

Trading on life itself

DOUG HENWOOD

The same human institution that's wrought environmental havoc might be adapted to undo the damage. With market approaches gaining ground, what questions need answers?

Nature is no exception to the market revolution. With government and planning out of fashion, greens are increasingly turning to market mechanisms as models for environmental preservation. Instead of regulation, mainstream environmentalists increasingly argue that the right to use or degrade natural assets should be traded in the style of the Chicago futures markets. Flexible market allocations would replace the inflexible writs of bureaucrats.

Most ecological economists would agree that the price system today doesn't do a very good job of incorporating environmental costs. The private activities of some people ruin the air and water of others. Ecological economists part company after agreeing to that. Market advocates believe the key is to define a new set of property rights, to define assets—claims to natural resources like clean air or the ozone layer—that then can be priced and traded. More radical green economists prefer to talk about ecological resources as common property, objecting to the commodification of nature.

One of the leading theoreticians of "costing the Earth," as *The Economist* puts it, is Graciela Chichilnisky, holder of the UNESCO Chair in Mathematics and Economics at Columbia. Chichilnisky, who directs the university's Program on Information and Resources, has written (or co-authored, with Professor Geoffrey Heal of Columbia Business School) a series of articles exploring ways of using financial markets to manage natural assets.

To move against global warming, Chichilnisky wants to use an international market to trade the right to vent greenhouse gases. The total quantity of pollution permits would be determined by scientific judgment, but the distribution of those rights would be determined by trading.

Such proposals are not without complications, Chichilnisky concedes. For example, would anything prevent cash-starved countries from selling their pollution rights, thereby foregoing the right to industrialize—an outcome that wouldn't necessarily be desirable, she further concedes? It's no wonder that this is a sticky diplomatic point in international climate negotiations. The so-called developing countries argue that richer Northern nations have done most of the damage to nature and see no reason why the South should bear the brunt of any reductions in gas emissions, the likely outcome if the trading scheme turned out to be a way for the rich countries to buy their way out of compliance. Still, even if the South's contribution were reduced to zero, it wouldn't be enough to reach the goals of atmospheric scientists; the rich countries would still have to make major changes to meet the targets.

Harvesting drugs and insuring bugs

It's one thing to price the right to emit carbon dioxide; what about biodiversity? Chichilnisky cites arrangements like Merck's with INBio, a Costa Rican institute, in which the company pays a share of its profits on drugs based on genetic material first found in Costa Rican

forests. This agreement provides an incentive to preserve the forest, rather than turn it to lumber, and helps fund ecological research in Costa Rica.

Broader issues of biodiversity revolve more often around humble beetles than lucrative new drugs. The more diverse an ecosystem, the more resilient it is to shocks; warming the globe and reducing biodiversity simultaneously heighten the risk of each. Pricing these issues, to Chichilnisky, is the native terrain of financial markets. We buy insurance to replace an uncertain exposure—illness, car wrecks, burglary—with a fixed premium. Portfolio managers and corporations use futures and options to reduce the risks of price volatility. So it is perfectly natural to turn to financial markets to manage environmental risks. Since global warming appears to have increased hurricane severity, insurance companies have turned to futures and derivatives markets to hedge themselves against higher claims. Whether this is the best solution for society as a whole is another matter.

Options are an ideal way to price environmental assets, and Chichilnisky resists any suggestion that this is merely a metaphor; she aims to put dollar valuation on the Amazon forest. With stocks, option values can be fairly easily computed from the dividend yield and price volatility of the underlying stock and prevailing interest rates. How do you value a wilderness as an option (granting the point that money is an appropriate way of valuing nature)? You run a computer model of world output with the Amazon in the equations, then another model without it, and the difference is the basis of the valuation. Life itself (or at least lives, human and non-human) would then rely on this model—showing a great faith in economic models, which have a hard time predicting next year's GDP, let alone the "value" of the rain forest.

Risk, uncertainty, and noise

Economists recognize an old distinction, famously made by John Maynard Keynes, between risk (which is calculable) and uncertainty, the truly unknowable: matters such as "the prospect of a European war," as Keynes wrote in 1937, or "the position of private wealth-owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever."¹ Aren't environmental dangers hard to quantify?

Chichilnisky observes that financial markets are now facing down issues of the unknowable. "What do you do when you don't know something?" she asks. "You can do two things. One is worry about it. The other one is bet on it." If one person thinks there will be three hurricanes this season and another thinks six, they can make a bet. This



Graciela Chichilnisky

makes for efficient markets, says Chichilnisky, though "not necessarily socially desirable outcomes."

Market prices are the result of continuous changes in the balance of such wagers. How "right" are such prices? In the 1960s and 1970s, the so-called efficient market hypothesis, under which financial markets were thought to be frictionless mechanisms for pricing risk and reward, dominated academic economics and financial theory. In the 1980s, new theories arose, offering evidence that markets can go badly wrong, systematically mispricing assets. Rather than pricing the future, financial markets grossly overweight the last piece of news. Phrases like "noise trading," "excess volatility," and "information asymmetry" entered the lexicon alongside "market efficiency." Do these phenomena, which different commentators regard as either market anomalies or failures, give Chichilnisky any pause?

No, she says, because this sort of trouble isn't relevant to the kinds of markets she's proposing. Unlike conventional markets, which involve the trading of privately owned, privately produced goods, markets in nature will trade privately what economists call public goods. The classic example is national defense; economists like Chichilnisky would include the atmosphere. Assigning property rights in public goods is devilishly hard: Who owns the air, and how much of it? If the markets we know are plagued by volatility, ignorance, and noise, what will these unknown markets be like?

Despite these complications, market-based approaches to the environment are spreading like a Malibu wildfire. They're being adopted across the spectrum, from the Environmental Defense Fund to the official U.S. position on greenhouse emissions at the UN climate change conference in Geneva, where Timothy Wirth, the undersecretary of state, recommended the use of "trading mechanisms around the world"² to meet emissions targets. Those who believe the financial markets do a good job of running the economy will be pleased; those who don't might be a bit uncomfortable that the next generation's air may depend on this generation's trading skills. ()

²Remarks by the Hon. Timothy E. Wirth, Under Secretary for Global Affairs, on behalf of the United States of America before the Second Conference of the Parties, Framework Convention on Climate Change, Geneva, Switzerland, July 17, 1996.

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consecutive nights. Thanks to the wonders of modern video editing, Jacob found his comments juxtaposed with others that were, from a science point of view, "somewhat reckless." "There were statements," recalls Jacob, "about the Lincoln Tunnel breaking like glass tubes and nuclear debris floating down the Hudson River."

He discovered another unpleasant result: Because the comments were so tightly edited together, many people (including colleagues)

attributed other people's statements, including the most dramatic ones, to him. "My phone was jammed for days both with accusations of hypocrisy and sensationalism and [comments] saying, 'You really have done a great service here.'" Another outcome was that Jacob was invited to work on a committee to develop a seismic building code for New York City, a project that eventually would bear fruit.

More recently Jacob was the key seismic expert for an extensive lead feature article in *New York magazine* (Dec. 11, 1995), once again on the possibilities and consequences

of an earthquake in New York City. The piece opened with a full-page photo of Jacob.

Jacob is scornful of the article's technical shortcomings: "They mixed quotes together so that things didn't make sense or weren't true." And a copy editor didn't call him to check facts until the day before the piece went to press; he found himself on the phone for four hours trying to correct technical errors. When the story came out, Jacob discovered yet another wrinkle in the mysteries of attribution: Despite the writers' bylines, readers he speaks with inevitably refer to it as "his" article.

Another feature of the experience amuses and amazes Jacob. It turns out the writers of the *New York* magazine piece have been in touch with Hollywood about using their story as a springboard to screenplays for a disaster flick. Agents for the writers have been in touch with him about serving as a technical consultant, as has a book agent representing the local TV reporter. This reporter, with whom Jacob will no longer work, wrote a novel, *The Big One*, that features a character with a German shepherd and a heavy German accent (Jacob has the accent but not the dog).

Although Jacob's experiences with both print and television journalism have been "a mixed bag," as he puts it, he believes it's been worth it. It took three mayors and four building commissioners, but after 10 years "Mr. Walking Dooomsday Earthquake" finally had the effect he wanted: "New York City now has a [seismic] building code and is retrofitting its bridges."

—John O. Green ()

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