

On Earth Day, taking stock of nature

ASU professor explains the importance of putting a monetary value on nature

By Skip Derra, ASU News
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Nature gives us its best every day we live on this planet. And it is a constant resource for all human endeavors — whether for building shelter, advancing technology or nourishing our bodies.

But can we put a value on those vast resources, much like how we put values on land or machinery?

Arizona State University economist and School of Sustainability Director [Josh Abbott](#) has been doing exactly this for several years. His research with Eli Fenichel of Yale University has advanced the idea of valuing nature like we value other capital goods, with the goal of raising awareness of the value of investing in nature as a society.

What Abbott and Fenichel essentially have done is develop an equation to estimate the monetary value of natural resources, like groundwater, before it is pumped to the surface and used.

To calculate the value of natural capital, you begin with the same economic principles used to value traditional assets, then factor in changes in ecosystems and human behavior that influence the appreciation or depreciation of that natural resource. The result is a figure that can be compared on a balance sheet with traditional assets like real estate, factory machinery and infrastructure.

Here, Abbott talks about nature, what it provides us and the incredibly intertwined web it weaves on Earth.

Note: Answers have been edited for length and/or clarity.

Question: Why is putting a value on nature as important now as it has ever been?

Answer: We live at a time of great economic and social uncertainty, when pocketbook issues like affordability and jobs dominate. We are also experiencing the alleged "dematerialization" of the economy — where more and more of our economic activity comes from digital services as opposed to tangible products — although this growth ultimately relies upon a host of raw materials and ecosystem services derived from nature.

Together, these factors create a situation where it is easy to lose sight of the benefits nature generates “rent free” every day that undergird our economies and support the well-being of our communities. Fear, coupled with a lack of knowledge, can lead to short-sighted decisions to roll back wise investments in, or protection of, our natural assets.

Rigorous estimates of the value these assets create for us helps to inform the general public of the true nature of the tradeoffs — that failure to manage our assets can not only hurt future generations but undermine our current prosperity.

Q: How do you put real values on nature?

A: From an economic perspective, natural capital should be valued like any other form of capital — from the value, often monetized, of the present and future services it provides. Unlike an industrial machine or a house, most natural capital is not bought and sold in a marketplace, and so we often have to get creative to find ways to determine its value.

For groundwater, we may value an investment in aquifer recharge in terms of the profits to farmers, or industrial water uses, that this water enables. In other cases, the process is a little more indirect.

A while back, we produced an estimate of the value of the surface water used in man-made urban lakes in the Phoenix area. These lakes provide benefits to homeowners in these communities but face a very high rate of evaporation at a time of increasing water scarcity. We were able to utilize the fact that homes are bought and sold in an open market to estimate the extra value the lakes provide on an annual basis to lake community homes. We then linked this annual value creation to the water required to keep the lakes full over the same year. Our overall estimate valued this lake water at roughly \$20 per 1,000 gallons, an amount that is many times more than the very low prices paid by these communities for water deliveries.

Analogous approaches are now routinely used to value mangroves and other wetlands for their flood protection benefits. The point is that natural capital often leaves a partial “fingerprint” of its value through its role as an input to some marketed good or service. It is the job of people like me to recover those fingerprints.

Q: What are some of the more recent directions in this research?

A: Most recently, we built upon our basic valuation framework by incorporating the effect of risk in the abundance of natural capital. Natural stocks, especially renewable plant and animal resources, are subject to a lot of variability, including environmental variability and the added effects of climate change. Some of this is pure “noise,” like the day-to-day fluctuations in stock prices, while other forms of risk might result in large catastrophic shocks, where the likelihood of the shock itself may be a function of how a natural resource is managed.

For example, a fish stock that is overfished may be prone to a possibly irreversible collapse — like what happened with the New England cod — or a forest that is not thinned may face a heightened risk of a destructive fire.

This work is important because the high level of risk in natural capital stocks is sometimes used as an argument to delay their valuation. Our work establishes conditions under which risk may have only small effects on valuation versus when it can really matter. We find that catastrophic risks are

the most important to account for. Even tiny risks of collapse can have a huge effect on the value of natural stocks if the economic implications of the collapse are severe. We want our work to help inform how to target research to better understand the risks facing natural stocks.

Q: What insight does having a value for nature provide to policymakers, and how does that help the general public understand the value of nature?

A: Simply put, having a value of different aspects of nature as capital tells us the value to the public of conserving it. In the marketplace and political systems, there are many interests arguing for development projects — fossil fuel or mineral extraction on public lands, for example — that may deplete our stocks of natural capital. In these cases, the immediate benefits of the project are highly tangible compared to the losses of natural capital, leading to a situation where jobs or profits are set against unspecified “ecosystem damages.”

Valuing the affected natural capital helps governments weigh the tradeoffs more fairly, as well as providing a wider range of information for the public and advocates to engage with.

Q: Have any other countries shown an interest in putting a price on nature?

A: There are many efforts underway, particularly in wealthy, industrialized nations, to take better account of natural wealth in official statistics.

A couple of years ago, the EU adopted regulations to improve their accounting of nature’s contributions to the economy, particularly focusing on the condition of ecosystems and forests.

The U.K. has adopted a 25-year environment plan complete with a road map, including milestones and recurring evaluations, for building out natural capital accounts to guide government decision-making. Similar efforts are underway in Canada and Australia.

While there are many measurement and data challenges to overcome, and political will and interest can ebb and flow with changes of government, the overall tendency has been for nations to take greater account of nature in their official statistics.

This story originally appeared on [ASU News](#).

Main image



Josh Abbott, the director of ASU's School of Sustainability, has developed a way to put a value on natural resources, even if unused. ASU photo