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Economy vs. the Environment: Fact or Fiction?

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Executive Summary

There is a widely held theory that resource management practices and policies which protect the environment must necessarily harm the economy and reduce employment. However, empirical data supporting this theory are scarce. In recent years, economists and ecologists have increasingly begun to use quantitative methods to test this theory.

Testing the Environment vs. Economy Hypothesis

This report presents an overview of some widely used methods in the emerging field of ecological economics, and summarizes representative examples of results that are obtained.

In the correlation method, quantitative indices of economic strength are compared with indices of environmental health and environmental policy strength across regions, states or nations. If strong environmental policies harm economies, these studies should show a negative correlation in which economic strength decreases as policy strength increases.

Studies examining factory emissions, endangered species, air quality and other issues have found no evidence that economies suffer as environmental policy strength increases. On the contrary, numerous researchers have reported slight positive correlations between environmental and economic indices, suggesting that environmental health may help fortify economies.

The "policy impact" method measures the impact of a change in environmental policy, such as a species listing under the endangered species act or a tightening of air or water quality regulations, on economic strength. In these studies too,

evidence that increased environmental regulation damages economies or reduces employment is scarce.

This report also reviews indirect estimates of the economic impact environmental policy or health. In the travel cost method, researchers estimate the economic value of rivers or wilderness by measuring how much visitors are willing to pay to travel to the area. In the contingent value method, surveys are used to determine how much people would be willing to pay for incremental increases in acreage in wilderness or in miles of clean river. The property value method measures differences between the value of real estate adjacent to clean water bodies, open space or in areas of high air quality, and similar real estate elsewhere. This provides an estimate the impact of ecosystem health on property values.

These methods increasingly are being used to measure the value of clean water and air, and healthy wildlands throughout the United States and around the world. Estimated values vary widely, but studies agree that clean, fishable and swimmable waterways, clean air, diverse and vigorous native plant and wildlife populations, and open space are highly valued by the public and that the public is willing to pay to preserve and enjoy these resources. For example, homes within 300 feet of clean waterbodies have been found to be worth up to 28% more than similar homes.

Ecosystem Services

Another rapidly expanding field of study involves the valuation of so-called "ecosystem services". Ecosystem services are the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants.

This report reviews some of the many recent studies estimating the values of ecosystem services for forests, wetlands, grasslands, and other ecosystems. One of the most widely cited analyses estimated the average aggregate global annual value of wildland ecosystem services at \$33 trillion. Examples of values for individual services include a value of \$4-7 billion per year for pollination in the United States and values of \$1-2 billion per year for the 42 million roadless acres on National Forests in the lower 48 states.

may be forgone if an ecosystem is damaged or destroyed. The growing body of scientific research in this area is making it steadily easier for project and policy analyses to quantify the economic effects of changes in ecosystem services flows.

As the public and policymakers begin to incorporate this research into resource management laws and practices, the quality and sustainability of our lives and economies will improve.

Environmental Protection Produces Jobs

Finally, economic analysis of the environment vs. economy hypothesis often ignore the fact that pollution control and other “green” industries are rapidly growing and are strengthening economies and producing new jobs every day. A recent report by the Environmental Protection Agency estimated that 1.3 million Americans are employed in “environmental technology”. That figure does not include the hundreds of thousands of jobs nationwide in wildland ecosystem restoration and management.

Conclusion

There is little evidence to support the fear that strong environmental protection policies will harm the economy or destroy jobs. The increase in meticulous quantitative studies of this issue should help to replace the anecdote and hyperbole which frequently dominate environmental policy debates with dispassionate fact-based analysis, leading to improved policymaking.

Standard cost-benefit analyses for polices such as clean water laws or for land use projects such as dam construction, logging, or housing development tend to ignore the value of ecosystem services that

Introduction

There is a longstanding widely held theory that resource management practices and policies which protect the environment must necessarily harm the economy. Proponents of this theory claim that practices which protect or restore water quality, air quality, the global climate, biological diversity, or public health add costs to manufacturing, resource extraction and other economically important activities and so drive up prices and reduce available jobs. This theory frequently used as a reason to oppose environmental protections such as the Kyoto Protocol (e.g. Bush, 2001; Thorning, 1998) and the Endangered Species Act (e.g. Johnson, 2002).

Claims that environmental protection harms the economy and destroys jobs are commonly based on anecdote, rather than quantitative economic analyses

Empirical data supporting this theory are scarce. Proponents of the environment vs. economy theory often rely heavily on anecdote rather than broad quantitative studies (Roberson, 1997; Endangered Species Coalition, 1995; Johnson, 2002; U.S. General Accounting Office, 1994). However, in recent years, ecologists and economists have begun to examine this theory through numerous academic studies. The broad consensus of these studies is that there is no evidence that environmental protection harms economies, destroys jobs, or reduces productivity. Rather, the evidence suggests that cities, regions, states, and nations that actively protect natural resources and public health tend to have stronger economies than those which do not.

This report reviews some methods more commonly used by researchers in this expanding field and provides examples of the types of results that are reported. The report also examines some often

overlooked positive economic impacts of biological diversity conservation and pollution control.

Testing the Environment vs. Economy Hypothesis

“Correlation” Method

In these studies, researchers use quantitative indices of the strength of economies and of the strength of resource protection policies. The indices are measured for a number of regions or nations. If environmental protection harms economic strength, such studies should show a negative correlation between the two indices: economic strength should decline as resource conservation policies strengthen.

Composite Indices: Gold and Green Reports

A number of these analyses have been performed at different geographic scales. One example is the Institute for Southern Studies “*Gold and Green*” reports. “*Gold and Green 2000*” (Institute for Southern Studies, 2002) ranked the 50 U.S. states based on 20-factor composite indices of economic strength and sustainability (the “gold” index) and of environmental policy strength (“green” index). The gold index is derived from statistics such as employment, worker safety, salaries, numbers of business start ups, poverty rate and job growth. The bases for the green index include toxic releases, recycling rates, air quality, per capita energy consumption, state spending on the environment and pesticide use.

The study found that states with high green index ratings tended to also rank

high in the gold index of economic strength. The report concluded,

"[s]even states rank in the top 15 for both economic and environmental health. Vermont, Rhode Island and Minnesota rank in the top six on both lists. Other "top performers" with high marks on both scales are Colorado, Maryland, Maine, and Wisconsin. Conversely, 10 states...are among the worst 15 on both lists.

Louisiana ranks 48th on economic performance and 50th on the environment. Others [ranking low on both lists] are: Alabama, Texas, Tennessee, Mississippi, Indiana, Arkansas, West Virginia, Kentucky, and South Carolina."

Single Factor Indices: endangered species, factory emissions

Other examples of the correlation approach to the economy vs. environment question use single factor indices to measure economic and environmental policy strength. A series of studies by the Massachusetts Institute of Technology Project on Environmental Politics and Policy examined the effects of endangered species protection on indicators of state economic performance, focusing on real estate markets (Meyer, 1995, 1996). They reported no evidence that increasing endangered species protection, as measured by the number of federally listed species in each state, adversely affected the value of real estate or rates of home construction.

In another example, the World Resources Institute compared measures of profitability (e.g. return on investment) with

measures of environmental performance (e.g. emissions/factory) for almost 2,000 individual U.S. factories in numerous industries from softdrink manufacture to paper production (Repetto, 1995). The study also found no evidence that factories with poor environmental records are more profitable than less polluting plants.

Policy Impact Method

Another widely used method is measurement of the economic impact of a change in environmental policy, such as the listing of one or more widespread species under the federal Endangered Species Act (ESA) or pollution control laws.

Job losses and other adverse economic impacts are sometimes erroneously attributed to environmental protection through a failure to examine all relevant factors. Many causes, including automation, exports to jobs to countries or states with cheaper labor, rather than environmental regulation are often responsible for job losses. For example, from 1973-88, the period of greatest layoffs in smokestack industries, U.S. industrial output increased 10 percent while, nationwide, factory employment dropped 2 percent (York Daily Record 11/20/97).

Owls vs. Jobs?

From 1980-8, 13,800 timber jobs were lost in the Pacific Northwest.

During the same period, timber output grew by nearly 20%.

In another case, job losses in timber-related industries in the Pacific northwest have often been blamed on environmentalists under the "owls vs. jobs" paradigm, but this painful phenomenon cannot be attributed solely to species listings or environmental laws. Studies show that from 1980 to 1988,

when the timber industry was relatively unregulated by environmental laws, Northwest timber output grew by 19.2%. However during the same period, 13,800 timber jobs were lost in the region due to

log exports, mill automation, and export of entire mills, with their and associated jobs (California Senate Office of Research, 1996). Moreover, the environmental quality of the Pacific Northwest, protected by the ESA, Clean Water Act and other laws, has positive economic impacts. Employers and jobs are drawn to areas where quality of life, including clean air and water and access to recreation, is high. In 1995, 5 years after the listing of Northern Spotted Owl under the federal endangered species act, Oregon found itself in an economic boom and posted its lowest unemployment rate in 25 years: 5.2% (ABC News, July, 1995).

One case study of the effects of stronger environmental laws is cited in an excellent review of economic impacts of environmental regulation in California by the California Senate Office of Research (1996). They examined the effects of air quality regulation on the economy of the five county south coast air basin surrounding Los Angeles. The study tracks changes in two measures of economic strength in the area - employment and population - after strict air quality regulations were adopted in 1970. As the rules were implemented and air quality improved, economic strength also grew dramatically. These results suggest that in this case effective protection of air quality did not undermine the economy. In fact, despite the imposition of strong air quality rules in the region, the rate of employment growth in the Los Angeles area was almost 30% greater than the rate in the United States as a whole, where air quality standards were largely unchanged. Another recent review found that despite the fact that pollution control laws in the United States are relatively strong compared to many nations, no evidence

suggests that the relatively strong U.S. regulations harm the international competitiveness of industries (Arnold, 1999).

Other Methods

A final set of methods involves using surveys and indirect measurements to determine the perceived value of increased environmental protection. The contingent value method uses surveys to determine what people would be willing to pay for healthier wilderness, cleaner air, cleaner water, or more open space. The "travel cost" method measures the travel expenditures involved in reaching a healthy ecosystem such as a wilderness area, wild and scenic river (Pearce and Moran, 1994). For forest water quality and quantity, contingent valuation and travel cost studies

have found a range of values up to several hundred dollars per acre foot of clean recreational streamwater with most studies reporting values of \$20-\$40/acre foot (Krieger, 2001; Duffield et al., 1994).

The "hedonic" property value method uses differences in property values between more and less polluted sites to

determine the value of air and water quality, and healthy wildlands. A 1991 survey found that homes located within 300 feet of a clean body of water were worth up to 28% more than similar homes elsewhere (Environmental Protection Agency, 1996). A 2000 study estimated that conservation of the 42 million acres of roadless National Forest lands in the contiguous 48 states would yield an increase of 13% in local property values (Loomis and Richardson, 2000).

Conserved roadless areas in National Forests have been estimated to increase local property values up to 13%.

Additional Considerations

Healthy Ecosystems are Valuable

There are other substantial problems with the “economy vs. environment” theory. First, the theory does not account for the economic benefits and values provided by a healthy environment. These are often collectively called “ecosystem services”.

Ecosystem Services

The Ecological Society of America defines ecosystem services as the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants.

Ecosystem include functions of healthy ecosystems such as

- water purification,
- oxygen production,
- maintenance of genetic diversity,
- soil formation,
- erosion control,
- sustainable commodity production,
- flood control,
- pollination,
- recreation and
- climate regulation.

The valuation of ecosystem services is

The benefit: cost ratio of conserving wildlands vs. destroying them for development or resource extraction is estimated at in excess of 100:1.

ecosystem services to local, regional and

still an inexact science (Daily, 1997; Pearce and Moran, 1995).

However, in recent years, many researchers have published estimates of the value of

global economies. Probably the most widely discussed study, published in the journal *Nature*, reported an average annual global

economic value for ecosystem services of approximately \$33 trillion (Costanza, et al., 1997).

The global value of wildland ecosystem services has been estimated at \$33 trillion per year.

The estimated values of individual ecosystem services ranged from \$0.4 trillion for pollination and \$1 trillion for flood control to \$17 trillion for soil formation. For the U.S. alone, pollination of agricultural crops by native pollinators has an estimated value of \$4.1 to \$6.7 billion per year (Nabham and Buchmann, 1997). Costs associated with losses of soil ecosystem services, primarily nutrient cycling and storage, have been estimated at \$27 billion per year for the United States alone (Pimentel et al., 1995).

A recent update to the Costanza study based on case studies in wildland ecosystems including Canadian wetlands, Thai Mangrove swamps, and tropical forests, reported that the average benefit:cost ratio of conservation of intact wildlands is at least 100:1 (Balmford et al., 2002).

Recreation

Of all ecosystem services, probably the best studied in the United States is recreation. Every 5 years, the U.S. Fish and Wildlife Services publishes a survey of the use of wildlands for wildlife-associated recreation (fishing, hunting, viewing). The most recent survey available reports that 77 million people spent \$101 billion in 1996 on wildlife-associated recreation, including bird watching, wildflower viewing, hiking and other non-consumptive activities (U.S.

Fish and Wildlife Service, 1996). These activities supported over 1 million full and part time jobs, nationwide. For California, total expenditures were \$7.5 billion.

The high economic values associated with non-consumptive uses of resources have important policy implications. The Klamath River in northern California is home to several endangered species and to fisheries important to local communities, including Indian tribes. These species and fisheries have been adversely impacted by water diversions for agriculture. A recent U.S. Geological Survey analysis, using the travel cost method, found that a \$5 billion expenditure to reallocate water currently diverted for agriculture to restore the health of the river basin would produce approximately \$36 billion in economic benefits over 12 years, primarily associated with increased recreational use (Wall Street Journal 11/1/02; Douglas and Sleeper, 2002).

Forest Ecosystem Services

Ecosystem services provided by forests are also relatively well studied (Krieger, 2001). A review of tropical forest ecosystem services has suggested that an average acre of sustainably managed tropical forest is worth approximately \$220 per year. The \$220/acre includes: \$69 from non timber forest products (mushrooms, fibers), \$17 from recreation, \$10 from watershed functions including flood control, and \$110

"Forests ... supply such an exceptional array of goods and services that they should be reckoned among our most valuable natural resources. Only a few products are generally harvested, however, [and that harvest often damages] other potential outputs. Thus forests are overexploited and underutilized."

- Economist Norman Myers (1995)

from timber (Myers, 1997a).

Another study focusing on U.S. national forest roadless areas in the 48 contiguous states, reported a recreational value for these areas of \$600 million per year, nearly \$280 million in passive use

values, and \$1 - \$1.5 billion per year in ecosystem services such as carbon storage and waste treatment (Loomis and Richardson, 2000).

Genetic Diversity – “The World’s Insurance Policy”

An often overlooked, but vital, service of wildland ecosystems is their function as genetic diversity reservoirs. Wild relatives of commercial timber, livestock and crop species are sources of genetic material which improve productivity, pest and disease resistance, and create ever more profitable plant and animal products (Myers, 1997). In Britain alone, there may be as many as 400 “microspecies” of blackberries (Crocker, 2002).

Corn is a well studied example. Hundreds of varieties of corn are found in its native habitat in Mexico and Guatemala. This genetic diversity has been called “the world’s [food] insurance policy” (Schapiro, 2002). Modern commercial crops are often grown as genetically identical monocultures of high yielding varieties. This can cause problems if disease, climate change, pests, or other environmental factors reduce or destroy a widely-used hybrid’s yield. For example, in 1970, 15% of the U.S. corn crop was

A Presidential science commission calculated that it would cost \$6 – 8 billion to construct a water treatment plant to replace water purification services provided by wildlands.

destroyed because a blight attacked a hybrid strain that covered 25% of the nation's corn farms (Raven et al, 1981). This caused a substantial jump in food prices.

Standard economic and cost-benefit analyses tend to ignore non-consumptive values of wildland ecosystems.

When such an event occurs, breeders look to wild and semi-wild strains for new traits to restore productivity. For wheat and maize only, estimates of the

contribution of genetic diversity to the value of crop production in developed countries range from \$500 million/yr for the U.S. to \$2.7 billion per year for all OECD countries (United Kingdom, Europe, United States) (Mooney, 1993 cited in Pearce and Moran, 1995).

Generally the economic value of ecosystem services is not factored into cost-benefit analysis for projects or policies that affect the environment. Analyses of economic impacts of environmental policies tend to be limited to the impacts of policies to the value of commodities (timber, minerals) that may be extracted or products (power, paper, cement) that may be produced. Degradation of the ability of impacted ecosystems to purify water, control floods, provide habitat for pollinators, offer recreational opportunities, create soil or to perform other economically valuable services is rarely calculated or analyzed in project plans or economic analyses.

The U.S. Gross Domestic Product (GDP), for example, has been described as "recognizing environmental degradation as *an improvement in the economy*, sometimes counting it more than once – as the sales of products from a firm that

pollutes, as the firms subsequent expenditures to clean up the pollution, and as sales of medical services to those harmed by the pollution" (Niemi and Whitelaw, 1997).

Some leaders are beginning to recognize the worth of ecosystem services. Water purification is a visible example. The city of New York has spend \$1.4 billion to purchase and restore forestland in the Catskill mountains watersheds which surround its largest water supply. Portland, Oregon and Portland, Maine each spend almost \$1 million per year in land acquisition and management to maintain watershed integrity around their water supplies (Krieger, 2001). These cities have calculated that water purification delivered by intact native plant communities is less expensive and of higher quality than water purification provided by human-made facilities. In fact President Clinton's Committee on Science and Technology (1998) reported that it would cost \$6-8 billion for New York City to construct an artificial filtration plant to replace the ecosystem services provided by natural forests.

Environment vs. Jobs means Jobs vs. Jobs

Finally, the economy vs. environment theory does not account for the fact that, although rules promoting environmental health may reduce employment in some heavily polluting industries, environmental protection also creates jobs.

Many sectors of the economy are positively affected by strong environmental policies. These sectors include pollution control, environmental restoration, and resource management industries. Studies have found that pollution control industries are relatively labor intensive, creating more jobs per dollar invested than many highly polluting industries (Repetto, 1995; Goodstein, 1994). In 1994, water pollution

prevention alone generated over \$64 billion in the U.S. and \$170 billion worldwide (Environmental Protection Agency, 1996). Estimates of the economic value of the total market for goods and services in the U.S. environmental protection and restoration sectors range from \$85 billion to \$160 billion (Li and Hou, 2000; Goodstein, 1994; Renner, 1991). One EPA study reported that 1991 pollution control expenditures created 744,000 U.S. jobs (Repetto, 1995). A more recent report estimated that as many as 1.3 million Americans are employed in “environmental technology” (Environmental Protection Agency, 1996). That figure does not include the hundreds of thousands of jobs nationwide in wildland ecosystem restoration and management. The Department of Labor has reported environmental technology sector creates jobs at about twice the rate of the overall economy (Environmental Protection Agency, 1996).

In addition, environment vs. jobs proponents often fail to acknowledge that resources can be used in different ways, each of which produces jobs. If a single industry views a resource, such as a forest, water source, or fishery, as its own, and monopolizes its uses and benefits, employment in other industries suffer. For example sedimentation associated with poorly managed timber harvesting frequently harms fisheries and decreases commercial fishing employment (Krieger, 2001; Niemi and Ehitelaw, 1997).

Moreover, jobs in consumptive industries, which destroy resources as they are used are often in conflict with jobs in industries that use resources non-consumptively or sustainably. Non-consumptive or sustainable-use industries flows of goods, services and employment

to remain relatively stable over the long term.

Thus, when considering the question of an environmental policy's impact on jobs, it is important to analyze impacts to all sectors that depend on the resource being managed. It is also important to consider the long-term as well as short-term affects of a policy or project on employment and economic strength.

Pollution control industries employ more than 1 million Americans.

Conclusion

Clearly, there are unanswered questions about the environment vs. economy theory. Through the diligence of researchers around the world, high quality data quantifying the actual economic impacts of environmental policies are accumulating. There is little evidence to support the fear that strong environmental protection policies will harm the economy or destroy jobs. Overwhelmingly, they show, as a consensus report of several dozen Pacific Northwest university economists put it:

“[We do not] have to choose between jobs and the environment. Quite the opposite: a healthy environment is a major stimulus for a healthy economy” (Power, et al., 1995).

In addition, The growing body of scientific research on the value of ecosystem services is making it steadily easier for project and policy analyses to quantify the economic effects of damage to ecosystems and the services that flow from them.

As the public and policymakers accept and act upon these increasingly well-documented concepts, the quality and

sustainability of both our lives and economies will improve.

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