

QUAKER ECO-BULLETIN

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for an Ecologically Sustainable World

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Economic Valuation of Ecosystem Services

by Judy Lumb

What Are Ecosystem Services?

Ecosystem services are those fundamental life-supporting services - seemingly infinite and free - that we take for granted, such as, purifying air to breathe, purifying water to drink, and providing fertile soil to produce the food we eat. We are even less aware of the other services that ecosystems provide: pollination, dispersal of seeds, climate stabilization, flood protection, erosion prevention, decomposition, detoxification, maintenance of biodiversity, control of agricultural pests, and carbon sequestration, to name a few.

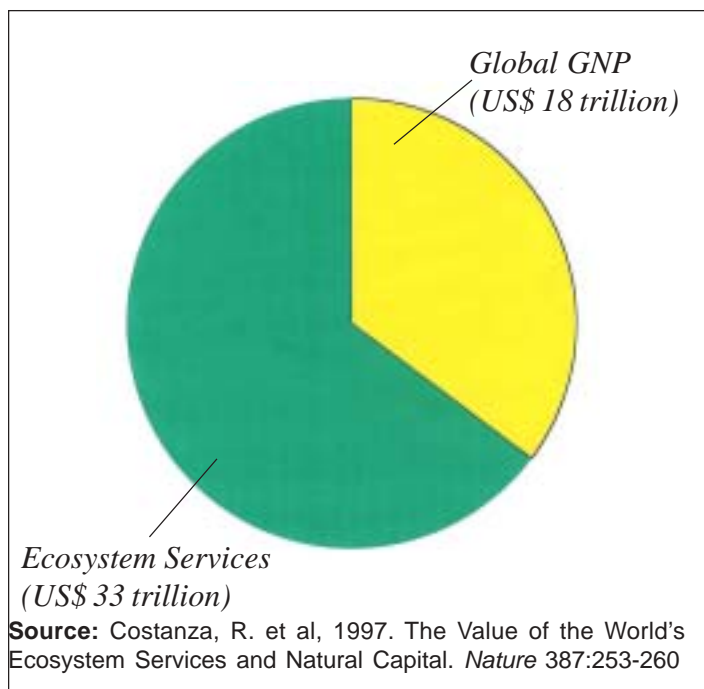
Human activity inevitably leads to disruption of ecosystem services. The growth in population and increasing per capita consumption exacerbates the problem, as does the predominant focus on short-term gains at the expense of long-term needs. Urban sprawl, destruction of wetlands, deforestation, soil erosion, industrial pollution of air and water, agricultural runoff of pesticides and fertilizers, sewage and animal waste, over-harvesting of fish, and introduction of exotic species are only a few of the disruptions to ecosystem services.

Our economic system is based upon exploitation of natural resources for human consumption with total disregard for the true costs - the disruption of natural ecosystem services. Using economic model to describe our natural systems, we might consider such God-given gifts as air and water as "products," the processes that replenish and purify them as "services," and the system that provides these as "natural capital". This model can be useful in quantifying the costs of environmental destruction in terms that our policy-makers can understand - dollar amounts! But without some means of assessing the value of those services, they cannot not included in our economic calculations. To make our life on this planet sustainable, we must become conscious of ecosystem services and factor them into every decision.

Externalities versus Natural Capital

There are different economic approaches in regard to payment for ecosystem services. Environmental Economists attempt to incorporate payment for ecosystem services into the current economic systems. They regard ecosystem services as "externalities", or production costs for which someone else other than the producer pays.

"Pure air, for example, is the common property of many. A company that fouls the air without paying for it receives a stolen profit, stolen from the people who suffer. ... Logging companies using federally built roads take advantage of external costs. Environmentalists should lobby to internalize the exter-



nalities by requiring firms to pay the costs of pollution. Loggers should pay for the logging roads. If everyone paid all costs (and passed them on in the price to the consumer), environmental degradation would sink to restorable levels." (Powelson, 2002)

Ecological Economists maintain that there needs to be a fundamental change in the basic assumptions and economic models so that ecosystem services are incorporated as externalities. Quaker Economist Kenneth Boulding is widely regarded at the "grandfather of ecological economics". Ecological Economists regard natural resources, living systems and ecosystem services as natural capital.

"Capitalism, as practiced, is a financially profitable, non-sustainable aberration in human development. What might be called "industrial capitalism" does not fully conform to its own accounting principles. It liquidates its [natural] capital and calls it income. It neglects to assign any value to the largest stocks of capital it employs - the natural resources and living systems, as well as the social and cultural systems that are the basis of human capital." (Hawken, et al, 1999)

These two approaches are not mutually exclusive. Insofar as it is possible to assign dollar amounts to ecosystem services and bring them into the current economic system, it is an improvement over the past complete disregard of ecosystem services. However, dollar amounts can never express the entire

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Quaker Eco-Witness (QEW) promotes government and corporate policies to help restore and protect Earth's biological integrity. It works within and through the Religious Society of Friends for policies that enable human communities to relate in mutually enhancing ways to the ecosystems of which they are a part. This witness seeks to be guided by the Spirit and grounded in reverence for Earth's communities of life as God's creation.

QEB's purpose is to inform the **QEW** network to advance Friends' witness on government and corporate policy as it relates to the ecosystems that sustains us. Each issue is an article about timely legislative or corporate policy issues affecting our society's relationship to the earth.

Friends are invited to contact us about writing an article for *QEB*. Submissions are subject to editing and should:

- Provide background information that reflects the complexity of the issue and is respectful toward other points of view.
- Explain why the issue is a Friends' concern.
- Describe the positions of other faith-based and secular environmental groups on the issue.
- Relate the issue to legislation or corporate policy.
- Provide sources for additional information.

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cost of environmental destruction. How does one put a value on an endangered species? Our air and water are truly priceless – without them we cannot exist.

Why Should Friends Be Concerned?

“As Friends, we recognize the intrinsic value of the natural world as God's creation, beyond its use by humankind. We are part of an intricate web connecting all of Earth's communities of life. Failure to recognize our interdependence with and responsibility to all life results in activities and institutions that are impairing Earth's ecosystems and their ability to support life. We are called to promote policies, laws, and institutions that respond to these problems.” (from the Quaker Eco-Witness Guidance Policy)

Friends have a history of fairness in business – they initiated the fixed price system. Instead of bargaining over each transaction, which resulted in different people paying different prices for the same goods and services, Friends set a fixed price that was fair to both the merchant and their customers. Now we are beginning to realize that we have not been paying the full cost of our human activities.

This issue also invokes Friends' testimonies of peace, simplicity and sustainability because conflicts over resource availability can lead to war. Paying attention to our use and abuse of ecosystem services can lead us to a more simplified lifestyle in current time and sustainability for the future.

Valuation Methods

One way to determine dollar values is by a person's willingness to pay, how much is one willing to give up to obtain goods or services or to avoid damage. What is actually paid in market prices, the prices of ecosystem products such as fish or wood that are traded in markets, can be calculated directly.

Methods of Dollar-based Valuation of Ecosystem Services

Market Price Method estimates economic values for ecosystem product or services that are bought and sold in commercial markets

Productivity Method estimates values for ecosystem products or services that contribute to the productivity of commercially marketed goods.

Hedonic Pricing Method estimates values for ecosystem services that directly affect market prices of other goods, commonly applied to housing prices.

Factor Income Method estimates the increase in income accruing due to ecosystem services.

Travel Cost method estimates value of a natural area based on how much people are willing to pay to travel to visit that area.

Damage Cost Avoided Method estimates value based on costs of avoided damages resulting from lost ecosystem services

Replacement Cost Method estimates value based on the cost of replacing or providing a substitute for the ecosystem service.

Benefit Transfer Method estimates value by transferring existing benefit from studies already completed for another location or issue.

Contingent Valuation Method estimates value by asking people to directly state their willingness to pay for specific services based on a hypothetical scenario.

Contingent Choice Method estimates value based on asking people to make choices among sets of ecosystem services or development projects. Dollar value is then inferred from tradeoffs that include cost.

Group Contingent Valuation Method estimates value based on small group deliberation in order to reflect the values of a community.

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Willingness to pay can also be measured indirectly by the cost of actions people are willing to take. For example, the cost of travel and travel time to a recreation site is a measure of the value of that recreation site. It is possible to conduct surveys to ask individuals or groups what they are willing to pay given a hypothetical scenario. A dollar value can be assigned indirectly by asking people to make trade-offs among scenarios involving different ecosystem services or developmental projects. These and other methods of assigning dollar values are listed in Table 1.

Dollar-based value systems are limited because not all ecosystem service characteristics can be expressed in dollar values. There are no substitutes for air, water and soil – we are wholly dependent on their healthy functioning. These methods estimate the value of ecosystems from the human point of view. The intrinsic, innate value of each component of an ecosystem that has no relationship to human needs and activities is completely neglected and cannot be given a dollar value. For example, endangered species cannot be saved on economic grounds.

Developing methods for the valuation of ecosystem services is merely one step toward a basic change in our economic system that incorporates the ecological sustainability of human activities, along with an equitable global distribution of resources between humans and nature, between humans in current time, and between this generation and future generations.

Public Decision-making

Ecosystem valuation is currently being used for cost-benefit analysis and environmental impact statements both for public spending for infrastructure and for regulating private sector development. Public officials and managers must consider public values, encourage public participation, compare benefits of different projects, prioritize conservation projects, maximize environmental benefits, and assess the true costs of developmental projects.

For the solution of any problem, or evaluation of any proposed project, possible alternatives must be identified. Often the only alternatives studied are human interventions and the preservation of the natural ecosystem is never even considered. The natural ecosystem services are the most efficient and should be given first priority!

Global Assessment of Ecosystem Services

In order to demonstrate the magnitude of ecosystem services, a team of researchers from Brazil, Sweden, the Netherlands and the United States made an estimate of the value of global ecosystem services (see piechart on page 1). They divided the earth's surface into different environmental types (biomes) - ocean, forest, wetland, etc. (Table 2). They compiled the values (maximum and minimum) for ecosystem services estimated in published studies for each biome and multiplied times the area of that biome on earth. The total value of

ecosystem services added up to a minimum of US\$ 16 and a maximum of US\$ 54 trillion, with an average of US\$ 33 trillion (Figure 1). They used an estimate of the gross global product (global GNP) at the same time of US\$18 trillion for comparison. (Costanza, et al, 1997)

There has been considerable debate over this study. Some feel the estimates of ecosystem services are too large; others feel they are too small – that it is inappropriate to set a dollar value, for ecosystem services are infinitely valuable. There are concerns that such data can be misused to justify developmental projects that destroy ecosystem services. Despite the limitations of the study, it has called attention to the fact that ecosystem services have economic value that must be incorporated into our economic systems.

New York City's Water Supply

Several years ago New York City was faced with deteriorating water quality because the natural ecological water system was being overwhelmed with sewage and agricultural runoff. Natural hardwood and evergreen forests filter the water and hold the soil from erosion. But when the land is cleared for agriculture or human habitation, those ecosystem services are destroyed and pollution is generated. The city administration investigated the cost of replacing this natural system with an artificial filtration plant. The large estimated cost of \$ 6 - 8 billion with an annual operating cost of \$300 million made them take a look at the natural alternatives. In contrast, the cost of restoring the integrity of nature's purification services was \$1 - 1.5 million. They floated an "environmental bond issue" and used the money to purchase land, to compensate property owners for development restrictions on their land, and to subsidize the improvement of septic systems. Clearly, restoration and preservation of the watershed was the best economic option in this case.

Australia's Privatization of Wildlife Preservation

Earth Sanctuaries, Ltd. (ESL) was listed on the Australian Stock Exchange in May, 2000. This conservation company buys land and restores its natural vegetation and wildlife. Income is earned through ecotourism in their wildlife sanctuaries and consulting to private land owners. Crucial in the public offering was the change in Australia's accounting law so that Earth Sanctuaries could list rare native animals as assets (AASB 1037 Self Generating and Regenerating Assets - SGARA).

The number of each rare, vulnerable, and endangered species in each of the ESL sanctuaries was determined. Since there is no liquid market in wildlife in Australia, values were assigned based upon sanctuary costs for re-establishing populations and for translocation (\$1,375 for rare animals, \$2,750 for vulnerable animals, and \$5,500 for endangered animals). ESL's 2001 Annual Report showed assets exceeding \$5 billion in rare, vulnerable and endangered wildlife :

Earth Sanctuaries Wildlife Assets

Name	Number	Value (Aust\$)
Rare		
Southern hairy-nosed wombat	633	\$870,375
Woylie	339	\$466,125
Southern brown bandicoot	80	\$110,000
Vulnerable		
Long-nosed potoroo	107	\$294,250
Plains rat	34	\$93,500
Yellow-footed rock-wallaby	290	\$797,500
Numbat	222	\$610,500
Bilby	63	\$173,250
Greater stick-nest rat	55	\$151,250
Silver boodie	40	\$110,000
Rufous bettong	213	\$585,750
Endangered		
Bridled nailtail wallaby	70	\$385,000
Eastern quoll	82	\$451,000
Bolam's mouse	49	\$269,500
Platypus	8	\$44,000
Total	2,285	\$5,412,000

Management of Marine Protected Areas in East Africa

Economic valuation has been used extensively in the management of marine protected areas in East Africa. The establishment of marine protected areas was justified by demonstrating their economic value and by considering economics, management of the protected areas has been financed. Incentives for marine conservation ensure that the affected populations are the ones who benefit. A 1999 study of Kisite Marine National Park and Mpunguti Marine National Reserve showed a total economic benefit of KSh 145 million/year (approximately US\$ 1.7 million) (see Table 4).

Costa Rica Carbon Sequestration

The government of Costa Rica has been paying landowners since 1997 for ecosystem services, such as, carbon sequestration, protection of watersheds, biodiversity and scenic beauty. The payments (approximately US\$50/hectare/year) are financed partly by a tax on fossil fuels. Under the Kyoto agreement Costa Rica has sold carbon sequestration credits to European countries. Calculation of the amount of carbon sequestered is a complicated process, but with current land data available it is possible to make an estimate.

Belize PACT

In Belize ecosystem services are being paid for by a tax on non-resident visitors collected as an exit tax (US\$7.50 per person). These funds, as well as a portion of entrance fees collected at the protected areas, go into the Protected Areas Conservation Trust (PACT), which is used to support the management of Belize's protected areas. Belize has 40% of her land mass under some form of protection and nine Marine Reserves. According to their Annual Report, PACT collected BZ\$1.4 million (US\$700,000) in 2001. The government does not have the financial resources to manage these areas, so most

of Belize's protected areas are co-managed by non-governmental organizations, many of which are composed of residents of adjacent communities. PACT funds are distributed in the form of grants to these organizations to facilitate the sustainable management of Belize's natural resources and preservation of her ecosystem services.

What Friends Can Do

It is most important to raise consciousness of the general public and of public officials and managers of the value of ecosystem services. Here are some ways that individual Friends might choose.

- 1) Educate ourselves about Ecosystem Services.
- 2) Monitor local news for issues that impact ecosystem services.
to point out areas of public concern when ecosystem services are destroyed or disregarded.
- 3) Speak truth to power – discuss the implications of their decisions on ecosystem services with local officials and congressional representatives.
- 4) Hold agencies to the environmental and public input requirements of the laws.
- 5) Make certain that preservation of ecosystem services is among the options presented.
- 6) Write letters to the Editor to educate the public about ecosystem services.

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