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Advancing Conservation in a Globalized World

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Globalization is the process of linking people and integrating economies through trade. Government policies promoting free trade, multilateral institutions like the World Trade Organization, and technology have together accelerated and amplified globalization, allowing more goods and services to be exchanged more rapidly over longer distances than ever before. Indeed, information technology enables connections to be made almost instantly almost anywhere around the world.

The societal and environmental implications of globalization are profound and legitimately debated. Advocates argue that globalization helps reduce poverty by giving poor people access to markets and opportunity to raise their standard of living, and promotes environmental protection by creating alternatives to subsistence practices like slash and burn agriculture and by making markets more efficient. Critics contend that globalization harms local economies, homogenizes cultural identities, undermines environmental protections and exacerbates abuse of "commons" resources like the oceans and atmosphere.

For better or worse, globalization is a current reality that presents big new challenges -- and I believe big new opportunities -- for advancing conservation in a globalized world. I don't have all the answers, but I have some ideas that I hope will influence your thinking and perhaps spark some creative new ideas.

Think globally. Act locally.

This is a familiar and favorite adage in the conservation community. And one that I want us to re-examine. Too often, it is just a feel-good slogan that encourages some token support for the plight of fur seals and rainforests and impoverished people in far-away lands, but lets us keep most of our attention and energy focused close to home.

In this paper, I want us to REALLY think globally, and in so doing, challenge you to change your perspective on what it might mean to act locally. I will begin by trying to convince you that we are each truly globalized such that our local "backyards" now extend to the far corners of the world. I will then present an overview of The Nature Conservancy's global habitat assessments -- a multi-year effort to help our organization better understand the state of the world and our place in it. Finally, I will present some case studies that demonstrate how we are using our global assessments to advance conservation by revealing fresh perspectives on fundamental problems, and by helping to identify strategic fulcrums for leveraging and multiplying conservation action.

An immediate consequence of globalization is that each of us is increasingly connected to other people and other places through the goods and services that we use every day. A quick survey of my cupboard and closet finds products from close to home in Seattle, Washington and from far away places like Honduras, Chile, Italy, Ghana, Madagascar, India, Thailand, and Indonesia. High-tech gadgets are often manufactured in China, Japan and Korea, while energy resources are tapped in the Middle East, Alaska, Venezuela and Russia. When you begin to factor in the provenance of raw materials like cotton and mineral ore, the web of connections quickly extends and can potentially touch almost anywhere.

I believe that this connectedness creates some personal share of responsibility for the impacts in these many places. It also reminds us of our susceptibility to consequences such as exposure to industrial pollutants that have been blown from China and can now be detected in Seattle, or acid deposition in Northeastern forests downwind of mid-western coal-fired power plants.

The Nature Conservancy' global habitat assessments

For the past 3 years, I have led The Nature Conservancy' global habitat assessments. This new program was started to broaden our perspectives and to think more globally about how and where The Nature Conservancy (TNC) should focus its conservation work. Being on point to bring new knowledge and insight to the organization has been an exciting, eye-opening experience. But it has also been challenging and humbling to realize just how much we have yet to learn.

TNC is an organization proudly rooted in local action. Since buying our first preserve more than 50 years ago, TNC has remained committed to working closely with neighboring land owners and communities to protect important and valued natural places. In the early 1990's, though, TNC began to appreciate that conservation could not succeed in isolation from the surrounding landscape. Local stewardship had to be conducted within a larger context that accounted for both ecological processes and socio- economic factors. This spurred TNC to develop ecoregional assessments that set conservation goals for how much we needed to conserve in a larger ecological context. These comprehensive plans evaluated both the biological features we were interested in conserving and the human aspects of the landscape that we had to work with, and prioritized conservation areas where we believed mutual interests could best be satisfied. These ecoregional assessments have been a hallmark of TNC conservation and an influential strategy that other organizations have adopted.

In 2003, TNC was again challenged to understand how our conservation work fit within a broader context -- this time globally. TNC had programs in all 50 states and 27 other countries, and organizational ambitions to have a truly global reach and impact. TNC wanted to define global priorities for the organization, and also chart a strategic vision for achieving our mission -- to conserve plants, animals and natural communities that represent the diversity of life on earth.

The global habitat assessments were designed to document what we know -- and don't know -- about the

- distribution of biodiversity,
- condition of natural habitats
- stresses that put biodiversity at risk, and
- conservation progress

across the world's terrestrial, freshwater and marine habitats. The assessments built on the work of others to compile available information and fill critical knowledge gaps through collaborative research. The result is an unprecedented compilation of global conservation data.

The global habitat assessments were organized on a hierarchical system of ecoregions, biomes and biogeographic realms. Ecoregions are areas of land or water that contain characteristic and geographically distinctive assemblages of species and ecosystems. Biomes delineate global-scale patterns of biological organization and diversity, and define groupings of ecoregions that share similar environmental conditions, habitat structure and patterns of biological complexity. Biogeographic realms are defined by the unique collections of species that evolved in each of the world's "biological continents" and group ecoregions according to shared evolutionary history.

The terrestrial world has been divided into 825 ecoregions that can be grouped into 13 biomes and 8 biogeographic realms. The freshwater environment has been divided into 450 ecoregions that can be grouped into 12 biomes and 8 realms. The world's coastal waters have been divided into 232 coastal ecoregions that can be grouped into 12 realms; biome groupings are redundant.

Through the global habitat assessments, we assembled more than 150 unique data layers with global or nearly global coverage. Each describes some aspect of the biodiversity, status or threats to the world's terrestrial, freshwater or marine ecoregions. Data were consistently summarized and registered to the ecoregion frameworks to facilitate comparisons among ecoregions globally or within biome or realm subsets.

Examples include:

<u>Terrestrial</u>	<u>Freshwater</u>	<u>Marine</u>
Plant richness	Fish endemism	Coral reef abundance
% habitat loss	River fragmentation	Change in mean trophic level
Fire regime alteration	Environmental water stress	Trawling pressure
% area protected	Ramsar sites	% area protected by MPAs

Each layer of data constitutes a significant product of scientific research that adds to our understanding of the state of the world. Some of this information is new -- much of the marine and freshwater data (such as saltmarsh occurrences or the distribution of aquatic invasive species) had to be compiled for the first time. However, the real value of the global habitat assessments is realized when the data are juxtaposed to reveal new perspectives on familiar or perhaps unrecognized conservation problems.

Confronting a biome crisis

One of our first and most influential analyses illustrates the value of global assessments. In preparation for the last World Parks Congress, we undertook a "habitat gap analysis" to determine whether any habitat types were falling in the gaps between the world's protected areas. Global commitments to expand the protected area network had resulted in nearly 12% of the

world's land area under some sort of protection, but did these areas protect the habitats most at risk?

As reported in a paper in *Ecology Letters*, we juxtaposed global land cover data and the World Database on Protected Areas. The former classified land cover at 1 km resolution and enabled us to estimate the extent of gross habitat loss. The latter catalogs the size and location of more than 100,000 designated protected areas, and thus enabled us to estimate the extent of habitat protection.

We discovered that habitat loss was most extensive in four biomes: temperate grasslands, Mediterranean forests and woodlands, temperate broadleaf forests, and tropical dry forests. But habitat protection was most extensive in temperate conifer forests, montane grasslands, and tundra. In other words, we were not protecting the same habitats that we were losing. We were not the first to show this sort of habitat bias, but we were the first to demonstrate the global scale of this disparity.

The disparity between habitat loss and protection is most acute in temperate grassland and Mediterranean forests and woodlands with global loss:protection ratios of 10:1 and 8:1, respectively. The potential consequences of this disparity are severe -- not only could individual species go extinct because of habitat loss, but the continued function of entire ecosystems could be disrupted. This would impact human communities as well as natural ones. We called this risk the "biome crisis."

Viewed at the scale of individual ecoregions, we found even greater variability in the disparity of habitat loss and protection. Many ecoregions are still largely intact, but a surprising number have been almost completely converted. Likewise, some ecoregions have no protected areas at all while 7 are 100% protected. We classified ecoregions as "vulnerable," "endangered" or "critically endangered" based on how much habitat had been lost and protected in each:

- Vulnerable: >20% habitat loss and loss:protection ratio >2
- Endangered: >40% habitat loss and loss:protection ratio >10
- Critically endangered: >50% habitat loss and loss:protection ratio >25

The resulting map of "crisis ecoregions" reveals a new perspective on where global conservation efforts should be focused. Instead of ranking places based on their biological importance, this analysis flagged ecoregions based on the severity of a conservation problem -- insufficient habitat protection. In practice, some of these ecoregions may be too far gone for meaningful large-scale conservation. But in others, there may still be potential to change the divergent trajectories of habitat loss and protection.

This global assessment revealed a significant but previously unrecognized gap in global conservation, and flagged specific places around the world where those gaps were greatest. The findings are helping TNC prioritize where our work can help avert the most substantial losses of biodiversity, and raising greater public awareness of the biome crisis looming across the world's temperate grasslands and Mediterranean ecosystems.

Leveraging global thinking into local action

Thinking globally can help us recognize problems, but it also needs to help leverage action for local solutions. This is the most exciting and challenging frontier for global conservation thinking. I will close with a couple of examples of how global science is helping to motivate local action in the right places around the world, and some ideas about how we might do even better.

The Convention for Biological Diversity (CBD) represents a global strategic framework for safeguarding the world's biodiversity. The nearly 170 signatory countries have endorsed a 2010 target of significantly reducing the current rate of biodiversity loss at global, regional and national scales. Among their sub-goals are a target to effectively conserve at least 10% of every ecological region, and another to maintain the capacity of ecosystems to deliver goods and services and support livelihoods.

The Marine Ecoregions of the World (MEOW) that TNC delineated to underpin our global habitat assessments have been distributed by the CBD Secretariat as a framework for national governments to use in meeting their protected area commitments. Less than 3% of the world's coastal marine areas are protected, and mostly in the coral regions of the Great Barrier Reef. To the extent that countries act to fulfill their CBD commitments, the MEOW should help direct an expanded and more representative distribution of local conservation action in coastal marine habitats.

Similarly, our work on river fragmentation with the University of Umea in Sweden has been provided to the CBD as an indicator of river intactness that countries can use to target both proactive and restorative conservation action. The indicator reflects the portion of river systems that remains free flowing and so is sensitive to changes that might result from new dam construction, reservoir extraction or other changes in river management policies.

I think that global science has some exciting potential when strategically applied, but I don't want to give you the impression that it is all sunshine and roses. We are exploring new territory in which key assumptions are still subject to critical testing and revision. I expect that global science will raise more questions than it answers for a while. The potential impacts appear far-reaching, but they also tend to be diffuse and so may difficult to detect unambiguously. Global strategies may help inform and leverage local action, but it will never be a panacea or substitute.

Still, we are just scratching the surface of global thinking and its applications for conservation. Most of our global analyses have been pretty rudimentary. We have focused mainly on static descriptions of pattern and straightforward juxtaposition analyses. And yet we have learned valuable new lessons and been able to contribute to important international initiatives.

Looking ahead, I see the emphasis of global thinking shifting toward analyses aimed at understanding the underlying processes that create and change those patterns. I am especially excited about the prospect of analyses that synergize ecology and economics to disentangle the complicated interactions of industry and nature. For example, how do the economics of the international wood products market influence the demand for timber from tropical, temperate and boreal forests, and how can consequent pressures toward deforestation be shifted? Or, what are the economic and ecological tradeoffs of meeting world food demands through continued harvest of wild fish versus expanded aquaculture?

As long as globalization continues to interconnect our world, we will need global thinking to inform local action.