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What is a Healthy Ecosystem?

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Very young children have a habit of asking innocent, but thorny questions. My grandson, however, has reached an age where innocence no longer passes for an excuse for his questions; he knows enough now that his questions reflect the traits of a budding intellectual troublemaker.

A case in point: here is my answer to his question about the increasingly popular term: ecosystem health.

"Grandpa, in school today in my science class, we talked about healthy ecosystems. My teacher says that when we are not feeling well, we go to a doctor to find out how to get healthy. If I have a sick ecosystem, she says that I should go to a scientist find out how to make the ecosystem healthy. Dad says you are a scientist, so what is a healthy ecosystem?"

It is a good question and one that I, as a research scientist who has worked on such issues for over 40 years, should be able to answer with ease.

This seemingly straightforward question, however, does not have a simple answer. Further, the answer requires a clear understanding of the proper role of science in a democracy.

First, how is a person to recognize a healthy ecosystem? Many might identify the healthiest ecosystems as those that are pristine. But what is the pristine state of an ecosystem? Is it the condition of North America prior to alterations caused by European immigrants, say 1491? Or perhaps it is the condition of the land sometime well after the arrival of immigrants who came by way of the Bering land bridge, say 1,000 years ago? Or maybe it is the state of North America prior to the arrival of any humans, say more than 15,000 years ago?

Ultimately it is a policy decision that will specify the desired state of an ecosystem. It is a choice, a preference, a goal.

Scientists can provide options, alternatives, and possibilities, but ultimately in a democracy it is society that chooses from among the possible goals.

A malarial infested swamp in its natural state could be defined as a healthy ecosystem, as could the same land converted to an intensively managed rice paddy. Neither the swamp nor the rice paddy can be seen as a "healthy" ecosystem except through the lens of a person's values or policy goals.

Once the desired state of an ecosystem is specified by someone, or by society overall through laws and regulation, scientists can determine how close we are to achieving that goal. They might even offer some approaches that might better achieve the goal. Ultimately, though, it is society that defines the goal, not scientists. One person's sick ecosystem is another person's healthy ecosystem.

So, the answer to my grandson's provocative question is that human health is not an appropriate metaphor for ecosystem health. There is no inherently "healthy" state of ecosystems except when viewed from the perspective of societal values.

Pristine ecosystems (e.g., wilderness watersheds, Antarctica, uninhabited tundra) are certainly very different than highly altered ecosystems (e.g., farms, city parks, harbors) but neither a pristine ecosystem nor a highly altered ecosystem is scientifically better or worse — just different.

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Further Reading:

Is Science Biased Toward Natural?

Axioms of Ecological Policy

Normative Science

Setting Goals for Managing for Healthy Ecosystems

Values, Policy, and Ecological Health

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