

Science Paper

Investing in environment pays off at 100-1

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Investing in environment pays off at 100-1, says paper published in Science this week 'Ecological economics' provides truer picture of global balance sheet than the market economy, co-authors say. Shell shocked investors bouncing between stocks, bonds, and real estate are putting their money in all the wrong places, according to a paper published in Science magazine this week. The best deal going, by a wide margin, is the environment. An annual investment of \$45 billion in preserving large tracts of wild nature, say the paper's authors, would yield an annual return to society of between \$44 and \$52 trillion in "ecosystem services" like water filtration and climate regulation, a 100-1 ROI.

Greenbacks aren't rushing into green causes because the market-based economy doesn't tell the whole financial truth, according to Robert Costanza, director of the Gund Institute for Ecological Economics at the University of Vermont and one of the paper's co-authors.

"Converting ecosystems typically benefits only a few private individuals," he says. "Leaving wild nature wild produces benefits in the form of ecosystem services, but these services are public, rather than private goods. They serve society as a whole and aren't captured by the imperfect market."

The Science paper constructs a careful argument to recast the globe's balance sheet so it takes into account environmental research.

Costanza and his co-authors first wanted to determine the full economic impact of developing wild areas, adding environmental factors to the mix. They identified five studies that compared diverse "biomes," or massive ecosystems, before and after development took place - for instance, a tropical forest in Selangor, Malasia that converted to high impact logging and a mangrove system in Thailand that installed an aquaculture and shrimp farming economy.

Taking into account the erosion of non-marketed services like soil formation, flood protection, and carbon dioxide conversion and the compromise of low impact activities like tourism and the sustainable harvesting of plants and animals, the biomes lost about half their value after development took place, according to the combined results of the studies.

That net loss translates to about \$250 billion a year, given current rates of global development of wild areas.

The authors performed several statistical analyses to reach the 100-1 ROI figure.

To establish the \$45 billion annual cost of building and maintaining an adequate global reserve of wild nature, which they define as 15 percent of the terrestrial biosphere and 30 percent of the marine biosphere, the authors extrapolate from current studies, including their own earlier research. To preserve land areas, \$20-28 billion per year is needed, say the authors, while \$23 billion per year is needed for the seas.

To reach the \$44 to \$52 trillion annual return figure, the authors modified earlier estimates of the gross value of 17 ecosystems across 16 biomes. For the current study, they used the net benefit

of conversion - the value of the intact system minus the value of the converted system. While the reasoning sounds abstract, the financial analysis is all too real, Costanza says.

"In many cases, we're talking about replacing services that ecosystems provide, flood protection, for instance, or repairing damage once ecosystems have been compromised. It takes real money to do that." There are also lost opportunity costs, such as the loss of potential pharmaceutical products if rainforests are razed, and quality of life issues, which can also be assigned a monetary value.

According to Costanza, the current system of cost accounting is plainly out of whack. Harmful development policies go unchecked largely because of a lack of information: values aren't assigned to natural goods and services so markets are by definition imperfect. In addition, private developers don't realize social benefits - or pay social costs.

"A compensatory system is clearly needed," says Costanza. "Corporations need to know the true cost of doing business. If we assign a system of compensatory levies, for instance, individuals will make different, more environmentally and socially beneficial decisions."

Further muddying the water is a welter of perverse subsidies, widely in use around the globe, that promote ecologically damaging behaviors that don't make sense economically. For example, many governments subsidize logging by building logging roads and selling logging rights to public lands at well below market value.

"By reallocating the funds that are supporting perverse subsidies," says Costanza, "we can easily pay the annual costs of preserving the global reserve network."

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The Gund Institute for Ecological Economics is a transdisciplinary research and teaching institute at the University of Vermont. The institute integrates natural and social science tools to address environmental research, policy, and management issues at multiples scales, from small watersheds to global systems.

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