http://naturalpatriot.org/2008/11/19/biodiversity-loss-is-sickening-literally/

November 19th, 2008

Biodiversity loss is sickening — literally

By Emmett Duffy

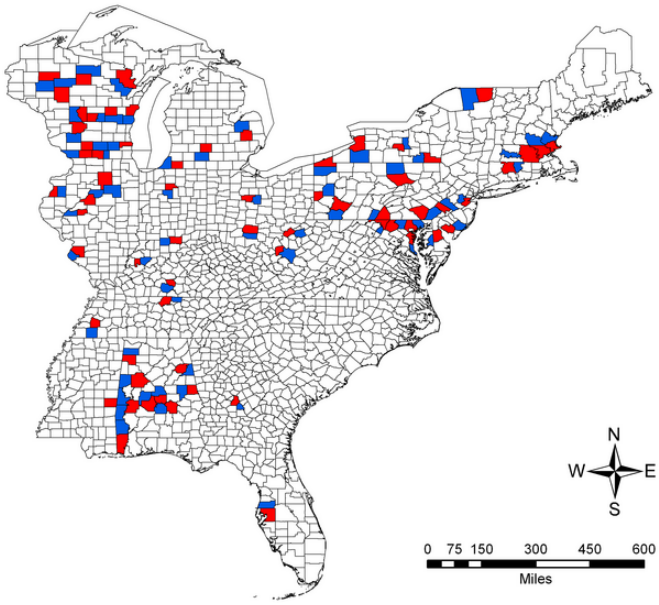
The degrading global environment has raised concern, even alarm, for many reasons, but one of the most important involves the issue of how loss of species may influence nature's ability to continue providing life support to us — "ecosystem services" in the common parlance. Ecosystem services include the various processes necessary to life and well-being that we get free of charge, and usually unnoticed, from the natural world: purification of water by percolation through soil and plant communities, moderation of climate by forest cover, production of fish for human consumption, protection of coastal communities from storms by mangrove thickets, and so on.

It's well appreciated of course that nature, in a very general sense, is essential to our well-being (although this seemingly obvious fact appears to have escaped the understanding of many mainstream economists — see here for an antidote). But what about "biodiversity" — that somewhat nebulous term we hear so frequently these days? What real difference does it make to us whether we have one or ten or a hundred species in our backyards? Can we just pick the several types of plants and animals we think that we will need in perpetuity and plant them under a glass dome on the moon, as some people in surprisingly high positions appear to believe?

The general question is how biodiversity affects the way ecosystems work, and more particularly how they work for us. This question has been a hotbed of scientific research in the last 15 years (and a strong personal interest of mine). Ecologists have conducted hundreds of experiments to determine how the number of species in a habitat affects the total production of plant biomass, the use of soil nutrients, the production of small animals that serve as food for fish, the ecosystem's ability to rebound from disturbances, and so on.

There are are now enough such experiments that it's been possible to synthesize the results in search of generalizations, some of which I have participated in myself (e.g., here). These show pretty clearly that, in a nutshell, more species means higher production and more efficient use of resources.

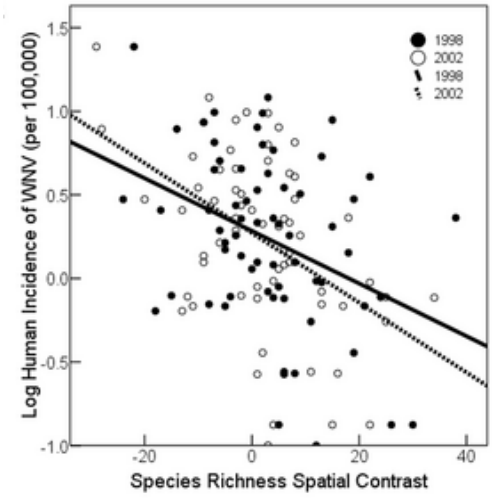
But what about the real world? I have argued that these experiments, despite being small-scale, of short duration, and under artificially simple conditions, are probably conservative — that is, the influence of biodiversity on functioning of ecosystems in the real world is likely *more*, not less, important than we see in small-scale experiments. But the real test of this idea will come from studies in the real world, studies of how loss of species influences processes that are directly important to us where we live.



A new study published in the open-access journal *PLoS Biology* does just that. John Swaddle and Stavros Calos tackled a specific question about how biodiversity influences risk of disease, namely the hypothesis of the "dilution effect". The idea applies to diseases that humans contract from animals in the environment, such as lyme disease, west nile virus, and bird flu. The hypothesis goes like this: when diversity of animal hosts is high, the disease organisms that live in them cannot be transmitted or grow as effectively, because the animal species differ in their susceptibility to infection, the population sizes of individual species tend to be lower (and hence support lower disease populations) in diverse communities, etc. But what is the evidence for this?

Swaddle and Calos used a clever approach to test the dilution hypothesis for West Nile Virus (WNV), which is carried by birds. They compared counties in the eastern USA that reported WNV with adjacent counties that reported no cases of WNV (shown as red and blue respectively — no relation to their political leanings, as far as I know), a pair-wise comparative test that controlled for differences in climate and other regional environmental factors. They also used human census data to account for human demographic and socioeconomic variation between the counties.

Supporting the dilution effect of biodiversity, their analysis showed that incidence of West Nile Virus in humans was lower in counties where bird diversity is high, and that, quite surprisingly, bird diversity explained more variation in disease incidence (roughly 50% of total) than urbanization or socioeconomics. The mechanisms appear complex but support a component of the "dilution effect" by which higher host diversity reduced abundance of those bird species that are the most susceptible hosts.The results of this study generalize previous evidence of the dilution effect, notably the similar finding that lyme disease in humans is more prevalent in areas where diversity of small mammals



(the usual hosts of the organism that produces lyme disease) is reduced. In both cases, lower-diversity communities tend to favor the host species most likely to carry and transmit infections. In other words, loss of biodiversity is sickening — not just esthetically and ethically, but literally.

This study is one of a growing number of examples supporting the suggestion that biodiversity enhances ecosystem services not only in small-scale experiments, but also in real-world landscapes.

[**Original source**: Swaddle JP, Calos SE. 2008. Increased Avian Diversity Is Associated with Lower Incidence of Human West Nile Infection: Observation of the Dilution Effect. *PLoS One* 3(6): e2488. doi:10.1371/journal.pone.0002488]

Posted in Biodiversity, Sustainability, Science | No Comments