Some economists and ecologists predict that the Deepwater Horizon oil disaster will sharpen the tools of ecosystem damage valuation in much the same way that war advances emergency medicine. Others fault both the methods and the premises of attempts to price nature.

Generally agreed: avoiding future “spills” always beats trying to calculate the losses afterward, and that industrial societies have to rewire the incentives that fail to prevent appalling carelessness.

The federal Natural Resource Damage Assessment (NRDA) process for the Gulf of Mexico may absorb federal scientists and economists, as well as dozens of collaborators in academia, for years. “Every damage assessment is different, and this one is really different. I couldn’t put a timeline on it,” says Tom Brosnan, a NOAA (National Oceanic and Atmospheric Administration) environmental scientist and a veteran of several earlier oil spill audits. NOAA and the US Fish and Wildlife Service are the lead agencies for the NRDA.

Economic techniques used to calculate direct losses to fishers, boaters, tourists, sunbathers, or scuba divers and the businesses that serve them are complex but comparatively well settled. Trying to tally ecosystem damage that doesn’t immediately affect what humans buy, consume, or earn from directly, however, sends economists and ecologists down a labyrinth. What’s the price tag for a brown pelican, sea turtle, reef, marsh, or mangrove, or for the ecological resilience of the Gulf as a whole?

Assessment and restoration

Dollars can become the focus if there is litigation, or if the perpetrators want to settle. But the federal NRDA process is intended to look past the difficult question of dollar valuation of nature, at least initially, to calculate the costs of restoration instead. “Our job is to...
determine what injuries have occurred to the public’s natural resources,” Brosnan says. “It’s quantifying that and then crafting restoration projects to offset that loss, so that the public is compensated.”

In creating a parallel effort, an advisory Gulf Coast Ecosystem Restoration Task Force, President Obama put forward the same goal in far broader terms: making the ecosystem even healthier than it was before the spill. The scope and probable duration of the effects of the Deepwater Horizon event make the ideal of restoration a profound challenge, however.

The interim estimate is that more than 1500 kilometers (km) of coastal salt marshes, beaches, mud flats, and mangroves are oiled. Out in the water, two storylines unfold. In one, largely unseen oil continues to poison and smother segments of the food chain. In the other, oil-eating microbes, some partly effective cleanup measures, and a lot of luck combine to limit long-term ecosystem damage. Confounding the assessment effort are other major environmental stressors that already weaken the Gulf ecosystem: overfishing, global warming, and the 18,000-km² oxygen-starved dead zone caused by toxic agricultural runoff from the Mississippi, to cite a partial list.

University of South Florida chemical oceanographer David Hollander is one of a legion of scientists surveying the postspill Gulf. He has located persistent pooled oil in a deep submarine rent called DeSoto Canyon, about a hundred kilometers southwest of Pensacola. Upwelling currents could periodically dose shallower Gulf waters with toxic oil from these pools long into the future.

“One of the odd aspects of this assessment is its intractability. How do you get a handle on cryptic mortality?” Hollander asks. “This is a deep-sea event. Some of the subtleties of effects to the ecosystem may not be apparent for numbers of years in the future.” He adds: “I think there are going to be things that are beyond restoring. I don’t know if there is a very clear or effective strategy for manipulating an ecosystem to create a restoration in the open ocean.”

On land, even for small spills where just a few acres of marsh were oiled in the past, NOAA has had to fall back on a different gambit allowed by the Oil Pollution Act: substitution. A marsh somewhere else, deemed to be of equivalent value, may be protected in order to compensate. “It’s not our preference, certainly. Our preference is restoration ‘in kind, in place,’” Brosnan says. “But you know, it doesn’t always work that way. Sometimes we have to be creative.”

When a few hundred ruddy ducks were wiped out by a Chesapeake flyway spill, measures were taken to improve one of their nesting areas on a Nebraska prairie. Turtles killed by a Florida spill were compensated for by changes in fishing practices to spare turtles and some improved nest protection. Benthic worms couldn’t be restored to the toxic floor of a polluted bay, so an oyster reef with roughly similar populations of invertebrates was created somewhere else.

**Ecosystem service economics**

This alchemy of finding “equivalent value” for restoring or substituting natural systems or their component species is one of several points in
It’s not clear what role ecosystem services valuation will play in the federal assessment of damage to the Gulf, though “restoring service flows” is one of its goals. Ecosystem services have not been fully considered in the past, says ecologist Peter Kareiva, chief scientist for The Nature Conservancy. He is also a founding member of the Natural Capital Project, a research and policy initiative whose goal is to communicate with a whole different audience than the typical environmentalists are going to be able to affect. If we want to make any real changes, the moralistic approach hasn’t really worked.

The boundaries of the mainstream view of valuation techniques are hard to judge. But Costanza and Kareiva don’t sense much resistance among scientists to incorporating ecosystem services into our ledgers. It is, after all, an attempt to bolster environmental protection on the basis of economic self-interest, and to integrate scientific knowledge into policy.

Some scientists and economists doubt the concept, however, and the possibility of restoration that often underlies it. “The greatest scientific challenge we face in the ocean is that we do not know how to put Humpty Dumpty back together again,” says ecologist Jeremy Jackson, director of the Scripps Institution’s Center for Marine Biodiversity and Conservation. “It’s ten or a hundred or a thousand times harder to put it back together again than it was to break it. If history is any judge, we have certainly not ever fulfilled that obligation.”

Jackson led a five-year study of the effects of a 1986 oil spill off Panama for the Smithsonian’s Tropical Research Institute. “The overriding lesson of our study was never never ever allow oil to get into a marsh, a mangrove, a seagrass bed, or an oyster reef, because you will never ever ever get it out,” he says.

He believes that no dollar valuation can capture the scale of such damage. “In the Gulf, the sea level is rising and the land is sinking and the whole coast is in precarious shape to begin with. Now it just got kicked in the balls by this oil spill. This is an area that is facing extreme hazards on all fronts. Nobody is going to value economically the synergistic effects of that oil spill with all those other things that are going on.

“We don’t think synergistically. We put things in little boxes. That’s why someone like me gets so angry when they say, oh, we’ll just destroy this marsh and we’ll build another one somewhere else—because it doesn’t work.”

Jackson earned his PhD in 1971. Douglas McCauley, nearer the other end of the career ladder, is a Stanford graduate student who studies large marine animals and the food web. He concedes some worthiness to the ecosystem service concept but adds that biodiversity reconstruction and service restoration in the Gulf don’t necessarily go hand in hand. For example, he says, “if a destroyed mangrove or wetland system in the Gulf provided storm protection and this is the service we want to recover, it is possible that it could be provided more cheaply and effectively by building levees...and that it could be the potential problem.”

McCauley has written in the journal Nature that the relationship between markets and conservation is “ephemeral and illusory.... To make ecosystem services the foundation of our conservation strategies is to imply—intentionally or otherwise—that nature is only worth conserving when it is, or can be made, profitable.”
He asks how we will account for “all of the many beautiful, evolutionarily old, irreplaceable—and useless—creatures of the oceans. Deep-sea benthic communities, piping plovers, the Alabama beach mouse? The kinds of things that are part of Gulf biodiversity but not part of the Gulf economy.”

**It’s not the economy, stupid**

Ecosystem service valuations are “all based on the assumption that economists should make policy decisions. And yet it’s a science, or a pseudoscience, that has shown its predictions not to be accurate at all,” says Michael Soulé, a founder of the Society for Conservation Biology and emeritus professor of environmental studies at the University of California, Santa Cruz. “They can’t forecast a depression or a recession. And yet, for some reason, society has vested a great deal of faith in this priesthood of economists, that they know how to determine what’s best for society. Trying to place a monetary value on everything is a foolish activity.

We don’t do it for other important values. For instance, how much is God worth to you? And yet, that’s the only thing economists haven’t been able to monetize up to this point.”

But economist James Sanchirico of the University of California, Davis, sees the ecosystem services approach as a useful addition to the valuation conversation, rather than as a substitute for moral inquiry. “I wouldn’t expect economics to address the moral question,” he adds. “That’s beyond our scope. In a policy analysis, economics is a tool to be used to help make better informed decisions, but they are made with deep core beliefs and the norms of the culture. It’s just a tool.

“If you believe that there are intrinsic values, it doesn’t mean you don’t go forward and try to quantify what is potentially quantifiable. We want to get ecosystem service damages counted so that people take the appropriate care, and these spills don’t occur in the future.” His own modeling work has valued mangroves, sea grass, and coral reefs as natural capital, linking their ecosystem services and conservation policy decisions. He readily concedes the complexity and imprecision of the technique. “But the really important thing is that it has opened up a nice dialogue between ecologists and economists, opened up a way of us talking together,” he says. “It is potentially a source of focus for the science, and on what science is needed, to help better inform policy.”

A more controversial damage assessment technique employs survey research to quantify “intrinsic” value for damaged or destroyed ecosystem components that provide no other easily discernible service. A cross-section of citizens is asked—sometimes using elaborate trade-off scenarios—what they would be willing to pay for the continued existence of, say, a deep-water coral reef, or turtles, or a population of birds. NOAA economist Tony Penn notes that this willingness-to-pay valuation is “a very expensive proposition”—at times, a solid, defensible survey may cost hundreds of thousands of dollars. Penn could not...
Ecosystem damage, then, is a violation only of the property rights of the humans. Attorney Tom Linzey, executive director of the Community Environmental Legal Defense Fund, points out that under long-established US law, corporations such as British Petroleum—although they are non-living entities—enjoy constitutional rights, whereas living natural systems do not. The Ecuador lawsuit calls corporations such as BP “antagonistic to life.”

The ecosystem services approach—“better than what we have now”—still leaves a bad taste in Linzey’s mouth. “Those economic numbers are very subjective,” he says. “It is still a cost-benefit analysis that could invite destruction of natural systems. That’s not the kind of valuation we need to be doing.” Linzey compares the current paradigm with the one that once justified slavery in the United States. If you harmed the slave, you violated the rights of the owner, not the slave, who had none. The NRDA process, he says, is constructed on that same philosophical platform. “The question is, which one of these models is actually going to bring us closer to environmental sustainability? If your Fourth Amendment rights are violated—your rights against unreasonable search and seizure—we don’t do a cost-benefit analysis on you. It’s about vindicating the right.

“Things are so bad and rapidly becoming so much worse. Unless a new structure of environmental protection that also protects communities’ survival frameworks emerges, we’re pretty much cooked.”

Steve Nash (snash@richmond.edu) teaches journalism and environmental studies at the University of Richmond and is the author of Millipedes and Moon Tigers: Science and Policy in an Age of Extinction (University of Virginia Press) and Blue Ridge 2020: An Owner’s Manual (University of North Carolina Press).