Putting a Value on Nature's "Free" Services

Contrary to conventional economic wisdom, most of the value in the world economy does not come from pulling things out of nature—it comes from the normal functioning of healthy rivers, forests, and fields.

by Janet N. Abramovitz

During the last half of 1997, massive fires swept through the forests of Sumatra, Borneo, and Irian Jaya, which together form a stretch of the Indonesian archipelago as wide as all of Europe. By November, almost 2 million hectares had burned, leaving the region shrouded in haze and more than 20 million of its people breathing hazardous air. Tens of thousands of people had been treated for respiratory ailments. Hundreds had died from illness, accidents and starvation. The fires, though by then out of control, had been set deliberately and systematically—not by small farmers, and not by El Niño, but by commercial outfits operating with implicit government approval. Strange as this immolation of some of the world's most valuable natural assets may seem, it was not unique. The same year, a large part of the Amazon Basin in Brazil was blanketed by smoke for similar reasons. The fires in the Amazon have been set annually, but in 1997 they destroyed over 50 percent more forest than the year before, which in turn had recorded five times as many fires (some 19,115 fires during a single six-week period) as in 1995.

For the timber and plantation barons of Indonesia, as for the cattle ranchers and frontier farmers of Amazonia, setting fires to clear forests has become standard practice. To them, the natural rainforests are an obstruction that must be sold or burned to make way for their profitable pulp and palm oil plantations. Yet, these are the same forests that for many others serve as both homes and livelihoods. For the hundreds of millions who live in Indonesia and in the neighboring nations of Malaysia, Singapore, Brunei, southern Thailand and the Philippines, it is becoming painfully apparent that without healthy forests, it is difficult to remain healthy people.

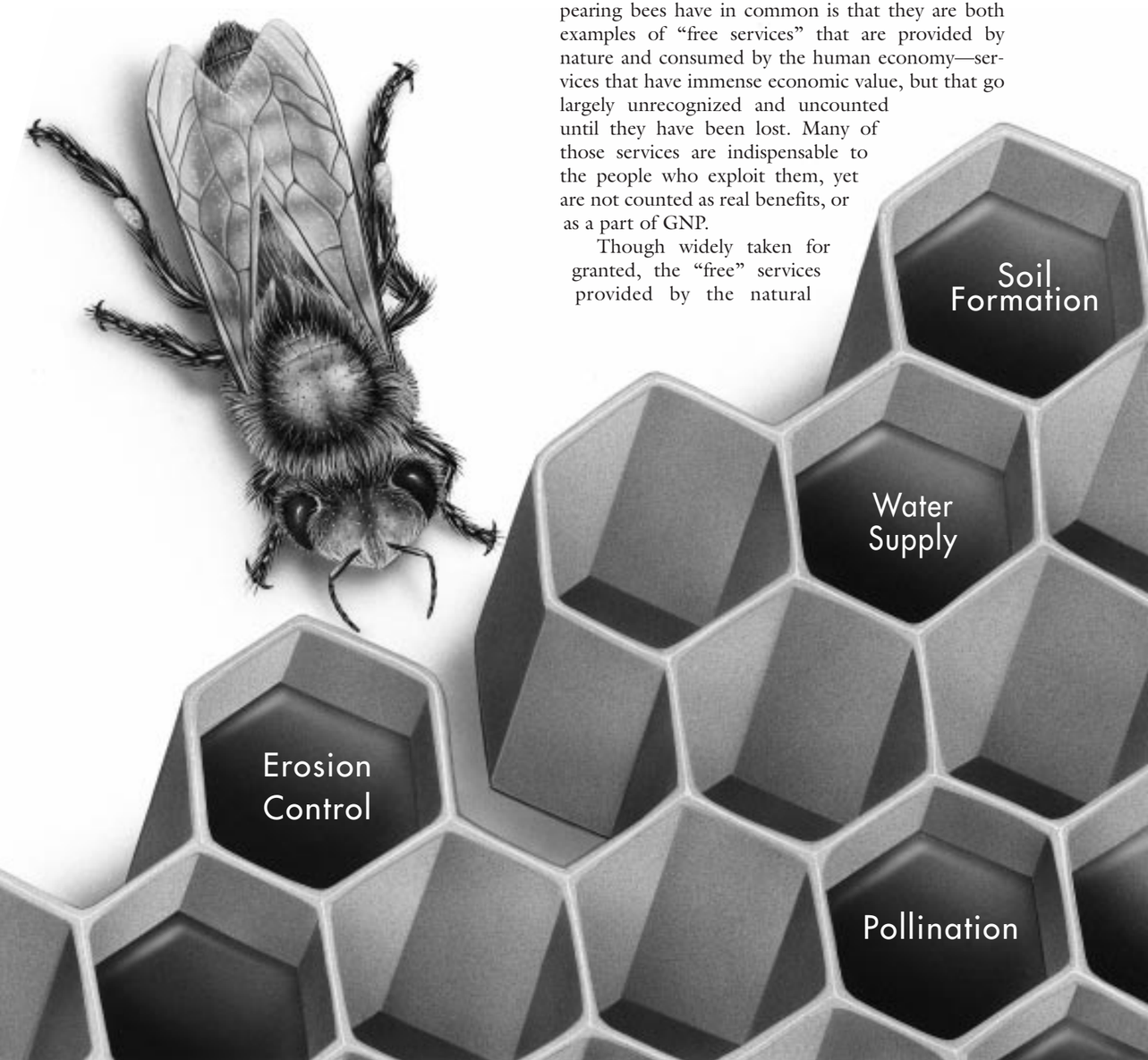
As this issue of WORLD WATCH went to press, the fires in Southeast Asia were still generating enough smoke to be visible from space. Some relief was expected with the arrival of the seasonal rains, but those rains were past due—in part because of an unusually strong El Niño effect. Along with the trees, the region's large underground peat deposits have caught on fire, and such fires are perniciously difficult to put out; they can continue smoldering for years.

When the smoke does finally clear, Southeast Asia—and the world—will attempt to tally the costs. There are the costs of impaired health and sometimes death, from both lung diseases and accidents caused by poor visibility. There is the productivity that was lost as factories, schools, roads, docks, and airports were shut down (over 1,000 flights in and out of Malaysia were cancelled in September alone); there are the crop yields that fell as haze kept the region in day-long twilight, and the harvests of forest products that were wiped out. Timber (some of the most valuable species in the world) and wildlife (some of the most endangered in the world) are still being consumed by flames. Over three-fourths of the world's remaining wild orangutans live on the fire-ravaged provinces of Sumatra and Kalimantan. Some of them, caught fleeing the flames, have become part of the illegal trade. Because of their location, the Indonesian fires, like those in the Amazon, have dealt a heavy blow to the biodiversity of the earth as a whole.

As the smoke billowed dramatically from Southeast Asia, a much less visible—but similarly costly—ecological loss was taking place in a very different kind of location. While the Indonesian haze was being photographed from satellites, this other loss might not be noticed by a person standing within an arm's length of the evidence—yet, in its implications for the human future, it is a close cousin of the Asian catastrophe. In the United States, more than 50 percent of all honeybee colonies have disappeared in the last 50 years, with half of that loss occurring in just the last 5 years. Similar losses have been observed in Europe. Thirteen of the 19 native bumblebee species in the United Kingdom are now extinct. These bees are just two of the many kinds of pollinators, and their decline is costing farmers, fruit growers, and beekeepers hundreds of millions of dollars in losses each year.

What the ravaged Indonesian forests and disappearing bees have in common is that they are both examples of "free services" that are provided by nature and consumed by the human economy—services that have immense economic value, but that go largely unrecognized and uncounted until they have been lost. Many of those services are indispensable to the people who exploit them, yet are not counted as real benefits, or as a part of GNP.

Though widely taken for granted, the "free" services provided by the natural



ILLUSTRATIONS BY PATRICK GNAN

world form the invisible foundation that supports all societies and economies. We rely on the oceans to provide abundant fish, on forests for wood and new medicines, on insects and other creatures to pollinate our crops, on birds and frogs to keep pests in check, and on forests and rivers to supply clean water. We take it for granted that when we need timber we can cut trees, or that when we need water we can find a spring or drill a well. We assume that clean air will blow the smog out of our cities, that the climate will be stable and predictable, and that the mounting quantity of waste we generate will continue to disappear, if we can just get it out of sight. Nature's services have always been there, free for the taking, and our expectations—and economies—are based on the premise that they always will be. A timber magnate or farmer may have to pay a price for the land, but assumes that what happens naturally on the land—the growing of trees, or pollinating of crops by wild bees, or filtering of fresh water—usually happens for free. We are like young children who think that food comes from the refrigerator, and who do not yet understand that what now seems free is not.

Ironically, by undervaluing natural services, economies unwittingly provide incentives to misuse and destroy the very systems that produce those services; rather than protecting their assets, they squander them. Nature, in turn becomes increasingly less able to supply the prolific range services that the earth's expanding population and economy demand (see graphic, pages 14-15). It is no exaggeration to suggest that the continued erosion of natural systems threatens not only the continuing viability of today's human enterprise, but ultimately the prospects for our continued existence.

Underpinning the steady stream of services nature provides to us, there is a more fundamental service these systems provide—a kind of self-regulating process by which ecosystems and the biosphere are kept relatively stable and resilient. The ability to withstand disturbances like fires, floods, diseases, and droughts, and to rebound from the shocks these events inflict, is essential to keeping the life-support system operating. As systems are simplified by monoculture or cut up by roads, and the webs that link systems become disconnected, they become more brittle and vulnerable to catastrophic, irreversible decline. We are being confronted by ample evidence, now—from the breakdown of the ozone layer to the increasingly severity of fires, floods and droughts, to the diminished productivity of fruit and seed sets in wild and agricultural plants—that the biosphere is becoming less resilient.

Unfortunately, much of the human economy is based on practices that convert natural systems into something simpler, either for ease of management (it's easier to harvest straight rows of trees that are all the same age than to harvest carefully from complex forests) or to maximize the production of a desired commodity (like corn). But simplified systems lack the resilience that allows them to survive short-term shocks such as outbreaks of diseases or pests, or forest fires, or even longer-term stresses such as that of global warming. One reason is that the conditions within these simplified systems are not hospitable to all of the numerous organisms and processes needed to keep such systems running. A tree plantation or fish farm may provide some of the products we need, but it cannot supply the array of services that natural diverse systems do—and must do—in order to survive over a range of conditions. To keep our own economies sustainable, then, we need to use natural systems in ways that capitalize on, rather than destroy, their regenerative capacity. For humans to be healthy and resilient, nature must be too.

Resiliency is destroyed by fragmentation, as well as by simplification. Fires in healthy rainforests are very rare. By nature, they are too wet to burn. But as they are opened up and fragmented by roads and logging and pasture, they become drier and more prone to fire. When fire strikes forests that are not adapted to fire (as is the case in the rainforests of both Brazil and Indonesia), it is exceptionally destructive and tends to kill a majority of the trees. The fires in Southeast Asia's peat swamp rainforests bring further disruption, by releasing long-sequestered carbon into the atmosphere.

The fires in Indonesia are not being started by poor slash-and-burn peasants, but by "slash-and-burn industrialists"—owners of rubber, palm oil, rice, and timber plantations who have been taking advantage of a dry year to clear as much natural forest as they can. Though it issued a recent law forbidding the burning, the government of Indonesia is in fact pushing for higher production levels from these export sectors. In both the rainforests and the peat swamps, it has given the plantation owners large concessions to encourage continued "conversion" to one-crop commodities. And the government continues to push costly agricultural settlements into peat forests ill-suited to rice. After the fires became a serious regional problem (and international embarrassment), the government revoked the permits of 29 companies, but such actions were too little, too late.

The current fires are not the first to ravage parts of Southeast Asia; extensive logging in Indonesia and Malaysia led to a major conflagration in 1983 that burned over 3 million hectares and wiped out $5 billion worth of standing timber in Indonesia alone. After 1983, fires that had once been rare became a common occurrence. The 1997 fire will likely turn out to have been the most costly yet. Unless policies change, the fires will be reignited this year.

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Under the current system of national accounting, a country could exhaust its mineral resources, cut down its forests, erode its soils, pollute its aquifers, and hunt its wildlife and fisheries to extinction, but measured income would not be affected as these assets disappeared…. (The) difference in the treatment of natural resources and other tangible assets confuses the depletion of valuable assets with the generation of income…. The result can be illusory gains in income and permanent losses in wealth.

Robert Repetto, economist at the World Resources Institute

What Forests Do

Around the world, the degradation, fragmentation, and simplification—or "conversion"—of ecosystems is progressing rapidly. Today, only 1 to 5 percent of the original forest cover of the United States and Europe remains. One-third of Asia's forest has been lost since 1960, and half of what remains is threatened by the same industrial forest activities responsible for the Indonesian fires. In the Amazon, 13 percent of the natural cover has already been cleared, mostly for cattle pasture. In many countries, including some of the largest, more than half of the land has been converted from natural habitat to other uses that are less resilient. In countries that stayed relatively undisturbed until the 1980s, significant portions of remaining ecosystems have been lost in the last decade. These trends have been accelerating everywhere. As the natural ecosystems disappear, so do many of the goods and services they provide.

That may seem to contradict the premise that people want those goods and services and would not deliberately destroy them. But there's a logical explanation: governments and business owners typically perceive that the way they can make the most profit from an ecosystem is to maximize its production of a single commodity, such as timber from a forest. For the community (or society) as a whole, however, that is often the least profitable or sustainable use. The economic values of other uses, and the number of people who benefit, added up, can be enormous. A forest, if not cut down to make space for a one-commodity plantation, can produce a rich variety of non-timber forest products (NTFPs) on one hand, while providing essential watershed protection and climate regulation, on the other. These uses not only have more immediate economic value but can also be sustained over a longer term and benefit more people.

In 1992, alternative management strategies were reviewed for the mangrove forests of Bintuni Bay in Indonesia. When nontimber uses such as fish, locally used products, and erosion control were included in the calculations, the researchers found that the most economically profitable strategy was to keep the forest standing with only a modest amount of timber cutting—yielding $4,800 per hectare. If the forest was managed only for timber-cutting, it would yield only $3,600 per hectare. Over the longer term, it was calculated that keeping the forest intact would ensure continued local uses of the area worth $10 million a year (providing 70 percent of local income) and protect fisheries worth $25 million a year—values that would be lost if the forest were cut.

The variety and value of goods produced and collected from forests, and their importance to local livelihoods and national economies, is an economic reality worldwide. For instance, rattan—a vine that grows naturally in tropical forests—is widely used to make furniture. Global trade in rattan is worth $2.7 billion in exports each year, and in Asia it employs a half-million people. In Thailand, the value of rattan exports is equal to 80 percent of the legal timber exports. In India, such "minor" products account for three fourths of the net export earnings from forest produce, and provide more than half of the formal employment in the forestry sector. And in Indonesia, hundreds of thousands of people make their livelihoods collecting and processing NTFPs for export, a trade worth at least $25 million a year. Many of these forests were destroyed in the fire.

Even so, non-timber commodities are only part of what is lost when a forest is converted to a one-commodity industry. There is a nexus between the two catastrophes of the Indonesian fires and the North American and European bee declines, for example, since forests provide habitat for bees and other pollinators. They also provide habitat for birds that control disease-carrying and agricultural pests. Their canopies break the force of the winds and reduce rainfall's impact on the ground, which lessens soil erosion. Their roots hold soil in place, further stemming erosion. In purely monetary terms, a forest's capacity to protect a watershed alone can exceed the value of its timber. Forests also act as effective water-pumping and recycling machinery, helping to stabilize local climate. And, through photosynthesis, they generate enough of the planet's oxygen, while absorbing and storing so much of its carbon (in living trees and plants), that they are essential to the stability of climate worldwide.

Beyond these general functions, there are services that are specific to particular kinds of forests. Mangrove forests and coastal wetlands, notably, play critical roles in linking land and sea. They buffer coasts from storms and erosion, cycle nutrients, serve as nurseries for coastal and marine fisheries, and supply critical resources to local communities. For flood

Priceless

Though widely taken for granted, the "free" services provided by the natural world form the invisible foundation that supports all societies and economies. Here are some of the ecosystem services a recent study attempted to quantify.

control alone, the value of mangroves has been calculated at $300,000 per kilometer of coastline in Malaysia—the cost of the rock walls that would be needed to replace them. Protecting coasts from storms will be especially important as climate change makes storms more violent and unpredictable. One force driving the accelerated loss of these mangroves in the last two decades has been the explosive growth of intensive commercial aquaculture, especially for shrimp export. Another has been the excess diversion of inland rivers and streams, which reduces downstream flow and allows the coastal waters to become too salty to support the coastal forests.

The planet's water moves in a continuous cycle, falling as precipitation and moving slowly across the landscape to streams and rivers and ultimately to the sea, being absorbed and recycled by plants along the way. Yet, human actions have changed even that most fundamental force of nature by removing natural plant cover, draining swamps and wetlands, separating rivers from their floodplains, and paving over land. The slow natural movement of water across the landscape is also vital for refilling nature's underground reservoirs, or aquifers, from which we draw much of our water. In many places, water now races across the landscape much too quickly, causing flooding and droughts, while failing to adequately recharge aquifers.

The value of a forested watershed comes from its capacity to absorb and cleanse water, recycle excess nutrients, hold soil in place, and prevent flooding. When plant cover is removed or disturbed, water and wind not only race across the land, but carry valuable topsoil with them. According to David Pimentel, an agricultural ecologist at Cornell University, exposed soil is eroded at several thousand times the natural rate. Under normal conditions, each hectare of land loses somewhere between 0.004 and 0.05 tons of soil to erosion each year—far less than what is replaced by natural soil building processes. On lands that have been logged or converted to crops and grazing, however, erosion typically takes away 17 tons in a year in the United States or Europe, and 30 to 40 tons in Asia, Africa, or South America. On severely degraded land, the hemorrhage can rise to 100 tons in a year. The eroded soil carries nutrients, sediments, and chemicals valuable to the system it leaves, but often harmful to the ultimate destination.

One way to estimate the economic value of an ostensibly free service like that of a forested watershed is to estimate what it would cost society if that service had to be replaced. New York City, for example, has always relied on the natural filtering capacity

of its rural watersheds to cleanse the water that serves 10 million people each day. In 1996, experts estimated that it would cost $7 billion to build water treatment facilities adequate to meet the city's future needs. Instead, the city chose a strategy that will cost it only one-tenth that amount: simply helping upstream counties to protect the watersheds around its drinking water reservoirs.

Even an estimate like that tends to greatly understate the real value, however, because it covers the replacement cost of only one of the many services the ecosystem provides. A watershed, for example, also contributes to the regulation of the local climate. After forest cover is removed, an area can become hotter and drier, because water is no longer cycled and recycled by plants (it has been estimated that a single rainforest tree pumps 2.5 million gallons of water into the atmosphere during its lifetime.) Ancient Greece and turn-of-the-century Ethiopia, for example, were moister, wooded regions before extensive deforestation, cultivation, and the soil erosion that followed transformed them into the hot, rocky countries they are today. The global spread of desertification offers brutal evidence of the toll of lost ecosystem services.

The cumulative effects of local land use changes have global implications. One of the planet's first ecosystem services was the production of oxygen over billions of years of photosynthetic activity, which allowed oxygen-breathing organisms—such as ourselves—to evolve. Humans have begun to unbalance the global climate regulation system, however, by generating too much carbon dioxide and reducing the capacity of ecosystems to absorb it. Burning forests and peat deposits only makes the problem worse. The fires in Asia sent about as much carbon into the atmosphere last year as did all of the factories, power plants, and vehicles in the United Kingdom. For carbon sequestration alone, economists have been able to estimate the value of intact forests at anywhere from several hundred to several thousand dollars per hectare. As the climate changes the value of being able to regulate local and global climates will only increase.

What Bees Do

If we are often blind to the value of the free products we take from nature, it is even easier to overlook the value of those products we don't harvest directly—but without which our economies could not function. Among these less conspicuous assets are the innumerable creatures that keep potentially harmful organisms in check, build and maintain soils, and decompose dead matter so it can used to build new life, as well as those that pollinate crops. These various birds, insects, worms, and microorganisms demonstrate that small things can have hugely disproportionate value. Unfortunately, their services are in increasingly short supply because pesticides, pollutants, disease, hunting, and habitat fragmentation or destruction have drastically reduced their numbers and ability to function. As Stephen Buchmann and Gary Paul Nabhan put it in a recent book on pollinators, "nature's most productive workers [are] slowly being put out of business."

Pollinators, for example, are of enormous value to agriculture and the functioning of natural ecosystems. Without them, plants cannot produce the seeds that ensure their survival—and ours. Unlike animals, plants cannot roam around looking for mates. To accomplish sexual reproduction and ensure genetic mixing, plants have evolved strategies for moving genetic material from one plant to the next, sometimes over great distances. Some rely on wind or water to carry pollen to a receptive female, and some can self-pollinate. The most highly evolved are those that use flowers, scents, oils, pollens, and nectars to attract and reward animals to do the job. In fact, more than 90 percent of the world's quarter-million flowering plant species are animal-pollinated. When animals pick up the flower's reward, they also pick up its pollen on various body parts—faces, legs, torsos. Laden with sticky yellow cargo, they can appear comical as they veer through the air—but their evolutionary adaptations are uncannily potent.

Developing a mutually beneficial relationship with a pollinator is a highly effective way for a plant to ensure reproductive success, especially when individuals are isolated from each other. Spending energy producing nectars and extra pollen is a small price to pay to guarantee reproduction. Performing this matchmaking service are between 120,000 and 200,000 animal species, including bees, beetles, butterflies, moths, ants, and flies, along with more than 1,000 species of vertebrates such as birds, bats, possums, lemurs, and even geckos. New evidence shows that many more of these pollinator species than previously believed are threatened with extinction.

Eighty percent of the world's 1,330 cultivated crop species (including fruits, vegetables, beans and legumes, coffee and tea, cocoa, and spices) are pollinated by wild and semi-wild pollinators. One-third of U.S. agricultural output is from insect-pollinated plants (the remainder is from wind-pollinated grain plants such as wheat, rice, and corn). In dollars, honeybee pollination services are 60 to 100 times more valuable than the honey they produce. The value of wild blueberry bees is so great, with each bee pollinating 15 to 19 liters (about 40 pints) of blueberries in its life, that they are viewed by farmers as "flying $50 bills."

Without pollinator services, crops would yield less, and wild plants would produce few seeds—with large economic and ecological consequences. In Europe, the contribution of honey bee pollination to agriculture was estimated to be worth $100 billion in 1989. In the Piedmont region of Italy, poor pollination of apple and apricot orchards cost growers $124 million in 1996. The most pervasive threats to pollinators include habitat fragmentation and disturbance, loss of nesting and over-wintering sites, intense exposure of pollinators to pesticides and of nectar plants to herbicides, breakdown of "nectar corridors" that provide food sources to pollinators during migration, new diseases, competition from exotic species, and excessive hunting. The rapid spread of two parasitic mites in the United States and Europe has wiped out substantial numbers of honeybee colonies. A "forgotten pollinators" campaign was recently launched by the Arizona Sonoran Desert Museum and others, to raise awareness of the importance and plight of these service providers.

Ironically, many modern agricultural practices actually limit the productivity of crops by reducing pollination. According to one estimate, for example, the high levels of pesticides used on cotton reduce annual yields by 20 percent (worth $400 million) in the United States alone by killing bees and other insect pollinators. One-fifth of all honeybee losses involve pesticide exposure, and honeybee poisonings may cost agriculture hundreds of millions of dollars each year. Wild pollinators are particularly vulnerable to chemical poisoning because their colonies cannot be picked up and moved in advance of spraying the way domesticated hives can. Herbicides can kill the plants that pollinators need to sustain themselves during the "off-season" when they are not at work pollinating crops. Plowing to the edges of fields to maximize planting area can reduce yields by disturbing pollinator nesting sites. Just one hectare of unplowed land, for example, provides nesting habitat for enough wild alkali bees to pollinate 100 hectares of alfalfa.

Domesticated honeybees cannot be expected to fill the gap left when wild pollinators are lost. Of the world's major crops, only 15 percent are pollinated by domesticated and feral honeybees, while at least 80 percent are serviced by wild pollinators. Honeybees do not "fit" every type of flower that needs pollination. And because honeybees visit so many different plant species, they are not very "efficient"—that is, there is no guarantee that the pollen will be carried to a potential mate of the same species and not deposited on a different species.

Many plants have developed interdependencies with particular species of pollinators. In peninsular Malaysia, the bat *Eonycteris spelea* is thought to be the exclusive pollinator of the durian, a large spiny fruit that is highly valued in Southeast Asia. The bats' primary food supply is a coastal mangrove that flowers continuously throughout the year. The bats routinely fly tens of kilometers from their roost sites to the mangrove stands, pollinating durian trees along the way. However, mangrove stands in Malaysia and elsewhere are under siege, as are the inland forests. Without both, the bats are unlikely to survive.

Pollinators that migrate long distances, such as bats, monarch butterflies, and hummingbirds, need to follow routes that offer a reliable supply of nectar-providing plants for the full journey. Today, however, such nectar corridors are being stretched increasingly thin and are breaking. When the travelers cannot rest and "refuel" every day, they may not survive the journey.

The migratory route followed by long-nosed bats from their summer breeding colonies in the desert regions of the U.S. Southwest to winter roosts in central Mexico illustrates the problems faced by many service providers. To fuel trips of up to 150 kilometers a night, these bats rely on the sequential flowering of at least 16 plant species—particularly century plants and columnar cacti. Along much of the migratory route, the nectar corridor is being fragmented. On both U.S. and Mexican rangelands, ranchers are converting native vegetation into exotic pasture grasses for grazing cattle. In the Mexican state of Sonora, an estimated 376,000 hectares have been stripped of nectar source plants. In parts of the Sierra Madre, the bat-pollinators are threatened by competition from human bootleggers, who have been overharvesting century plants to make the alcoholic beverage mescal. And the latest threat comes from dynamiting and burning of bat roosts by Mexican ranchers attempting to eliminate vampire bats that feed on cattle and spread livestock diseases. The World Conservation Union estimates that worldwide, 26 percent of bat species are threatened with extinction.

Many of the disturbances that have harmed pollinators are also hurting creatures that provide other beneficial services, such as biological control of pests and disease. Much of the wild and semi-wild habitat inhabited by beneficial predators such as birds has been wiped out. The "pest control services" that nature provides are incalculable, and do not have the fundamental flaws of chemical pesticides (which kill beneficial insects along with the pests and harm people). Individual bat colonies in Texas can eat 250 tons of insects each night. Without birds, leaf-eating insects are more abundant and can slow the growth of trees or damage crops. Biologists Paul and Anne Ehrlich speculate that without birds, insects would have become so dominant that humans might never have been able to achieve the agricultural revolution that set the stage for the rise of civilization.

It is not too late to provide essential protections to the providers of such essential services—by using no-till farming to reduce soil erosion and allow nature's underground economy to flourish, by cutting back on the use of toxic agricultural chemicals, and by protecting migratory routes and nectar corridors to ensure the survival of wild pollinators and pest control agents.

Buffer areas of native vegetation and trees can have numerous beneficial effects. They can serve as havens for resident and migratory insects and animals that pollinate crops and control pests. They can also help to reduce wind erosion, and to absorb nutrient pollution that leaks from agricultural fields. Such zones have been eliminated from many agricultural areas that are modernized to accommodate new equipment or larger field sizes. The "sacred groves" in South Asian and African villages—natural areas intentionally left undeveloped—still provide such havens. Where such buffers have been removed, they can be reestablished; they can be added not only around farmers' fields, but along highways and river banks, links between parks, and in people's back yards.

People can also encourage pollinators by providing nesting sites, such as hollow logs, or by ensuring that pollinators have the native plants they need during the "off-season" when they are not working on the agricultural crops. Changing some prevalent cultural or industrial practices, too, can help. There is the practice, for example, of growing tidy rows of cocoa trees. These may make for a handsome plantation. But midges, the only known pollinator of cultivated cacao (the source of chocolate), prefer an abundance of leaf litter and trees in a more natural array. Plantations that encourage midges can have ten times the yield of those that don't.

Scientists have begun to ratchet up their study of wild pollinators and to domesticate more of them. The bumblebee, for example, was domesticated ten years ago and is now a pollinator of valuable greenhouse grown crops.

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Maximization of GNP is not a proper objective of policy. Economists all know that, and yet their everyday use of GNP as the standard measure of economic performance apparently conveys the impression that they are evangelistic worshippers of GNP.

William Nordhaus and James Tobin, prominent Yale economists, in their 1972 landmark study criticizing the use of GNP and proposing an alternative indicator, the Measure of Economic Welfare (MEW)

The Other Service Economy

Natural services have been so undervalued because, for so long, we have viewed the natural world as an inexhaustible resource and sink. Human impact has been seen as insignificant or beneficial. The tools used to gauge the economic health and progress of a nation have tended to reinforce and encourage these attitudes. The gross domestic product (GDP), for example, supposedly measures the value of the goods and services produced in a nation. But the most valuable goods and services—the ones provided by nature, on which all else rests—are measured poorly or not at all (see the Environmental Intelligence piece by Matthew St. Clair on page 7). The unhealthy dynamic is compounded by the fact that activities that pollute or deplete natural capital are counted as contributions to economic wellbeing. As ecologist Norman Myers puts it, "Our tools of economic analysis are far from able to apprehend, let alone comprehend, the entire range of values implicit in forests."

When economies and societies use misleading signals about what is valuable, people are encouraged to make decisions that run counter to their own long-range interests—and those of society and future generations. Economic calculations grossly underestimate the current and future value of nature. While a fraction of nature's goods are counted when they enter the marketplace, many of them are not. And nature's services—the life-support systems—are not counted at all. When the goods are considered free and therefore valued at zero, the market sends signals that they are only economically valuable when converted into something else. For example, the profit from deforesting land is counted as a plus on a nation's ledger sheet, because the trees have been converted to saleable lumber or pulp, but the depletions of the timber stock, watershed, and fisheries are not subtracted.

Last year, an international team of researchers led by Robert Costanza of the University of Maryland's Institute for Ecological Economics, published a landmark study on the importance of nature's services in supporting human economies. The study provides, for the first time, a quantification of the current economic value of the world's ecosystem services and natural capital. The researchers synthesized the findings of over 100 studies to compute the average per hectare value for each of the 17 services that world's ecosystems provide. They concluded that the current economic value of the world's ecosystem services is in the neighborhood of $33 trillion per year, exceeding the global GNP of $25 trillion.

Placing a monetary value on nature in this way has been criticized by those who believe that it commoditizes and cheapens nature's infinite value. But in practice, we all regularly assign value to nature through the choices we make. The problem is that in normal practice, many of us don't assign such value to nature until it is converted to something man-made—forests to timber, or swimming fish to a restaurant meal. With a zero value, it's easy to see why nature has almost always been the loser in standard economic equations. As the authors of the Costanza study note, "...the decisions we make about ecosystems imply valuations (although not necessarily expressed in monetary terms). We can choose to make these valuations explicit or not...but as long as we are forced to make choices, we are going through the process of valuation." The study is also raising a powerful new challenge to those traditional economists who are accustomed to keeping environmental costs and benefits "external" to their calculations.

While some skeptics will doubtless argue that the global valuation reported by Costanza and his colleagues overestimates the current value of nature's services, if anything it is actually a very conservative estimate. As the authors point out, values for some biomes (such as mountains, arctic tundra, deserts, urban parks) were not included. Further, they note that as ecosystem services become scarcer, their economic value will only increase.

Clearly, failure to value nature's services is not the only reason why these services are misused. Too often, illogical and inequitable resource use continues—even in the face of evidence that it is ecologically, economically, and socially unsustainable—because powerful interests are able to shape policies by legal or illegal means. Frequently, some individuals or entities get the financial benefits from a resource while the losses are distributed across society. Economists call this "socializing costs." Stated simply, the people who get the benefits are not the ones who pay the costs. Thus, there is little economic incentive for those exploiting a resource to use it judiciously or in a manner that maximizes public good. Where laws are lax or are ignored, and where people do not have an opportunity for meaningful participation in decision-making, such abuses will continue.

The liquidation of 90 percent of the Philippines' forest during the 1970s and 1980s under the Ferdinand Marcos dictatorship, for example, made a few hundred families over $42 billion richer. But 18 million forest dwellers became much poorer. The nation as a whole went from being the world's second largest log exporter to a net importer. Likewise, In Indonesia today, the "benefits" from burning the forest will enrich a relatively few well-connected individuals and companies but tens of millions of others are bearing the costs. Even in wealthy nations, such as Canada, the forest industry wields heavy influence over how the forests are managed, and for whose benefit.

We have already seen that the loss of ecosystem services can have severe economic, social, and ecological costs even though we can only measure a fraction of them. The loss of timber and lives in the Indonesian fires, and the lower production of fruits and vegetables from inadequate pollination, are but the tip of the iceberg. The other consequences for nature are often unforeseen and unpredictable. The loss of individual species and habitat, and the degradation and simplification of ecosystems, impair nature's ability to provide the services we need. Many of these changes are irreversible, and much of what is lost is simply irreplaceable.

By reducing the number of species and the size and integrity of ecosystems, we are also reducing nature's capacity to evolve and create new life. Almost half of the forests that once covered the Earth are now gone, and much of what remains is in fragmented patches. In just a few centuries we have gone from living off nature's interest to spending down the capital that has accumulated over millions of years of evolution. At the same time we are diminishing the capacity of nature to create new capital. Humans are only one part of the evolutionary product. Yet we have taken on a major role in shaping its future production course and potential. We are pulling out the threads of nature's safety net even as we depend on it to support the world's expanding human population and economy.

In that expanding economy, consumers now need to recognize that it is possible to reduce and reverse the destructive impact of our activities by consuming less and by placing fewer demands on those services we have so mistakenly regarded as free. We can, for example, reduce the high levels of waste and overconsumption of timber and paper. We can also increase the efficiency of water and energy use. In agricultural fields we can leave hedgerows and unplowed areas that serve as nesting and feeding sites for pollinators. We can sharply reduce reliance on agricultural chemicals, and improve the timing of their application to avoid killing pollinators.

Maintaining nature's services requires looking beyond the needs of the present generation, with the goal of ensuring sustainability for many generations to come. We have no honest choice but to act under the assumption that future generations will need at least the same level of nature's services as we have today. We can neither practically nor ethically decide what future generations will need and what they can survive without.

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