

True cost accounting for Nature's services and capital assets

We all depend on Nature for our food, the air we breathe, and many of the materials that we use in our day to day lives. Historically most of these functions have been ignored in accounting. But the services and the structure of ecosystems have multiple values that may extend over decades or generations. If true costs are calculated and applied it will make many current management practices more sustainable.

The services that Nature provides are ongoing and more easily incorporated in accounting. The oxygen produced by a block of trees in a forestry management plan, for example, can be calculated and valued. So can the water retention of the forest and the air purification. In addition to traditional "timber only" accounting the forest may provide valuable recreation opportunities, wild harvest of mushrooms and berries, and a wide range of other valuable products.

Nature's capital is more often considered over a longer time period, perhaps decades, and related to structure and asset value. For example, a fishery stock can be valued as the sum of all the stages of a particular fish—while the conventional accounting only considers the fish when it is caught and sold. Poor accounting for capital leads to tragedies like the collapse of the cod fishery and groundwater basin destruction. The destruction of the Aral Sea to grow cheap cotton is a perfect example of an accounting problem.

The costs and benefits involved in calculating natural capital and nature's services also need to be refined. What is the value of biodiversity? Of an endangered species? Or of a species we know nothing about? What is the lifetime value of an antibiotic threatened by misuse? How can the impacts and costs be determined when only limited resources are available?

Rapid assessment methodologies, designed for quick, low-cost evaluations, can be very helpful. Local experience and knowledge may reduce concerns to a few items that could be evaluated and monitored more easily. Trends in population dynamics are often very informative. *Keystone species* (which play a critical role in the ecosystem) and *Indicator species* (that are particularly sensitive to change and reflect the overall health of an ecosystem) may help highlight issues that are significant. Rare and endangered species may be critically important in terms of legal liability and regulations, but may not matter much in terms of function or structure.

Ecosystem linkages are often important, but can be more difficult to understand and follow over time. Ecosystem analysis can be done at a fairly broad scale to help review possible system

interactions or problems. Is erosion in the upstream reach in a watershed leading to sediment deposition problems? Are ecotoxic amounts of nitrogen blowing in from a distant power plant or freeway? It is often possible to develop ecological metrics for evaluating and rating ecosystem health.

Governments, financial institutions, and corporations around the world have begun to incorporate nature's services and capital in their policies and practices. In the US, universities, non-governmental organizations, and state and federal agencies are working to develop and apply ecosystem services and capital concepts to management. It is desirable to invest in interdisciplinary collaborative research and development efforts to better understand and value Nature's services and capital.

