grassroots efforts. But when grassroots environmentalism was strong in the sixties, it suffered from an excess of anti-business sentiment. We cannot do conservation without business as our ally. And for sure we need governments and financial policy that is pro-conservation—hence the policy investment. But I am wondering if the fate of cap-and-trade and the Kyoto agreement is a signal that it is time to boost our investment in social change and marketing of conservation ideas. I am not talking about marketing TNC’s brand in order to build a better donor base. I am suggesting that reaching out to a broad constituency and changing their behavior and attitudes is the one critical missing ingredient of our global conservation strategy.

P Kareiva

A Measures Workshop: The Most Exciting Thing that's Happened to Me Recently!

It is entirely possible that I very badly need to get a life, but a Strategy Effectiveness Measures workshop is the most exciting thing that has happened to me recently. I'm not kidding. Before writing me off as totally hopeless, please give me a moment to try to explain.

It was the most exciting thing I have done recently because I came away with the management tool I have been searching for ever since I joined the Conservancy eleven years ago.

For a good deal of my almost 30 years in the world of finance I railed against quarterly earnings. To me they represent the single most powerful disincentive to sensible long term planning and management. If a company doesn't hit the quarterly earnings estimate that market analysts expect, the company's share price falls—and with it the bonuses, stock options and career opportunities of all the most senior managers. Little wonder, then, that their primary focus is on meeting short term objectives. Little wonder there is a major financial crisis every 10 years or so.

It is rich in irony, therefore, that ever since joining the Conservancy I have been searching for a conservation proxy for quarterly earnings.

The reason is simple. Conservation outcomes are achieved over years, often decades. Conservationists think and act at that timescale. We have to. But to achieve 5 or 10-year goals we need consistent and reliable indicators to measure whether we are hitting—or missing—the short term milestones essential to reaching those ultimate goals. If we don't hit milestone 2 or 3, we surely are not going to get to milestones 10 or 11. "Adaptive management" is a term much used. But in reality, far too often gets little more than powerful lip service.

And the reason for that is also simple—at least in my case. It may just be that I am woefully slow and behind the pack (and I'm really sorry that I wasn't able to attend the big Measures workshop in Long Island last October), but until the workshop this week I didn't have at my disposal a clear, logical and disciplined process for (i) highlighting essential outcomes that have to be achieved for a strategy to be effective, and (ii) putting tripwires in place at regular short term intervals to force appraisal of whether those essential milestones are being hit—with obvious implications for the entire strategy. The Conceptual Model and most especially the Results Chain processes I was introduced to this week, if applied dispassionately and with discipline, make it much more difficult to keep plowing on regardless with a strategy that isn't working or is in need of an important course correction.

In one example we worked through this week, using an actual strategy from the Berau Forest Carbon Project now being launched in Asia-Pacific, the process made the point jump out that if one particular political outcome was not achieved early on, or the prospects for achieving it were not persuasively positive in a limited period of time—in this example it happened to be milestone 2—the next two or three years of investment in that strategy would more than likely be wasted. The same applied to another outcome at milestone 5.

Disciplined implementation of the Results Chain process forces “go/no go” decisions. In our example, if we had not met milestone 2 but still decided the strategy was a “go”, then clearly continuing with the *status quo* was no longer a viable option. Either we needed to adjust the entire strategy to a different timeframe, or find a different approach to meet that particular milestone quickly. And if we couldn’t find a compelling alternative, we would have to think long and hard about whether continued investment in that strategy remained justified.

In many cases, I suspect the honest answer will be no. At which point you seriously have to consider the viability of the entire strategy. In many cases, I suspect the right return on investment decision should be: “No go”.

I am far from alone in my concern for the millions of dollars wasted in pursuing failing, or failed, conservation strategies. I completely concede that the type of conservation in which the Conservancy is and should be engaged, is in many cases as much art as it is science. In that context failure, on occasions, is a given. But how we fail, what we learn from failure, and what the cost of failure is, is entirely up to us.

In railing against the absence of a conservation proxy for quarterly earnings, my driving motivation has been a desperate need to learn, if a strategy is failing, how to fail early, and fail fast. This past week at the Strategy Effectiveness Measures workshop I think I took an important step forward in learning how to do that.

For that I am most grateful to Craig Groves, Mauricio Castro Schmitz and Lynne Eder for the superbly designed, facilitated and managed workshop in Thailand for Asia-Pacific Region staff. I am convinced that as a result of this workshop, conservation return on investment in the Asia-Pacific Region will be significantly enhanced.

R Leiman

Beyond Protected Areas

I recently visited the Farming for Wildlife project in the Skagit Valley in Washington. In this field study, farmers were paid to flood their fields for up to several years to create habitat for shorebirds. The benefits of this flooding include more use by other waterfowl, raptors, coyotes and amphibians and increased soil fertility; in addition, the three farmers involved use the project to transition to organic farming, which will reduce conventional herbicide and pesticide inputs into the river system. In a similar project in the Klamath Basin of California, wetland rotations control harmful pests and plant pathogens. The Conservancy is careful to emphasize that they are not creating new wetlands; these wetlands are analogous to another crop rotation. The habitat they are creating is ephemeral. But the goal is to create a critical mass of this type of habitat throughout the delta on an annual basis. Imagine if farmers throughout the valley or the region included flooding as part of their crop rotations. These temporary wetlands would form a shifting mosaic of habitat patches that would

greatly increase the total habitat available in any season. This project provides a model that could be applied in many ways as a complementary means of approaching and enhancing conservation in populated landscapes.



Photo by
Kirsten
Morse

Certainly, there is no substitute for protected areas. In many cases, protected areas offer the best hope for conserving biodiversity, especially endangered or heavily harvested species and rare or fragile ecosystems. But globally only 11.5 percent of the land and less than one percent of oceans are protected, and many of these areas are only parks on paper with protection poorly enforced.

Accepted species-area relationships tell us if we protect 10 percent of each habitat type—the Conservancy’s goal—we stand to lose approximately 50 percent of all species. This assessment might be true if all of the non-protected areas were paved. Thankfully that is not the case!

Promoting biodiversity in working forest, agricultural, marine, and urban environments is a key to landscape scale conservation in addition to protected areas. Living fences and hedgerows in agricultural landscapes provide important habitat and corridors for wildlife. Forest management practices that promote species and structural diversity of forests can create important conservation areas. In urban and suburban areas, planting native flowering and fruiting plants in yards, open spaces and in green strips along streets and highways provides food and habitat for insects, birds, and bats. Green roofs can become oases for native plants and animals while reducing energy costs.

Farming for Wildlife is an excellent example of integrating conservation with the ways people live and work. One participating farmer challenges local Conservancy staff by saying, "We (farmers) have never met a crop we can't over produce. If the Conservancy can develop incentives and projects that meet our bottom line needs, we will add wetland rotations to our list of commercially significant crops in the Valley." We need to expand on this approach, modify it for different regions, and come up with entirely new strategies based on the underlying principles of taking every opportunity to increase habitat and promote ecosystem services benefits to practical, modern human life.

J Aukema

The Methods Forum

Problem: How Much is Annually Spent on Global Biodiversity Conservation?

Problem Statement: For a paper I am working on I need an estimate of how much is globally spent each year on biodiversity conservation. Despite a thorough search of the literature I couldn't find any comprehensive answers to that question. It would be good to have an estimate, for example, to have some idea of the percentage of total global GDP that is spent on biodiversity conservation, to understand trends in conservation funding over time, changes in the role of different sectors in conservation funding (GO, NGO, commercial), or to assess regional variation in conservation spending.

Objective: The objective is to estimate the global funding for biodiversity conservation in 2009, with the ability to break down this estimate by funding sector, region, and other factors. The challenge would be to differentiate biodiversity spending from other related funding (e.g., climate change, development aid etc.). If indeed no global estimates exist, it should make an interesting short paper for a high impact journal.

Methods question: Apart from looking for data from and adding up the thousands of governmental, non-governmental and commercial sources of funding that are allocated to biodiversity conservation, is there a simpler way to estimate this? Are there any databases that have compiled at least part of the information?

Please reply to Erik Meijaard. Email: emeijaard@pnc-int.com.

Science Shorts

Changing Human Behavior as a Conservation Strategy

Hunt Allcott and Sendhil Mullainathan. 2010. Behavior and Energy Policy. *Science* **327**: 124-1205.

When I first showed up at Duke University, one could still find segregated public restrooms in North Carolina. When I attended my first faculty party in 1980, I think half the faculty drove home alcohol impaired. Smoking in bars?

Given information, people change their behavior, and these changes could be good for conservation— except we do not ask—or we do not ask in the right way. Allcott and Mullainathan’s article in *Science* reports on a remarkable study that examined the effects of simply displaying on gas and electricity bills a few tips about energy conservation plus each household’s energy consumption along with the consumption of similar households. Compared to controls (bills lacking the comparison), energy consumption was reduced on average by over 2%. Nothing heavy-handed—just tapping into our competitive nature (surely we can do better than our neighbors in energy conservation). Now 2% might not seem like much—but what is impressive was how easy and fast it was to get that change. And then there is the economics of it all. There are a lot of energy technology choices and options being discussed for the US—all designed to reduce our carbon emissions. These approaches cost between \$15 and \$44 per ton of CO₂ abated. In contrast, the little energy bill “trick” does not cost anything per ton of CO₂ abated—to the contrary it saves \$165 per ton CO₂ abated.

Human behavior is adaptable and can be smart. It is up to conservationists to take advantage of that possibility.

P Kareiva

The Key Role of Human Nature in Conservation.

Johnson, D., and S. Levin. 2009. The tragedy of cognition: psychological biases and environmental inaction. *Current Science* **97**:593-603.

Just like the above, this is an interesting paper about the importance of psychology in conservation. Much effort by environmentalists is focused on explaining and disseminating scientific facts. This paper suggests that the greater struggle should be to make facts more relevant to a collection of largely uninterested, distracted and biased human brains. One reason that this psychological dimension has been overlooked in conservation is the pervasive dominance of rational logic in academic and journalistic reporting. Conservationists are reluctant to discard the clean rational-choice paradigm for the messier and more complex reality of human nature.

Johnson and Levin point out the systematic biases in judgment and decision-making that we are all subject to. The bad news about psychological biases is that they lead people to downplay the probability and danger of environmental change, and their role in it, while increasing their perceived incentives to maintain the status quo, and to blame problems on others. Discounting plays a huge role: people are relatively insensitive to long-term and hypothetical dangers such as future environmental degradation and climate change, and much more sensitive to immediate and concrete personal experience such as floods and earthquakes.

The authors call for a better understanding of human psychology in conservation, and an adaptation of conservation approaches that are more accurately attuned to the psychological biases that we are all subject to. If beer, women, and money drive the average middle-aged western man, then a new sitcom about riotous, beer guzzling, gorgeous and rich conservationists might do a more effective job in raising grassroot support than another show about suffering orangutans.

E Meijaard

Missing the Obvious

Paul West, G. Narisma, C. Barford, C. Kucharik, and J. Foley. 2010. An alternative approach for quantifying climate regulation by ecosystems. [Frontiers in Ecology and the Environment](#)

Conservationists vigorously argue that protecting forests is good for humanity because forests absorb CO₂ from the atmosphere and thereby slow down global warming. This is true. But conservationists have largely overlooked another “climate benefit” of intact vegetation—direct regulation of climate by altering albedo, heat fluxes, and evaporation. City dwellers who are lucky enough to live in cities with abundant trees and parks can benefit from a cooling effect that is as much as 5 degrees Fahrenheit during the summer. All vegetation has the capacity to alter temperature and humidity directly, with the magnitude of this impact being as much as 3 degrees Fahrenheit in boreal and tropical regions. In the boreal regions vegetation warms the local climate, and removal of the vegetation causes cooling. In tropical regions vegetation cools the local climate and a removal of it causes local warming. The effects are significant enough to have impacts for agriculture and human comfort.

Paul West and colleagues provide a global map of the direct climate regulation conferred by intact vegetation. Their index of climate regulation is only a first approximation because it essentially contrasts intact vegetation to bare ground. Even so, the direct ameliorating effects of vegetation on climate are substantial enough that they warrant more attention when evaluating land use change. Plants do a lot more for us than simply absorbing CO₂.

P Kareiva

Orgspeak and News

Coda Global Fellows Program Seeks Quantitative Monitoring Candidates

The Coda Global Fellows Program is well on its way to meet its target of more than 50 Fellowships for FY10. Last year's total of 37 Fellowships was already double the number of any previous year. Part of TNC's Conservation Methods and Learning team in Central Science, the Fellows program deploys staff on short-term assignments to meet program and project needs in all areas of technical and organizational expertise and anywhere that TNC is working.

Currently, the Fellows program is seeking staff who have expertise and experience in quantitative monitoring to serve on future Fellowships. If you are interested in being a Fellow, please contact Fellows Program Director Jolie Sibert at jsibert@tnc.org and fill out [this brief questionnaire](#). If your program could use a Fellow to help fill any short-term expertise or capacity gap, please visit [the Fellows Program intranet site](#) and complete the [request form](#).

J Sibert

About the authors

Russell Leiman
Managing Director Asia-Pacific
The Nature Conservancy
Email: rleiman@tnc.org

Peter Kareiva
Chief Scientist
The Nature Conservancy
Seattle, WA
Email: pkareiva@tnc.org

Mark Spalding
Senior Marine Scientist
Global Marine Team, The Nature Conservancy and
Conservation Science Group, University of
Cambridge
Newmarket, UK
Email: mspalding@tnc.org

Jolie Sibert
Director, Coda Global Fellows Program
The Nature Conservancy
Conservation Methods and Learning
Tucson, AZ
Email: jsibert@tnc.org

Juliann Aukema
Senior Scientist and Coda Global Fellow
Climate Change Adaptation Team
The Nature Conservancy
Email: jaukema@tnc.org

Erik Meijaard
Forest Director
People and Nature Consulting
Jakarta, Indonesia
Email: emeijaard@pnc-int.com

Contact the Editor

Dr. Erik Meijaard

Editor Science Chronicles

People and Nature Consulting International

<http://www.people-nature-consulting.com/>

Vila Lumbung House No. 6, Jalan Raya Petitenget 1000X, Kerobokan, Badung 80361, Bali, Indonesia

Phone/Fax +62-812-5514006

E-Mail: emeijaard@pnc-int.com**TNC publications (2010)**

Please send new citations and the PDF (when possible) to: pkareiva@tnc.org and emeijaard@pnc-int.com

NOTE: New additions in red; TNC affiliated authors highlighted in bold.

Benítez, S., A. Blanco, J. Cole, M. Ibáñez, J. J. Rodríguez, and S. Halloy. 2010. Using water funds to finance watershed conservation in the Andes and Costa Rica. Mountain Forum **10**:71-73.

Biggs, R., M. W. Diebel, D. Gilroy, A. M. Kamarainen, M. S. Kornis, N. D. Preston, J. E. Schmitz, C. K. Uejio, M. C. Van De Botert, B. C. Weindel, **P. C. West**, D. P. M. Zaks, and S. R. Carpenter. In press. Preparing for the future: teaching scenario planning at the graduate level. Frontiers in Ecology and the Environment doi: 10.1890/080075.

Brown, J., L. Bach, A. Aldous, A. Wyers, and J. DeGagne. In press. Groundwater-dependent ecosystems in Oregon: an assessment of their distribution and associated threats. Frontiers in Ecology and Environment doi:10.1890/090108.

Cardillo, M., and **E. Meijaard.** In press. Phylogeny and the co-occurrence of mammal species on southeast Asian islands. Global Ecology & Biogeography.

Cohen, J. B., S. M. Karpanty, J. D. Fraser, and **B. R. Truitt.** 2010. The effect of benthic prey abundance and size on red knot (*Calidris canutus*) distribution at an alternative migratory stopover site on the US Atlantic Coast. Journal of Ornithology **151**:355-364.

Copeland, H. E., S. A. Tessman, E. H. Girvetz, L. Roberts, C. Enquist, A. Orabona, S. Patla, and J. M. Kiesecker. 2010. A geospatial assessment on the distribution, condition, and vulnerability of Wyoming's wetlands. Ecological Indicators **10**:869-879.

Denning, C. A., J. Christensen, and **R. I. McDonald.** In press. Did land protection in Silicon Valley reduce the housing stock? Landscape and Urban Planning doi:10.1016/j.biocon.2010.01.025.

- Doherty, K. E., D. E. Naugle, **H. Copeland**, **A. Pocewicz**, and **J. Kiesecker**. in press. Energy development and conservation tradeoffs: systematic planning for sage-grouse in their eastern range. *Studies in Avian Biology*: <http://sagemap.wr.usgs.gov/monograph.aspx>.
- Drever, C.R.**, Snider, J., Drever, M.C., 2010. Rare forest types in northeastern Ontario: a classification and analysis of representation in protected areas. *Canadian Journal Forest Research* 40, 423-435.
- Drummond, S. P., K. Wilson, **E. Meijaard**, M. Watts, R. Dennis, **L. Christy**, and H. P. Possingham. 2010. Influence of a Threatened-Species Focus on Conservation Planning. *Conservation Biology* 24: 441-449.
- Enderson, E. F., A. Quijada-Mascareñas, **D. S. Turner**, R. L. Bezy, and P. C. Rosen. 2010. Una sinopsis de la herpetofauna con comentarios sobre las prioridades en investigación y conservación. Pages 357-383 in F. Molina and T. Van Devender, editors. *Diversidad Biológica de Sonora*. Universidad Nacional Autónoma de México.
- Fletcher, R.J.J., Robertson, B.A., Evans, J.S., **Doran, P.J.**, Alavalapati, J.R.R., Schemske, D.W., 2010. Biodiversity conservation in the era of biofuels: risks and opportunities. *Frontiers in Ecology and the Environment* doi: 10.1890/090091.
- Fuller, D., **E. Meijaard**, **L. Christy**, and T. C. Jessup. In press. Spatial assessment of threats to biodiversity within East Kalimantan, Indonesia. *Applied Geography*.
- Game, E. T.**, H. Grantham, A. J. Hobday, R. L. Pressey, A. T. Lombard, L. E. Beckley, K. Gjerde, R. Bustamante, H. P. Possingham, and A. J. Richardson. 2010. Pelagic MPAs: The devil you know. *Trends in Ecology & Evolution* 25:63-64.
- Gleason, M.**, S. McCreary, M. Miller-Henson, J. Ugoretz, E. Fox, M. Merrifield, W. McClintock, P. Serpa, and K. Hoffman. 2010. Science-based and stakeholder-driven marine protected area network planning: A successful case study from north central California. *Ocean & Coastal Management* 53:52-68.
- Golet, G. H.**, T. Gardali, J. Hunt, D. Koenig, and N. Williams. In press. Temporal and taxonomic variability in response of fauna to riparian restoration. *Restoration Ecology*.
- Graham, N. A. J., **M. D. Spalding**, and C. R. C. Sheppard. 2010. Reef shark declines in remote atolls highlight the need for multi-faceted conservation action. *Aquatic Conservation: Marine & Freshwater Ecosystems*. DOI: 10.1002/aqc.1116.
- Griscom, B.**, H. Griscom, and S. Deacon. In press. Species-specific barriers to tree regeneration in high elevation habitats of West Virginia. *Restoration Ecology*.
- Herbert, M.E.**, McIntyre, P.B., **Doran, P.J.**, Allan, J.D., Abell, R., In press. Terrestrial reserve networks do not adequately represent aquatic ecosystems. *Conservation Biology*. DOI: 10.1111/j.1523-1739.2010.01460.x.
- Hoekstra, J. M.**, J. L. Molnar, M. Jennings, C. Revenga, **M. D. Spalding**, T. M. Boucher, J. C. Robertson, T. J. Heibel, and K. Ellison 2010. The Atlas of Global Conservation: Changes,

Challenges, and Opportunities to Make a Difference. University of California Press, Berkeley, USA.

Imbach, P., L. Molina, B. Locatelli, O. Roupsard, P. Ciais, **L. Corrales**, and G. Mahe. 2010. Regional modeling of vegetation and long term runoff for Mesoamerica. Hydrology and Earth System Sciences 7:801-846.

Kareiva, P. 2010. Am I Making Myself Clear? A Scientist's Guide to Talking to the Public. Science 327:34-35.

Kareiva, P. 2010. Don't Be Such a Scientist Talking Substance in an Age of Style. Science 327:34-35.

Lawler, J. J., **T. H. Tear**, C. Pyke, M. R. Shaw, P. Gonzalez, **P. Kareiva**, L. Hansen, L. Hannah, K. Klausmeyer, A. Aldous, C. Bienz, and S. Pearsall. 2010. Resource management in a changing and uncertain climate. Frontiers in Ecology & the Environment 8:35-43.

Louys, J., and **E. Meijaard**. in press. Palaeoecology of Southeast Asian megafauna-bearing sites from the Pleistocene and a review of environmental changes in the region. Journal of Biogeography.

Low, G., L. Provencher, and **S. L. Abele**. 2010. Enhanced conservation action planning: assessing landscape condition and predicting benefits of conservation strategies. Journal of Conservation Planning 6. Available online at: <http://www.journalconsplanning.org/2010/index.html>.

Kiesecker, J. M., H. Copeland, A. Pocewicz, and **B. McKenney**. in press. Development by design: blending landscape-level planning with the mitigation hierarchy. Frontiers in Ecology & the Environment doi:10.1890/090005.

McDonald, R. I., R. T. T. Forman, and **P. Kareiva**. 2010. Open space loss and land inequality in United States' cities, 1990-2000. PLoS One 5:e9509. doi:9510.1371/journal.pone.0009509.

McKenney, B., and J. M. Kiesecker. 2010. Policy development for biodiversity offsets: A review of offset frameworks. Environmental Management:165-176.

Menges, E. S., R. W. Dolan, R. Pickert, R. Yahr, and **D. R. Gordon**. 2010. Genetic variation in past and current landscapes: Conservation implications based on six endemic Florida scrub plants. International Journal of Ecology Article ID 503759, 12 pp. doi:10.1155/2010/503759.

Menges, E. S., and **D. R. Gordon**. 2010. Should mechanical treatments and herbicides be used to manage Florida's natural areas? A review of their use as fire surrogates or pre-treatments in upland ecosystems across the state. Florida Scientist 73:147-174.

Meijaard, E., Umilaela, and G. de Silva Wijeyeratne. In press. Aquatic flight behaviour in mouse-deer provides insight into tragulid evolution. Mammalian Biology.

Murphy, M., **J. S. Evans**, and A. Storfer. In press. Quantify *Bufo boreas* connectivity in Yellowstone National Park with landscape genetics. Ecology

Nielsen-Pincus, M., C. Goldberg, **A. Pocewicz**, J. E. Force, L. P. Waits, P. Morgan, and L. Vierling. 2010. Predicted effects of residential development on a northern Idaho landscape under alternative

growth management and land protection policies. Landscape and Urban Planning **94**:255-263.

- Opperman, J. J., R. Luster, B. A. McKenney, M. Roberts, and A. W. Meadows.** 2010. Ecologically functional floodplains: Connectivity, flow regime, and scale. Journal of the American Water Resources Association **46**:211-226.
- Panzer, R., **K. Gnaedinger**, and G. Derkovitz. 2010. The Prevalence and status of conservative prairie and sand savanna insects in the Chicago Wilderness Region. Natural Areas Journal **30**:73-81.
- Poff, N. L., and **J. K. H. Zimmerman.** 2010. Ecological responses to altered flow regimes: a literature review to inform environmental flows science and management. Freshwater Biology **55**:194-205.
- Richter, B. D.**, S. Postel, **C. Revenga**, T. Scudder, B. Lehner, A. Churchill, and M. Chow. In press. Lost in development's shadow: the downstream human consequences of dams. Water Alternatives.
- Rothlisberger, J.D., **Chadderton, W.L.**, McNulty, J., Lodge, D.M., 2010. Aquatic invasive species transport via trailered boats: what is being moved, who is moving it, and what can be done. Fisheries Bulletin **35**, 121-132.
- Shinneman, D. J., **M. W. Cornett**, and B. Palik. In press. Simulating restoration strategies for a southern boreal forest landscape with complex land ownership patterns. Forest Ecology and Management.
- Slapcinsky, J. L., D. R. Gordon**, and E. S. Menges. 2010. Responses of rare plant species to fire across Florida's fire-adapted communities. Natural Areas Journal **30**:4-19.
- Spalding, M. D.**, M. Kainuma, and L. Collins. In press. World Atlas of Mangroves. Earthscan, with International Society for Mangrove Ecosystems. Food and Agriculture Organization of the United Nations, UNEP World Conservation Monitoring Centre, United Nations Scientific and Cultural Organisation, United Nations University, London, UK.
- Spehar, S. N., P. D. Mathewson, Nuzuar, S. Wich, A. J. Marshall, H. Köhl, **Nardiyono**, and **E. Meijaard**. In press. Estimating orangutan densities using the standing crop and marked nest count methods: Lessons learned for conservation. Biotropica.
- Stricklin, A. G., M. S. Peterson, J. D. Lopez, C. A. May, C. F. Mohrman, and M. S. Woodrey.** 2010. Do small, patchy, constructed intertidal oyster reefs reduce salt marsh erosion as well as natural reefs? Gulf and Caribbean Research **22**:21-27.
- Struebig, M. J., **L. Christy**, D. Pio, and **E. Meijaard**. 2010. Bats of Borneo: diversity, distributions and representation in protected areas. Biodiversity & Conservation **19**:449-469.
- Sutherland, W. J., M. Clout, I. M. Côté, P. Daszak, M. H. Depledge, L. Fellman, E. Fleishman, R. Garthwaite, D. W. Gibbons, J. De Lurio, A. J. Impey, F. Lickorish, D. B. Lindenmayer, J. Madgwick, C. Margerison, T. Maynard, L. S. Peck, J. Pretty, S. Prior, K. H. Redford, J. P. W. Scharlemann, **M. Spalding**, and A. R. Watkinson. 2010. A horizon scan of global conservation issues for 2010. Trends in Ecology and Evolution **25**:1-7.

- Venter, O., J. Watson, **E. Meijaard**, W. F. Laurance, and H. P. Possingham. 2010. Avoiding unintended outcomes from REDD. *Conservation Biology* **24**:5-6.
- Weeks, R., G. R. Russ, A. C. Alcala, and A. T. White.** 2010. Effectiveness of marine protected areas in the Philippines for biodiversity conservation. *Conservation Biology* **24**:531-540.
- Wells, J. F., B. Robertson, K. V. Rosenberg, and **D. W. Mehlman**. 2010. Global versus local conservation focus of U.S. state agency endangered bird species lists. *PLoS ONE* **5**:e8608. doi:8610.1371/journal.pone.0008608.
- West, P. C., G. T. Narisma, C. C. Barford, C. J. Kucharik, and J. A. Foley.** In press. An alternative approach for quantifying climate regulation by ecosystems. *Frontiers in Ecology and the Environment* doi:10.1890/090015.
- Wilson, K., **E. Meijaard**, S. Drummond, H. Grantham, L. Boitani, G. Catullo, **L. Christie**, R. Dennis, I. Dutton, A. Falcucci, L. Maiorano, H. Possingham, C. Rondinini, W. Turner, O. Venter, and M. Watts. in press. Conserving biodiversity in production landscapes. *Ecological Applications*.
- Wunderle, J. M., D. Currie, E. Helmer, **D. Ewert**, J. White, T. Ruzycki, B. Parresol, and C. Kwit. 2010. Kirtland's warblers in anthropogenically disturbed early successional habitats on Eleuthera, The Bahamas. *The Condor* **112**:123-137.
- Zanger, C., Waltz, A.,** 2010. Prioritizing Restoration in Fire-Adapted Forest Ecosystems. In Mapping Forestry, ed. P. Eredics. ESRI Press.
- Zimmerman, J. K. H., B. H. Letcher, K. H. Nislow, K. A. Lutz, and F. J. Magilligan.** In press. Determining the effects of dams on subdaily variation in river flows at a whole-basin scale. *River Research and Applications* DOI: 10.1002/rra.1324.