the
science chronicles

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ecosystem services

by heather tallis

The buzz about ecosystem services is overwhelming and many in TNC are worried about the risks of overselling, misapplying or simply failing in conservation projects that are based on ecosystem services.

To successfully harness the energy of the ecosystem services concept, The Conservancy needs to do three things:

1. adopt a definition of ecosystem services that helps standardize projects and measures
2. embrace all the mechanisms for incorporating ecosystem services into conservation (it's not all about markets!)
3. develop guidelines for ecosystem service project design.

A useful definition

Much of the present confusion around ecosystem services comes from the definition itself. The most commonly used definition is "the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life". On the surface, this definition is easy to understand, but when we move to the project level, it provides little guidance for how to identify or measure ecosystem services.

Let's use the provisioning of clean, fresh water as a popular example. What is the actual service, and how will you measure success of a project aimed at maintaining it? Under the classic definition, we are dealing with at least three services in such a project; provisioning of fresh water, the regulating service of water purification and the supporting service of nutrient cycling that maintains water quality. To measure progress, you could measure water flow, contaminant or nutrient loads in the water, land cover classes, nutrient cycling rates in riparian areas, or water treatment costs. But which do you measure? One, two, all of them? A group of researchers at Resources for the Future (RFF) in Washington, D.C. has come up with an alternative (read their paper at http://www.rff.org/rff/Documents/RFF-DP-06-02.pdf). Their definition reads as follows:

Ecosystem services *are "the components of nature, directly enjoyed, consumed or used to yield human well-being".*

Initially, this may seem very similar to the common definition above, but on closer look it is, in fact, quite limiting. With this definition, we have an easy answer to our dilemma in the clean water example. Since ecosystem services are those things in nature *directly* enjoyed or consumed, high quality, consumable water is the service, and we would measure contaminant or nutrient loads to monitor progress of the project. The thinking is that the other classically defined services must be in place for water quality to meet our standards. Your conservation action may be to protect a tract of forest in the watershed, but measuring forest cover does not show that you have provided clean

water. Protecting the forest, then showing maintained levels of water quality does. The RFF paper gives a comparative example of valuing a car for the calculation of gross domestic product (GDP). The market value of the car is counted, but the value of the steel used to make the car or the hours of labor needed for its construction are not. The value of the steel and the work is, in theory, reflected in the value of the car.

This definition also provides an easy means for representing multiple services associated with one kind of habitat, or 'bundling'. If you wanted to motivate protection of a riparian area by showing its ecosystem services value, you could clearly identify what to measure using this new definition. Nutrient cycling is an important ecosystem service provided by riparian areas, but instead of measuring cycling rates, you would measure soil quality and water quality. This definition also allows for the easy inclusion of more conservation-related goals. The aesthetic or recreational services associated with the riparian habitat would be measured as the presence or abundance of species. This is not the full list of services that could be attributed to a riparian area, but you can see how this definition guides the selection of services and measures.

looking beyond markets

Definitions aside, the aspect of ecosystem services that most people are talking about is the markets. How do we develop new markets? What do we do in places where markets are hard to access? Why are people suddenly going to pay for things they now get for free? Some of these questions can be answered, largely through policy action as Bill Ginn explained in Austin, but some cannot. Luckily, ecosystem services are not all about markets. There are many non-market pathways to use ecosystem service values to motivate conservation-related change. For example, ecosystem service valuations can motivate allocation of government funds to projects that benefit conservation. Erika Zavaleta, a TNC Smith Fellow in 2001 and now a professor at the University of California, Santa Cruz, did a study in 2000 showing that the invasive shrub, tamarisk, costs the U.S. $285 million USD a year in lost irrigation water, municipal water, hydropower and flood control. She also showed that full eradication efforts would pay for themselves within 17 years. As a result of her work, California passed legislation to fund tamarisk containment, the National Invasive Species Council created a fund for tamarisk research and Congress passed a bill to give $125 million USD to tamarisk removal projects. If this money is spent wisely, these projects will help restore natural fire regimes and habitat for birds, reptiles and mammals that are negatively affected by tamarisk. These policy advances can benefit people and nature, yet nothing will be traded in a market.

Although motivating policy action can be very effective in the U.S., there are many parts of the world where this is not a viable option. There, we have another opportunity to use ecosystem services to enhance conservation through non-traditional pathways. International aid organizations regularly fund development projects that have negative consequences for the environment. At times, these consequences lead to project failure from the human perspective as well. Ecosystem service valuation could be used to guide these development

projects, ensuring that they result in sustainable outcomes that benefit humans and biodiversity.

For example, a development project in India established a shrimp aquaculture industry in a mangrove area. The species of shrimp used cannot be brought to reproductive maturity in captivity, so farmers rely on wild brood stock to keep their aquaculture going. However, so many farms were established that the natural habitat of the shrimp, mangrove forests, severely declined. The lack of habitat meant a lack of brood shrimp, and the gap between demand and supply became so great that a single brood shrimp could sell for $2000 USD on the market. If the development bank had conducted an ecosystem service valuation for the mangroves that included the value of brood shrimp, they could have identified a number of farms that would allow an increase in the local economy from shrimp production while maintaining enough mangrove habitat to provide brood shrimp. What's good for brood shrimp is good for many other mangrove-dwelling species, so sustainable development has added conservation value. By working with development banks, TNC can minimize the impacts of development that will continue to happen in some of the most biodiverse regions, especially as countries push to meet the Millennium Development Goals. These are just two of the many non-market mechanisms that should be developed in TNC's approach to ecosystem services.

guidelines

Regardless of the mechanism you choose, here are a few steps towards ensuring a successful ecosystem services project.

1. Know whether the service(s) overlaps with biodiversity.

For example, we generally think that more forest cover means higher quality water. But a recent study by the Trust for Public Lands and the American Water Works Association shows that water treatment costs decline 12% with every 10% increase in forest cover, up to a point. Once there is more than 70% forest cover in a watershed, there are no further returns on increasing forest cover. Thus any increase in forest cover above 70% might be good for biodiversity, but it has no payoff in terms of higher water quality.

2. Choose services that will show return on investment in a realistic time frame.

There are many ecosystem processes that vary over long time frames. For example, showing that a conservation project alters flood frequency or intensity will likely take 50-100 years. No matter how committed you are to conservation, sticking around long enough to see those results is a tall order. Conservation projects that will eventually have flood control benefits likely provide other ecosystem services that have a shorter response time like soil quality. Focusing on these will ensure that you can show progress in a time frame that resonates with other stakeholders.

3. Know the mechanism you will use to show or realize ecosystem service

value and make sure that it is tied to your conservation goal.

Carbon credits are currently the most promising ecosystem service for market trading. But, you can get carbon credits for planting non-native trees in native grasslands. That kind of carbon credit project could endanger native species and negatively impact soil and water quality. When trees are planted into native grasslands, they often use more water than native vegetation and can draw saline groundwater closer to the surface, causing soil salinization and making water undrinkable for native species and people. Knowing the ecology of the region will help avoid unintended consequences like this.

4. Have an economist, ecologist and social scientist to work with.

Following steps 1-3 will be much easier if you are not working alone. TNC has a long history of working with people and nature, and although the skills developed through this history can bring us far along the path to successful ecosystem service projects, new types of collaborations will be essential.

popular nightlife

by lynn lozier

"Popular Nightlife" proclaims a billboard above the Congress Avenue Bridge, just ten blocks south of the capital in Austin, Texas. This advertisement for townhouses is dominated by a huge image of a Mexican free-tailed bat in flight. I learned just what this meant with a handful of other conference attendees when we walked five minutes from the hotel to sit on a knoll just south of the bridge. Together we watched hundreds of bats a minute pour from under it and wing their way out over the water and beyond. And "popular" they were! At dusk on this humid Sunday evening about a hundred and fifty people shared our knoll or lined the rail up on the bridge. Families with strollers, tourists, and city workers on their way home sat in the still air, with a hint of "diaper pail" odor, and watched as individual bats blended into a streaming cloud that poured southward for fifty minutes – outbound on its nightly insect-hunting mission.

It wasn't always so. In 1982 the original Congress Avenue Bridge deck was replaced with a larger modern structure equipped with parallel, sixteen-inch deep groves called "expansion cracks" running the length of the under surface. Soon these migratory bats, *Tadarida brasiliensis mexicaba* (I. Geoffroy, 1824), began to discover that the one- to four- inch wide gaps were ideal warm, damp, narrow places to roost and raise their young. At first the community was alarmed, circulating petitions to have the bats removed. Then, in 1986, Mervin Tuttle founder of Bat Conservation International (BCI) moved his organization with its one other staffer from Milwakee to Austin to focus on the education challenge. Tuttle focused on the ecosystem services provided by the bats and approached it in what is now classic community-based conservation style. Mark Bloschock, the

Department of Transportation special projects engineer, described Tuttle's effort as "brilliant, nonconfrontational environmentalism." "You don't get in anybody's face; you deal with the facts and you educate people and let them make their own decisions."

Tuttle focused on the fact that every night, each of the 750,000 to 1.5 million bats that use the bridge eats its own weight in insects. Although a Mexican free-tailed bats weigh just fifteen grams (about half an ounce), this amounts to 6,000 to 12,000 kg (13,000-26,000 *pounds*) of insects consumed with each nocturnal flight. The crop pests and mosquitoes gleaned from their thousand square mile foraging area is a great service to the community, and thanks to BCI's advocacy, the amazing spectacle has become a serious tourist attraction. More than 100,000 people turn out to watch them each year, bringing an estimated $8 million to the local economy.

In 1990, when concerns were expressed that visitors might pick up an injured bat and have a (very low) risk of rabies exposure, instead of just posting cautioning signs, the city's parks department also sponsored a set of interpretive kiosks, developed with the assistance of BCI, telling the whole story of the bats' arrival and insect-eating life style. Grade school student Bat Club members with "Ask Me About Bats!" buttons provided interpretation at the dedication. Developed by BCI, these clubs provide a ten-week program open to Kindergarten through sixth grade.

Now, each March three-quarters of a million female Mexican free-tailed bats arrive from the south. Each measures about 9 cm (3 ½ inches) from wing tip to wing tip with the end of the tail extending beyond the hind edge of the "wing" or flying membrane. (This is why they are called "free tailed".) In June, each bears a single baby which is nursed for five to six weeks. By August the youngsters are foraging with their mothers, swelling the nightly emergence to 1.5 million animals.

They don't go unnoticed. Reservations at restaurants with a view of the spectacle are hard to come by, ditto for the boat tours which view it from below, (wear a hat). A large, kenetic bat sculpture rotates at the foot of the bridge, and the local brewery produces a popular Bat City Lager. In September before they depart for Mexico, they are celebrated with the annual "Batfest" including live music, food, arts and crafts, educational displays, and, of course bat watching. And to ensure they aren't forgotten over the winter, in 1996 when Austin launched its entry into the Central Hockey League, the team took as its name the "Austin Ice Bats". Although bats are not exactly "hug-able", these animals, reportedly the largest urban bat colony in North America, have been embraced by the community!

interview

with terry richey, vp of marketing and philanthropy on the single most important attribute of tnc: our science

with stacey solie

How do you describe the relationship between tnc scientists and the philanthropy staff?

In our division we have about 200 staff. I would say half of those interface with the science staff at some point during the year and the reports I get back are very positive and constructive.

Okay, but what are the complaints?

What frustrates the marketing and philanthropy staff about science is the lack of conclusions that scientists often are faced with. In [the scientist's] mind it's a constantly changing arena. You're always learning more, always testing. In general there's a frustration with that, but that's inherent in science, whether you're at Harvard, or WWF or TNC.

I know from over-the-beer discussions that the scientists get frustrated with the philanthropy staff for oversimplifying complex subjects.

People say the NYT is geared for someone with a twelfth grade vocabulary, and that many newspapers are geared much lower than that. What education level do you assume for your readers?

We have different levels. From a philanthropy point of view, we aim at a post graduate level. Most of the people that support us financially have a post-grad education, and they will absorb a significant amount of technical information, of science. On the consumer side, our web presence, we're probably taking a post high school approach to that, or it may be at a baccalaureate level.

That site is a vast collection of people coming there for all kinds of purposes, and most of the purposes are very simplistic. Most of it is someone doing a homework assignment, or they want to know if there's a preserve near the town they're visiting. We're at the very beginning of trying to understand how to use our website to help people navigate into information they're interested in. It's tough for us to do that with three people.

It strikes me as odd that there are only three people allocated to managing the website.

I think it's crazy. People always wonder how could you have such a multi-faceted website managed by only three people? Our dilemma is figuring out what group of people we want to serve in that website. Right now our principal focus is trying to serve the needs of the millions that come there looking to a relatively simple piece of information. We want to begin to engage them in the value of conservation. We want to show

a range of things that might capture the imagination. As we get better we can let people go deeper into what they're interested in, the science, the policy, and the geographies.

Is there a five year plan, or any kind of plan, for ramping up the internet staff?

No. There are a lot of competing interests for growth money.

Still, what we believe is that in the future, the web will be a much better delivery system for a lot of the content we deliver right now on paper. The question is how to do that without putting a dam on the funding pipeline. For example, one idea is that in the long run donors and funders could choose to have the magazine delivered digitally. Then we could include all kinds of reports, associated, white papers, studies, blogs about particular issues of interest, and really allow the reader to have an active experience, where they can find out as much as they want.

We see the promise of that, but we have to figure out how to migrate in that direction without upsetting the apple cart. Each magazine generates about 10 million in bequests to the Conservancy. It's a fairly serious consideration to migrate that to the digital world.

I had no idea the magazine generated that much money.

And the magazine also has only three people on staff.

Another thing that's happening is we're concluding our Identity project, which looked at the attitudes people have about TNC. The single most important attribute in the minds of investors is our science base. That should make our scientists very happy. That gives us a substantial amount of credibility. The question is how to turn that into something that people can access--something between nature.org and Conserve Online. There's a vast amount of space between those two things.

Is there anything new going on that people should know about?

We're trying to explore some other channels by which we could get our science more visible, including developing a partnership with National Geographic. We're discussing a range of possibilities for how to access our experts in the field, and funnel them into web channels or magazine channels.

What do you think of training programs like the Aldo Leopold fellowship, for helping scientists learn to communicate better?

I don't know about that, but we have marketing communications professionals in key locations all around the country. These are people who have significant expertise at working with scientists and managers to develop messaging. The reports I get back about these staff are just very very positive. They came to work here because they don't have an inclination to be superficial, they like the science. But they also understand that you have to translate the messages into words that people understand. Everybody can use help with that. We're in a good place to encourage our science staff in every form to be more visible, if they want to.

org speak with a twist

tnc land stewards: be part of something bigger

by peter kareiva

Last month's *science chronicles*, and some of my previous ranting might give the impression that science at TNC is all about publishing, publishing, publishing. Meanwhile, the essay by Jacquart and Helzer in last month's Chronicles emphasized that stewards can be making valuable contributions without ever publishing. I agree. Publishing is NOT the only way to science heaven. But, and this is an important BUT -- somehow what we learn has to be shared. The website www.conservationevidence.com collates evidence on the effectiveness of conservation management practice. A major aim of the site is to provide a means for practitioners (such as site managers, land stewards and conservation volunteers) to document their experiences on the effectiveness of different management techniques. It is hoped that this will then enable those involved in species or habitat management to improve conservation practice by learning lessons from each other. This website and effort is being championed by William Sutherland at University of East Anglia (see TREE 2004, 19:305-308), and is gaining adherents around the world.

TNC needs to be a part of this. As a start, if you have conducted any sort of management experiment (fire treatment, grazing, invasive species control) with clear goals (reducing an invasive or increasing target cover or abundance or condition) please submit your case study via www.conservationevidence.com. A case is typically divided into three main sections: Background, Action and Consequences. It need not be complicated and each of the main sections could comprise just a few sentences. It would be worthwhile to spend a little time browsing some of the cases currently published in order to gain a better understanding of what the website is about.

TNC imposes numerous requests to fill out surveys, spread sheets etc, and if you are like me, you wonder why and what happens to all that information. I remember some of the most absurd spreadsheets I have ever seen in my life as part of the reorganization three years ago (I cannot even remember the silly name for those spreadsheets). What happens to all this information TNC requests from you? Evidence based conservation is different. I can tell you what happens to your information. It becomes a publicly available global resource for fellow land stewards everywhere in the world. That is what publications do as well – but this is much less work than a publication and strips the lessons down to their essentials –what did you do and how well did it work? No literature review, glorification of generality, and gratuitous sermonizing. Rather than adding cases directly to the website some find it easier to add cases using the template below. This can then be e-mailed (to d.showler@uea.ac.uk or w.sutherland@uea.ac.uk) for

submission. If you want help, e-mail me, and I will help. If you have information you want to submit, or do submit on your own, please e-mail and cc: Tim Tear (ttear@tnc.org). Tim wants to know who has information out there, and can also work with you to make this happen.

So, alright you do not have time to publish. What is your excuse for not being a conservation citizen in this way? There is no excuse. We talk a lot about being part of a larger community and leverage and partnering, but as far as I can tell we remain stunningly insular. The evidence based conservation website is a way to escape our incestuous past. I know we are all busy, so initially I expect only a few of you will add something to this website. But it really is important and gratifying. In time, wouldn't it be cool if your supervisors valued that you had contributed a case study to this global exchange?

An easy way to add cases to conservationevidence.com – please fill in as appropriate

Case Title	Include within the title the general action being undertaken (e.g. herbicide treatment, nest box provision etc.), the species (including scientific name) and site name or area:
Contributor	The name of the person writing the case and involvement (if any) with the work being described:
Organisation	Please give the name of the organization that did the work:
Country	
Region	County, province, state etc
Site name	Please give the name that is most likely to be useful. Give actual spatial coordinates if possible or details that would allow someone to come to close to relocating the site.
Habitat	A simple description e.g. deciduous woodland, grassland or marsh etc. is all that is required:
General issue	(we will add this)
General action	(we will add this)
Background	Why was the work done? Some information on the history of the site and/or an outline of the distribution and status of the species involved may be useful. For example, if the case describes an invasive plant then it could be useful to state when it arrived and/or what the main problems are or are likely to be as it spreads.
Action	What exactly was done? When was it done? Where was it done? Please give full details where possible. Please feel free to give technical information if appropriate e.g. the type of machine used or the exact way the herbicide was applied. If there were problems please describe them. If there are useful hints on the method please add. If something was unusual

	please describe if it might be important e.g. the weather was unusually dry.
Consequences	Please describe what was observed as a result of the Action undertaken. Please distinguish fact from speculation and quantify the results when possible. E.g. 'the mowing regime eradicated an estimated 65% (from quadrat sampling) of the invasive plant, but this might be more efficient earlier in the year before seeding started' or '11 of the 19 seedlings were grazed by rabbits, but this may have been atypically high as rabbits seemed unusually abundant'.
Tables, graphs or photos	If you have tables, graphs or relevant photos that you would like to add as attachments, pleased do so.

better than oprah

on the river

by mike dennis

Far Appalachia: Following the New River North, by Noah Adams, 2001, Random House.

I just finished a wonderful book "Far Appalachia" by Noah Adams, who has been the steady, mellow-voiced host of NPR's "All Things Considered" for many years. A few years back he interviewed me for an NPR piece but we spent most of the time talking about our whitewater rafting experiences on the New River, so I was pleased, but not surprised, when I came across this book.

Lyrical and captivating, it's is about one of the most ancient rivers in North America, the not so aptly named New River. In it, Adams chronicles his 350 mile excursion from the headwaters of the New River in the mountains of North Carolina, north into Virginia, then on into West Virginia where the "New" runs into the Gauley River. The New is unusual since, unlike most rivers in the East, it runs north through the heart of Appalachia. The author travels by foot, jeep, canoe, bike, raft and even airplane when he takes a short flight over the "New River Gorge" in a Cessna piloted by a 75-year-old former WWII pilot. His book not only gives a great feel for the wildlife and rhythms of the river, it also delves into the culture and history of the region.

Adams includes anecdotes about the Native Americans and original white settlers of this area, an account of a religious revival, stories about abandoned mill and coal towns along the shores, and a description of the people and music who attend the annual blue grass music festival in Galax, Virginia. Perhaps the high point of the book, both literally and figuratively, is his rendition of "Bridge Day" when hundreds of people parachute off the huge and high single span New River Gorge Bridge. Noah Adams, a native of eastern Kentucky, used this trip as a way to discover more about his own family's roots and history. In the process he has given us a well written, easy to read and informational story about one of this country's great but lesser known rivers.

global slumming

by stacey solie

Planet of Slums, by Mike Davis, Verso, 2006.

Last summer I spent time in a shantytown neighborhood on the southern edge of Bogota, Colombia. Ciudad Bolivar is where many—millions—of newcomers to the city wind up. The brown hillsides are stripped of vegetation and blanketed in pink brick shacks with tin roofs and dirt floors. A good portion of the residents are refugees: farmers, small-business owners, and home-owners who fled the war-torn countryside to escape harassment and death threats. They came to start anew, only to find that in addition to adjusting to harsh, landless city life, the edge of town is also a lawless low-level warzone. Order emerges not from legislated regulations enforced by police, but is instead dictated by urban networks of young men, often with ties to "paramilitary" forces. The hills and the shanties covering them are rumored to be owned by a wealthy emerald dealer, one who also commands the loyalty of the otherwise unemployed youth. Presumably at his bidding, these young men carry out frequent assassinations and make it their business to interrogate residents, enforce curfews and patrol the dusty roads. Murders go unreported and justice, if there is any, is meted out vigilante-style.

Basic living conditions are deplorable. The lucky have plumbing infrastructure supplied by small NGO's who operate successfully only by quietly providing aid. Much-needed social and political organization is undertaken only by fool-hardy and short-lived martyrs.

At the time I thought the shanties of Bogota represented some kind of strange, sad, but unique tragedy, a consequence of Colombia's convoluted political history, full of corruption, revolutionary violence and its backlashes. This new book, which documents the rise of slums around the outskirts of all the major cities in the world, stripped away that illusion.

There are currently approximately 200,000 slums in the world, and they're growing almost as fast as the population clock ticks. It is the relatively new reality (most count their beginnings from after the 1960's, and many from the last ten years) for upwards of a billion people. They've arisen so quickly and with such astonishing abundance that even where governments have tried, (Cuba, China), they have failed miserably to meet the burgeoning needs of the new urban masses.

Some places are worse than others—for example "85 percent of Kenya's population growth between 1989 and 1999 was absorbed in the fetid, densely packed slums of Nairobi and Mombasa." The UN Development Goal of halving poverty in many parts of Africa are projected to occur not in 2020, not 2050, but a hundred years later in 2150.

The pent-up frustration of slum dwellers seeps out far beyond neighborhood borders. "Security" becomes increasingly elusive for wealthier residents in nicer parts of

town. Private guards are hired, and private fears, sorrows and vendettas manifest in the public realm. Masses of bored, uneducated, unemployed youth in unplanned, destitute, densely populated urban settings provide fertile recruiting grounds for gang warlords, pimps, and in the Middle East, revolutionary 'terrorists'.

Davis' style is academic. He quotes relentlessly from U.N., NGO and government reports and piles on the case studies. The book holds no one up as a hero, and is not meant to inspire hope, but rather to establish the urgency of this rapidly worsening situation. Davis discredits almost all past strategies, and shows that even the oft-touted micro-enterprise lending programs have had no macro-economic impact, and have probably channeled funding from other more aggressive fixes. Davis also adds his voice to the growing chorus of World Bank detractors, skewering the structural adjustment programs touted by WB leaders in the 80's as having directly contributed to the problem.

Nature conservationists are becoming increasingly aware of the ties between human well-being and the ability of societies to prioritize, support and enforce environmental protection. This book relentlessly demonstrates the challenges ahead for our NGO colleagues who are working directly on these issues, and it's a shocking wake-up call for the rest of us about the state of humanity on earth today.

unpaid advertisements

ecoregional assessment and biodiversity vision toolbox

by rebecca esselman

The Global Conservation Approach Team has launched the ***Ecoregional Assessment and Biodiversity Vision Toolbox***; a new web-based resource available on ConserveOnline (http://conserveonline.org/workspaces/ecotools). This resource provides updated guidance, methods, tools and case studies to support staff involved in developing and implementing ecoregional assessments. The Toolbox grew out of a need to update available ecoregional assessment guidance to reflect our current understanding of the process. Many years of developing assessments and implementing results in a broader variety of geographies and data and staffing situations has provided us with valuable lessoned learned, facilitating refinement of our approach to Ecoregional Assessments.

The Toolbox is structured around the *Standards for Ecoregional Assessments and Biodiversity Visions*, a set of guiding principles that have been mutually developed by TNC and the WWF. The final version of the Standards is now available on ConserveOnline at http://conserveonline.org/docs/2006/02/EA%20Standards%201-26-06.pdf.

A benefit of providing guidance via a ConserveOnline workspace is the dynamic nature of the interface. For scientists, the resource can be helpful for identifying opportunities to test and strengthen our knowledge of ecoregion scale conservation. See the *Opportunities for Innovation* section at

the end of each unit for a summary of some key challenges associated with various aspects of the Ecoregional Assessment process. Further, this resource offers the opportunity to vet your work in the form of case studies and to receive feedback from others. Case studies and comments can be submitted through the workspace for posting. Finally, if you are aware of tools or resources you would like to see contained within the toolbox, please send your ideas to EAToolbox@tnc.org. The Toolbox will be updated as information is obtained and edited.

The Ecoregional Assessment and Biodiversity Toolbox is one component of a larger Conservation Approach Toolkit which is under development to provide similar guidance and linkages to information for developing strategies, Conservation Action Plans, and measuring the status and success of our conservation strategies, actions and progress towards organizational goals. Direct questions to Rebecca Esselman (resselman@tnc.org) or Jonathan Higgins (jhiggins@tnc.org).

calendar and events

April 27-28
Conserving Birds in Human-Dominated Landscapes: A Biodiversity Symposium American Museum of Natural History's Center for Biodiversity and Conservation (CBC)
New York City
http://cbc.amnh.org

June 26-29, 2006
SCB 20th Annual Meeting
San Jose, California

August 6-11, 2006
ESA: 91st Annual Meeting
Memphis, Tennessee

August 22-26th
First European Congress of Conservation Biology
With a symposia organized by Tosha Comendant and Carmen Ravenga.
http://www.eccb2006.org/
Edgar, Hungary

November 27-30th
TNC Conservation Science in Practice Conference
Tucson, AZ

contributors

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rebecca esselman is the conservation by design knowledge specialist in ann arbor.

jonathan higgins is a senior ecologist on the global conservation approach team and lives in chicago.

peter kareiva is a lead scientist in the science office and is based in seattle.

lynn lozier is the conservationtrack program director based out of san francisco.

stacey solie is the editor of the science chronicles and lives in new york city.

heather tallis is a doctoral student who has collaborated with the washington field office and the marine initiative. she will soon be starting a new position as the lead scientist for stanford's natural capital project in palo alto.

tnc publications 2006

The following publications have appeared in refereed journals, or in books and edited volumes that would be readily found through standard search engines. The point is to draw attention to publications that the broader scientific community can use as a source of data and information. . Send listings in this format to ssolie@tnc.org.

2006

Armsworth, P., Daily, G., Kareiva, P. and J. Sanchirico. 2006. Land Market Feedbacks Can Undermine Biodiversity Conservation. PNAS 103:5403-5408

Kareiva, P. Tear, T., Solie, S., Brown, M., Sotomayor, L. and C. Yuan-Farrell**.** 2006. Nongovernmental organizations. pages 176-191 in ***Endangered Species Act at Thirty***, edited by D. Goble, J. Michael Scott, and F. Davis. Island Press, Washington, DC.

Marshall, A. J., Nardiyono, L. M. Engström, B. Pamungkas, J. Palapa, E. Meijaard, and S. A. Stanley. 2006. The blowgun is mightier than the chainsaw in determining population density of Bornean orangutans (*Pongo pygmaeus morio*) in the forests of East Kalimantan. ***Biological***

Conservation. Available online 19 January 2006.

Meijaard, E., Sheil, D., Nasi, R., Augeri, D. Rosenbaum, B., Iskandar, D., Setyawati, T., Lammertink, M.J., Rachmatika, I., Wong, A., Soehartono, T. , Stanley, S. and O'Brien, T. 2005 **Life after logging: reconciling wildlife conservation and production forestry in Indonesian Borneo**. CIFOR, WCS, WWF, TNC, ITTO, SwedBio, CIRAD, LIPI, FORDA, EU, The World Bank and UNESCO. Bogor, Indonesia. 345 p.
http://www.cifor.cgiar.org/publications/pdf_files/books/BMeijaard0501E0.pdf
Semiadi, G. and Meijaard, E. 2006. Distribution and conservation of Javan Warty Pig (*Sus verrucosus*). **Oryx** April 2006 issue. Available online 19 January 2006.

Shlisky, A. 2006. Book review: Mimicking Nature's Fire: Restoring Fire-Prone Forests in the West. By Stephen Arno and Carl Fiedler. 2005. Washington, D.C. Island Press. ***Ecological Restoration*** 24(1):61-62.

Missing from the 2005 list:

Odell, J., M. E. Mather, and R. M. Muth. 2005. A biosocial approach for analyzing environmental conflicts: A case study of horseshoe crab allocation. **BioScience**. 55:9 735-748.