

***TURNING WATER INTO WINE: THE POTENTIALS AND PITFALLS OF
MARKET-BASED ENVIRONMENTALISM***

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1 INTRODUCTION

America's economy and quality of life depend upon public goods such as air, fisheries, water, forests, and grazing lands. When individuals use such common resources exclusively to optimize their own gain, total resource consumption tends to exceed sustainable levels, and the social benefit is suboptimal. This phenomenon is referred to as the "tragedy of the commons."

Currently, government regulation prohibits individuals and industry from practicing this type of inefficient and destructive resource use. Unfortunately, the current regulatory system relies on *command and control* regulations, whereby government dictates environmental standards and requires each actor to comply, has proven to be highly inefficient. Some economists propose full privatization of environmental amenities as an alternative. These *free market environmentalists* assert that private ownership creates the incentives to protect environmental resources best.

Free market environmentalism recognizes a governmental role in environmental protection. The free market approach to environmental conservation does not necessarily entail a *laissez-faire* role for government. In contrast, privatization requires creating a comprehensive system of property rights and maintaining a government role in enforcing these rights. If correctly instituted, the market and common law procedures will ensure a socially optimal allocation of environmental resources.¹ A fair, efficacious judicial system will redistribute externalities by compensating injured parties.

Market approaches that stop short of full privatization are gaining acceptance within industry, government, and environmental interest groups. With market-based pro-

grams, the government selects the socially optimal use of environmental amenities and then uses market mechanisms to assure maximal efficiency. Currently, a variety of theoretical and empirical programs exist that harness market forces for environmental protection.

This report evaluates market-based approaches to environmental regulation, ranging from cap and trade programs for air pollution to complete privatization, and assesses their potential to improve the current state of environmental protections.

¹ Indeed, the environmental problems that spurred massive government regulation in the early 1970s stemmed from the failure of the proper authorities to establish and maintain such rules.

2 CRITICISMS OF THE CURRENT REGULATORY REGIME

Free market environmentalists and proponents of market incentives claim that the current regulatory regime is neither efficient nor effective. This section analyzes several elements of the present system of environmental regulation with the assertions of the free market environmentalists in mind. In particular, the efficiency of current regulation, the proper role of subsidies, the problems of takings and equity, the challenge of identifying and valuing environmental problems and goods, the ability of common law to protect rights, the possibility of promoting innovation, and the overall feasibility of privatization are discussed.

2.1 To what extent has the current regulatory regime in the U.S. failed or proven to be costly and inefficient?

The current regulatory regime, with its reliance on command and control measures, imposes high compliance costs on both government agencies and private entities, which some would argue are unacceptably high. Various analysts have estimated the total budgetary cost of legislating and enforcing environmental policy in the U.S. at more than \$120 billion per year.² The negative impact that a polluted environment would have on human health, ecological stability, and many economic activities might justify this expenditure. Such costly government regulation must prevent environmental damage effectively; however, the available data show that, in some circumstances, regulation provides little protection and may actually cause harm to the environment.

² Richard F. Kosobud and Jennifer Zimmerman, *Market Based Approaches to Environmental Policy*, (Von Nostrand Reinhold: New York, NY, 1997), 269.

2.1.1 *Have the Current Regulations Worked?*

In a study of the effectiveness of present regulations in abating pollution, Resources for the Future (RFF), a non-governmental organization focusing on environmental policy issues, gathered the available data on a number of improvements in air and water quality, toxic materials, and waste disposal.³ In some ways, the state of the environment has demonstrably improved. For instance, between 1986 and 1995 the amount of lead in the air decreased by 78%, and carbon monoxide and SO₂ levels decreased by 37%. Municipal sewage treatment programs, which served 4 million people in 1960, currently serve well over 150 million. Environmentally harmful practices such as open garbage burning and disposal of untreated hazardous waste, routinely performed before the 1970s, have been reduced by the current system of regulation. One notable failure of this system has been the control of non-point source water pollution (see box on page 7).

For environmental programs unrelated to pollution, such as resource consumption, command and control regulation has proven to be ineffective. Despite federal regulations meant to protect fish stocks, the fishing industry's unremitting harvesting of U.S. fisheries have brought populations of many fish species to dangerously low levels.⁴ In addition, the Endangered Species Act (ESA) has not led to substantial species recovery as its authors expected. Only ten percent of all endangered species are improving substantially, and less than one-third of listed species' populations have stabilized.⁵ As described further in Section 2.3, government subsidies for logging and mining have encour-

³ J. Clarence Davies and Jan Mazurek, *Regulating Pollution: Does the U.S. System Work?* (Washington, DC: Resources for the Future, 1997), 16-23.

⁴ "Which Fish are Overfished?" *Worldview Articles* 11 Feb. 1997 (Natural Resources Defense Council, <http://www.nrdc.org/howto/ochookwh.html>) 29.

⁵ Department of the Interior, U.S. Fish and Wildlife Service, *Report to Congress: Endangered and Threatened Species Recovery Program*, (U.S. Government Printing Office: Washington DC, 1992), 2.

aged soil erosion, watershed destruction, and habitat loss. The results of the current regulatory regime leave both environmentalists and property rights activists unsatisfied.

2.1.2 *Is there an alternative?*

The high costs and disappointing results of some command and control policies led to a search for more efficient alternatives. The 1990 Amendments to the Clean Air Act (CAA) provide one example of a successful market-based alternative to a regulatory approach. The original 1970 CAA required specific technologies for the control of air pollution, resulting in exorbitantly high costs to individual firms. In the 1970s, the government implemented measures to allow firms greater flexibility. *Netting* allowed a firm to counterbalance the inability of one source to meet emissions standards with the equivalent emission reductions from another source in the same facility, to count the *net* pollution from one firm. *Bubble programs* expanded the area under which emission trading could occur to a group of facilities, called a *bubble*. *Offsetting* permitted new sources wishing to enter a region to pay other firms to reduce their emissions, offsetting the new firm's output.⁶

Building on these innovations, the Clean Air Act Amendments of 1990 utilized a *cap and trade* program to control acid rain. A government-set cap ensures the achievement of the environmental goal: in this case, the reduction of SO₂ emissions, the primary cause of acid rain. Each participating company is given a specific number of allowances—tradable documents that give their owner the right to emit one ton of SO₂—until the sum of the allowances dealt out equals the emissions cap. The government-determined cap will gradually be lowered to reduce overall emissions. At the same time,

⁶ In this way, offsetting removed barriers to entry into regional markets, opening the door to external competition for available pollution resources.

the amendment provides individual companies with the flexibility to select the optimal strategy, either emissions reduction or the purchase of allowances from other companies, to achieve industry-wide compliance.

The Government Accounting Office (GAO) December 1994 report comprehensively analyzed the SO₂ allowance-trading program. It estimated that fully implementing trading programs could reduce compliance costs to industry by \$3.1 billion annually. It also predicted that trading will reduce SO₂ emissions by nearly two million tons **more** than required by the cap. Market-based programs do seem to be a viable alternative to command and control regulation in regard to point source air pollution. However, the existence of a handful of successful programs does not prove that the market-based approach will reduce costs and improve efficiency in all areas of environmental protection.

The Evolution of U.S. Regulatory Policy to Reduce Water Pollution

Legislatures have often struggled to define and implement water control policies. Despite several acts to protect water sources, by the early 1970s water pollution had reached unprecedented levels. In 1969, over 41 million fish—more than in the previous three years combined—perished in large fish kills as a result of chemical contamination. On June 22, 1969, the Cuyahoga River in Cleveland, Ohio, burst into flames when a spark ignited the accumulated industrial waste on the water's surface. These incidents and foreboding statistics prompted legislators to pass the Clean Water Act (CWA) of 1972 to salvage the health of the nation's waters. Unlike previous acts, it established strict targets and emphasized federal government enforcement of the new standards.

When implemented in 1972, the CWA contained two primary goals. It called for the nation's waters to be safe for fishing and swimming by 1983. And, it mandated the elimination of discharges of pollutants into the water by 1985. The CWA used several techniques to achieve these goals. It raised federal government subsidies for the construction of publicly owned sewage treatment plants, and it declared that all point sources must adhere to specific effluent limitations. The act charged the Environmental Protection Agency (EPA) with the daunting task of issuing permits that would define the amount of pollutant that should be removable through modern treatment technology.

Legislators have made several amendments to the CWA to improve its effectiveness. In 1977, they realized that complying with specified technology controls often failed to produce cleaner water and shifted their focus from technology-based controls to actual water quality targets by requiring states to set standards for water bodies. After reports of worsening conditions, CWA administrators acknowledged the need to address non-point source pollution. In 1987, the CWA was amended again. The amended section of the Act encourages states to identify non-point source pollution problems and attempt to reduce them. However, the amendments do not obligate states to deal with non-point source pollution; they merely ask for voluntary cooperation and provide minimal federal funding to support state efforts.

2.2 Is it true, as free market environmentalists have generally asserted, that much land use regulation today unjustly “takes” private property from private landowners?

The Fifth and Fourteenth Amendments state that “No person shall be . . . deprived of life, liberty, or property without due process of law; nor shall private property be taken for public use without just compensation,” and that “No State shall . . . deprive any person of life, liberty, or property without due process of law.” Here, the framers of the Constitution have established the government’s power of *eminent domain*, which permits the government to overrule individual rights for the greater good of society. These Amendments frame the takings debate with respect to environmental policy: does environmental regulation constitute a taking of private property without providing just compensation?

Supreme Court precedent has defined takings as the seizure or invasion of private property. Nevertheless, *Mulger v. Kansas* ruled that government regulation of a “noxious use” of property does not require compensation. *Pennsylvania Coal v. Mahon* established the concept of a regulatory takings: government can “effect” a taking by promulgating regulation “too far” and limiting the productive use of property. The result was numerous political and legal battles fought by private property rights activists and environmentalists, both seeking to define exactly how far was “too far” in constituting a regulatory taking.

Penn Central Transportation Company v. City of New York and *First English Evangelical Lutheran Church of Glendale v. Los Angeles County* further qualified what bundle of rights were entitled to a property owner and assessed what value of property

must be affected to constitute a takings.⁷ In these cases, the court determined that the “parcel [of rights] as a whole” must be affected in order to constitute a compensable takings claim. Thus defined, government regulation rarely qualifies as a takings. More recently, in *Lucas v. South Carolina Coastal Council*, the Court declared that “[when] a regulation that declares off-limits all economically productive or beneficial uses of land goes beyond what the relevant background principles would dictate, compensation must be paid to sustain it.”⁸ This controversial opinion suggests that compensation may have to be paid as the result of more restrictive environmental regulation.

The takings argument as defined in these cases is subject to criticism. If government regulation can reduce property values, then such laws may also increase land value. Some question whether the government should tax regulatory *givings* if it compensates for *takings*. In addition, theorists have argued that the social contract allows the government to place society’s interests above private interests whenever necessary, resulting in an unconditional mandate to regulate private property.

Nevertheless, the possibility of the court labeling a command and control environmental regulation as a taking does exist. Full privatization of environmental resources, where feasible, could circumvent this problem. Also, some market instruments, such as Transferable Development Rights, could allow for the compensation for landowners without the federal government incurring large costs (see section 3.1.5).

⁷ 438 U.S. 104 (1978); 482 U.S. 304 (1987).

⁸ 112 S. Ct. 2886 (1992); *Lucas v. South Carolina Coastal Council*, 112 S. Ct. 2886 (1992) as cited in Caryn L. Beck-Dudley and James E. MacDonald, “Lucas b. South Carolina Coastal Council, Takings, and the Search for the Common Good,” *American Business Law Journal* 33 (December 22, 1995), np.

2.3 Do Government subsidies and other interference in the market today lead to environmental harm?

Although overgrazing leads to soil erosion, watershed destruction, and habitat loss, the grazing industry enjoys greatly discounted user's fees.⁹ As sheep and cattle trample riparian areas, contaminate fish habitats, and disrupt ecosystems, less hearty wildlife species are disappearing.¹⁰ The Bureau of Land Management and the Forest Service ultimately decide how many grazing permits to issue based on estimates of the land's natural grazing capacity and perceptions of the demand for grazing concessions. The agencies' perpetual overestimation of both sustainable grazing burdens and industry demands results in overgrazing. The grazing subsidies themselves increase grazing permit demand, reinforcing the agencies' misperception of actual grazing needs.

Government subsidies of logging and mining have encouraged clear-cutting, massive road construction, and destructive mineral extraction that greatly exceed free market conditions.¹¹ Deforestation and road construction cause water pollution, soil erosion, and the disruption of migratory routes. Acidic run-off from active mines contaminates groundwater and rivers; abandoned mines are ecological threats, safety hazards, and eye-

⁹ Government grazing subsidies caused the degradation of over "one-third of the American West...tens of millions of acres, both public and private, are weed-infested and either stalled or collapsing in ecological health." John A. Baden and Donald Snow, *The Next West: Public lands, Community, and Economy in the American West*, (Washington, D.C.: Island Press, 1997), 160, and Friends of the Earth, "The Green Solution to Red Ink: Cutting Wasteful and Environmentally Harmful Subsidies and Spending - The Clinton Plan and Additional Cuts," (Public Interest Publication, March 1993), 7.

¹⁰ These include the desert tortoise, the Colombian sharp-tailed grouse, and the desert bighorn sheep. Jerry Holechek and Karl Hess, Jr., "Market Forces Would Benefit U.S. Rangelands," *Policy Issues, Forum for Applied Research and Public Policy*, (Winter 1996), 5.

¹¹ "Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, Vol. 1," (February 1994) p. 3&4-126, cited in U.S. House of Representatives, Subcommittee on Oversight and Investigations of the Committee on Natural Resources, *Taking from the Taxpayer: Public Subsidies for Natural Resource Development: An Investigative Report*, (Washington, D.C.: Government Printing Office, August 1994), 71; Friends of the Earth 9.

sores, with “almost 50 billion tons of old mining and mineral processing wastes lie scattered about the United States.”¹²

Energy subsidies such as the \$5 billion in tax breaks given to utilities and fossil fuel producers each year and the \$4.4 billion in subsidized power from dams and nuclear plants all contribute to overproduction and over-consumption.¹³ Energy production increases greenhouse gas emissions, water contamination related to oil drilling, and habitat destruction caused by new dams.¹⁴ Artificially cheap power encourages environmentally destructive and energy inefficient practices in industry, at home, and on the road.¹⁵

Price supports in agriculture have led to similar environmental harms, endangering more than one-third of all listed species, boosting pesticide and fertilizer use, reducing crop rotation, and augmenting water pollution and soil erosion.¹⁶ However, the greatest subsidy “measured by both economic and environmental impact,” is the “institutionalized giveaway of the public’s water to irrigators and other users, who have spent the past century emptying the [West’s] rivers and streams.”¹⁷ The Bureau of Reclamation provides farmers with water at one-tenth the agency’s delivery costs. Federal dams have

¹² Mining currently “adversely affects over 12,000 miles of rivers and streams and over 180,000 acres of lakes and reservoirs today.” U.S. House of Representatives, Subcommittee on Oversight and Investigations of the Committee on Natural Resources, *Taking from the Taxpayer: Public Subsidies for Natural Resource Development: An Investigative Report*, (Washington, D.C.: Government Printing Office, August 1994), 13.

¹³ David Malin Roodman, *Paying the Piper: Subsidies, Politics, and the Environment*, *Worldwatch Paper #133*, (Washington, D.C.: Worldwatch Institute, December 1996), 37.

¹⁴ *Ibid.* 26.

¹⁵ Roodman notes (p. 38) that, in 1984, electricity prices that were 27 percent below market value boosted electricity use by 37 percent. Artificially low gasoline prices favor automobile use over public transportation and gas-guzzling cars over fuel-efficient vehicles. Ernest U. von Weizsäcker and Jochen Jesinghaus, *Ecological Tax Reform: A Policy Proposal for Sustainable Development*, (New Jersey: Zed Books, 1992), 22; and Barbara Crossette, “Subsidies Hurt Environment, Critics Say Before Talks,” *New York Times*, June 20, A3.

¹⁶ U.S. Congress, Office of Technology Assessment, *Agriculture, Trade, and Environment: Achieving Complementary Policies*, OTA-ENV-617 (Washington, DC: U.S. Government Printing Office, May 1995), 86-87; Roodman 7; Fred H. Sanderson, ed., *Agricultural Protectionism in the Industrialized World*, (Washington, D.C.: Resources for the Future), 4.

¹⁷ Baden and Snow 4.

endangered dozens of aquatic species and, in conjunction with water subsidies, motivated farmers to clear-cut new lands and convert vulnerable land to cropland regardless of its agricultural suitability.¹⁸

Economists frown upon market distortions that disrupt the supply and demand schedules arising from producer and consumer good valuation. Subsidies are notorious for biasing the market and creating artificially high equilibria. Beyond inefficiency, activists blame subsidies for inducing environmental destruction; when provided to industries with environmentally unsound practices, subsidies amplify environmental degradation by generating artificial production incentives. Conservationists argue that the Federal bankrolling of ranchers, miners, and loggers on public lands resulted in excessive resource extraction and devastating damage to endangered ecosystems and wildlife habitats.¹⁹ Most free market environmentalists argue against subsidies, noting they are misdirected in pursuit of outdated or contradictory goals.

Subsidy elimination also raises equity concerns as many price controls, price supports, and transfers to industry aid the poor or support lifestyles such as small farms and Native American fishing communities. However, removing certain subsidies could facilitate income redistribution from favored industries to disadvantaged groups. If properly targeted, directed at realistic goals, and based on a comprehensive valuation of environmental costs and benefits, subsidies may be justified, effective, and even environmentally beneficial. For example, farmers can be paid not to convert wetlands into croplands. Subsidies could become a market-oriented weapon of environmentalists.

¹⁸ Debra S. Knopman, "Easier to be Green: the Second Generation of Environmental Action," in Will Marshall, ed., *Building the Bridge: 10 Big Ideas to Transform America*, Progressive Policy Institute, p. 177.

2.4 Will movement toward free market environmentalism allow timely identification and valuation of environmental problems?

2.4.1 Problem Identification

Within the current regulatory framework, the U.S. recognizes environmental problems through scientific discoveries, observations of nature, environmental trend tracking by public and private actors, and multi-media publicity.²⁰ Recognition is also catalyzed by special interest and citizen advocacy groups, or by catastrophes like the Exxon-Valdez oil spill. Private sector recognition is not actively encouraged; and when problem discovery (i.e. an endangered species on private land) could trigger costly government regulation, it is in fact discouraged.

Under a market-based approach, special interest groups, privately funded researchers, and concerned citizens could continue to identify problems; nevertheless, most responsibility for recognition would lie with individual property owners. This shift would give owners a real stake in identification, if the problems are localized and tangible. Unfortunately, transferring responsibility from the public sector to private sector, could potentially reduce recognition of environmental problems that have only indirect bearing on humans or which are spread over a public commons.

Adding market incentives to the present system would bolster problem identification. For example, the option of developing habitat conservation plans for owners of species habitat could go a long way to reverse the negative incentives created by command

¹⁹ Similarly, environmentalists allege that agricultural subsidies motivate farmers to ignore the true costs of erosion, pollution, and the loss of ecosystem services and therefore convert ecologically-valuable lands into croplands.

²⁰ University, private, and government researcher in addition to citizen advocates and special interest group scientists represent the primary sources for environmental problem identification.

and control regulation and to encourage private landowners to identify both immediate and indirect environmental problems.

2.4.2 *Valuation of Environmental Goods*

Valuation of the environment is essential to preservation as it implicitly determines policy priorities. *Rigorous valuation* attempts to determine the economic value of environmental goods (see box), amenities such as the existence of certain species, appreciation of unique biological attributes like complexity, diversity, and genetic variability, and the aesthetic and cultural importance of natural commodities.

It is theoretically possible to set elephant-hunting permits at a price high enough to avoid overhunting and to provide sufficient incentives for property owners to preserve them. It is particularly difficult to value commodities which lack markets (burying beetles and black footed ferrets).²¹ Under a command and control regime, government serves as the primary valuation agent. This role is best exemplified by the ESA which sets very high economic value and environmental protection standards for species such as the Karner blue butterfly and the bald eagle. In a system of full privatization, since the owners of environmental resources will take responsibility for valuation, it is doubtful that they will place high values on amenities with only indirect human impact. Such resources would be undervalued and, thus, underconserved.

Other market incentive programs place valuation in the hands of both property holders and the government. Cap and trade systems allow the government to evaluate a resource or pollutant to cap the amount used or emitted, while the private sector trades

²¹ Several species of Antarctic whales have slow reproduction cycles. Considering the current rate of return for investments in many stock-markets, it is more economical to immediately hunt all whales to extinction and invest the resultant profits rather than trying to gradually harvest whales at a sustainable rate.

the amount set by the cap and determines the value of individual allowances. Similar to command and control systems, such programs depend upon accurate government valuations.

Pricing the Priceless: Valuation Techniques

What is a forest worth? A river? A butterfly? While the philosopher ponders, the policymaker employs three primary methods of assigning monetary values to environmental goods.

Market value approaches determine an environmental good's value by calculating the economic effect of a change of the good's supply, focusing on income, the cost of good replacement, and the cost of preventing the good's destruction. For example, a clean river could be valued as the sum of the lost income resulting from pollution-related illnesses, the expense of river pollution prevention, and the potential cost of constructing an alternative waterway.

Surrogate market approaches equate an environmental good's worth with the amount of money paid for activities related to that good. For example, a national park could be valued by its revenue from tourism. Similarly, a small pond might be deemed equivalent to the value of a community pool.

Simulated market approaches calculate worth by surveying people to determine the value that they place on specific environmental goods. The most popular form of this approach is *contingent valuation*, which asks people how much they would pay for a particular good or would accept as compensation for the reduction of that good's quantity or quality.

All approaches are substantially flawed. Market value approaches require that direct links be made between expenditures and effects. For example, the amount of water pollution necessary to cause particular health problems must be calculated in order to evaluate pollution's impact on income. Unfortunately, this correlation may be unknown and is further complicated by the possibility that expenditures have multiple benefits and replacement goods differ significantly from original goods.

Surrogate market value approaches also prove problematic. The surrogate market may not be equivalent to the market for the item in question. For example, while pools and rivers are used in much the same way, they provide users with different subjective experiences. Furthermore, surrogate markets fail to consider all aspects of the environmental good being evaluated: rivers, unlike pools, are a vital part of the ecosystem. Similarly, using property values to determine worth assumes that property buyers are aware of the land's environmental characteristics.

Simulated market approaches face significant criticism. Empirical evidence indicates that people's measured willingness to pay often fails to increase with the size of the good. Moreover, people are often willing to pay more to fix harms caused by natural events (e.g., hurricanes) than human caused events (e.g., oil spills).

Thus, although valuation is essential for solid policy analysis, there is often no effective way to assign monetary values to environmental goods.

2.5 Will the adoption of market approaches tend to ameliorate or rather to exacerbate inequitable impacts of environmental regulation?

2.5.1 Environmental Justice

Following President Clinton's commitment to make environmental justice—a more equal distribution of environmental hazards among localities and socioeconomic strata—an Executive Priority, the EPA attempted to further incorporate equity standards into its policies and practices. Unfortunately, the pursuit of environmental equity often conflicts with the desired efficiency gains and the emission reduction goals of market-based environmentalism.

Many critics feel that environmental justice cannot coexist with market-based programs. Tort-based free market environmentalism may encourage uneven pollution distributions by exacerbating the already uneven playing field between disadvantaged communities and corporations. While corporations can afford lawyers or out of court settlements, low-income and under-educated communities—already suffering the majority of environmental hazards—cannot absorb high legal fees.²² Critics fear that the economic incentives of emission trading schemes could eventually lead to pollution *hot spots* in disadvantaged communities. Nevertheless, proponents of a free market approach argue that additional legislation in combination with more efficient court mechanisms will obviate potential inequities. Overall, it seems that without additional safeguards, shifting to more market-based incentives could harm already disadvantaged communities. Setting stricter baselines for hazardous pollutants and rigorously implementing regional and local caps on total emissions would ease this concern.

Trading Justice: *California Citizens for a Better Environment v. South Coast Air Quality Management District*

The incompatibility of environmental justice and pollution-trading markets was revealed in a lawsuit against the South Coast Air Quality Management District (SCAQMD) and the California Air Resources Board by the California Citizens for a Better Environment (CBE). CBE is suing SCAQMD and four oil refineries because SCAQMD's "smog markets" are creating pollution hot spots, which threaten the residents of industrial areas. Instead of installing expensive vapor filters to cut hazardous hydrocarbon fumes by 95%, these refineries purchased and scrapped over 7,400 old cars (at \$600 a piece), which emitted an equal volume of toxins.

While reducing hazardous smog and benzene pollution overall for 14 million Southern California residents, these oil refineries released 590 tons of carcinogenic hydrocarbons into a few small, low-income, minority communities in the past three years. Is such a transfer of cancer risks just?

Most major metropolitan areas are creating similar trading programs that allow swaps of mobile-source emissions for stationary-source emissions. These policies may result in concentrated smog levels around disadvantaged communities near stationary-sources. While environmentally neutral and economically efficient, the car-scrapping programs run into substantial environmental justice concerns.

2.6 Are increased uses of market approaches likely to encourage innovation?

While tradable permits and other market incentives can efficiently address pollution problems, advanced low and zero-emission technologies can stop air pollution and greenhouse gas emissions without retarding industry. To achieve these goals, the government must promote the development of these technologies.

²² Moreover, disadvantaged communities have limited access to medical care, making it difficult for them to demonstrate the legally required link between polluters' toxic emissions and unusual illness patterns.

Recently, Congress cut research and development (R&D) spending on low emission and renewable energy technologies (RETs). Opponents of R&D spending argue that research and development is corporate welfare; it distorts the market and prematurely picks winners. They contend that private industry and the market should determine the amount of and allocate R&D funds.

If left to the market, private firms will probably under-invest in research and development. Although the average expected return for private firms from R&D is twenty to thirty percent, societal return is closer to fifty percent. Because firms are not compensated for the spillover effects from R&D, they do not consider the total social benefit and therefore under-invest in research and development. When the results of a firm's research and development can be quickly duplicated and used by competing firms, firms will under-invest out of the fear of free-riders.²³

Industry is often not attracted to high risk or high cost research and development. Since stockholders care most about stock value and dividends, executives sacrifice costly long term research and development projects in order to achieve a better bottom line, deeply discounting the expected future returns. Industry will not invest in basic research because it generally does not lead to a useful, marketable product in the short-term. Finally, private industry fails to internalize externalities such as environmental harm. Therefore, environmentally friendly research and development often has little or no value because of the nature of environmental R&D as a public good.

The promotion of research and development through market schemes can circumvent the problems associated with the shortsightedness of industry. Cap and trade pro-

²³ Basic research is especially susceptible to free-riders because research findings are often not able to be patented.

grams or direct emission taxes internalize the cost of pollution and encourage low-emission and reduced-emission technologies R&D. Additionally, they avoid the arbitrary selection of technology for subsidies and therefore encourage more innovation. Tax incentives and subsidies can also promote low-emission and reduced-emission technologies. Subsidies and tax incentives with built-in sunset periods curtail the ability of private firms to take advantage of the government dole. Incentives scaled proportionally to the decrease in cost of the technology ensure the eventual marketability of these technologies. Subsidies and tax incentives force industry to share a significant portion of the cost and risk.

To stimulate advanced research, market incentives cannot be too specific. For example, in the development of low emissions vehicles, the government should reward automakers and fleets for actual emissions reductions, rather than for incremental standards. Additionally, government should allow firms maximum technological flexibility and should avoid dictating types of fuels and engines used. Averaging pollutants, rather than requiring individual vehicle standards for each pollutant, would also enhance innovation.

Research partnerships between government and industry can also stimulate research and development. The Partnership for a New Generation of Vehicles (PNGV) combines Ford, General Motors, Chrysler, and seven governmental agencies into a research partnership dedicated to developing more fuel-efficient vehicles. The United States Advanced Battery Consortium (USABC) seeks to build advanced batteries that will make electric cars comparable to gasoline powered vehicles. Unfortunately, the con-

sortium focuses on one particular technology, which may stifle other efforts for more cost-effective solutions.

2.7 Is the reliance by free market environmentalists on common law to prevent harmful pollution realistic?

The premise that common law mechanisms will yield a socially optimal allocation and use of environmental resources is based on several assumptions: 1) that individuals will bring all complaints to court; 2) that individuals with claims too small for separate filing will aggregate via class action suits; 3) that the cost of disputation is non-existent or at least minimal; 4) that the judicial system will always rule both rapidly and justly by adequately compensating the party whose property has been damaged.²⁴

Because these assumptions are consistently violated in our current system, judicial resolution of environmental problems takes longer and costs more than traditional regulation.²⁵ The necessity of legal counsel results in high court costs for all the parties involved, even if cases involving the environmental harms involve less cost than attorneys' fees.²⁶ It is doubtful that the judicial system could create an efficacious forum for evaluating the highly complex nature of environmental damages. Furthermore, if one relaxes the no-cost assumption, individual property owners will neither sue over small, personal complaints nor cooperate in class action suits with small individual damages because the opportunity cost of the necessary time and money will outweigh the expected benefits and probability of victory.²⁷

Critics also argue that private suits would be a poor substitute for agency suits, which are selected carefully in order to establish precedents deterring other similar envi-

²⁴ Such efforts require the courts to correctly value the actual damage done to the property

²⁵ Edward Brunet, "Debunking Wholesale Private Enforcement of Environmental Rights," *The Harvard Journal of Law and Public Policy* Vol. 15, No 2, (1992), 313

²⁶ *Ibid.* 321.

²⁷ *Ibid.* 313-323,

ronmental harms. Without such precedents, significant redundancy may plague attempts at environmental compensation. Concentrating environmental regulation in the hands of the federal government allows for economies of scale that would not be realized if all private landowners acted as self-regulators. One act of legislation can remedy environmental problems across the entire country, whereas in a privatized system, each landowner affected by a problem must act individually.

The failure of common law to resolve such environmental disputes supports the move to a government capped market system, a perspective bolstered by evidence that private property proponents consistently “overlook the fact that environmental regulation was a response to inadequate ecological information and protection provided by the market in the pre-regulatory era prior to 1970.”²⁸

2.8 In what if any circumstances will full privatization of environmental goods be technically feasible?

Full privatization of environmental goods requires that all environmental goods become property. However, commodities such as air, ozone, and oceans clearly defy proprietorship. Land, roads, rivers, mountains, and most reasonably large plant and animal species could be sold to private firms or individuals relatively easily, and immobile species and migrant species with small ranges could be privatized by including the property making up their habitat. The size, pervasiveness, or relative intangibility of some environmental goods prevents full privatization. Migratory or large species with large ranges (e.g., Grizzly bears and fish schools) could be privatized only with monitoring equipment and/or legal contracts granting the animals trespass rights for property overlapping their habitat.

Proponents of privatization argue that environmental interest groups would still be able to influence environmental preservation by purchasing and protecting environmentally sensitive goods. However, the wealth disparity between interest groups and corporate America essentially nullifies this possibility: the combined revenue of the thirteen largest environmental organizations is over \$400 million per year while the combined revenues of just two oil companies—Exxon and Mobil—total more than \$400 million per day.²⁹

Converting species-protection to a purely free market approach could be problematic because of the permanence of species extinction, the irrationality of individual and corporate actors, and the innovation lag involved with markets. Endangered species protection, as well as toxic waste regulation, requires balancing market strategies with stricter command-and-control regulations.

²⁸ Michael C. Blumm, “The Fallacies of Free Market Environmentalism,” *The Harvard Journal of Law and Public Policy* Vol. 15, No 2, (1992), 379.

²⁹ William Funk “Free Market Environmentalism: Wonder Drug or Snake Oil,” *The Harvard Journal of Law and Public Policy* Vol. 15, No 2, (1992), 514.

3 A GUIDED TOUR OF WHAT HAS BEEN TRIED

Policymakers have already implemented environmental programs based on market incentives. These efforts fall into three broad categories: cap and trade mechanisms, industrial innovation incentives, and ecological programs.

3.1 Cap and Trade

Under a cap and trade system, the government establishes a cap on pollutant emissions, total allowable fishing catch, or another environmental good. Individual permits or quotas are allocated to the relevant parties; owners are then allowed to trade their permits or quotas on a market.

3.1.1 Air Trading

Federal and state governments have established emissions abatement programs to reduce national SO₂ emissions and address regional air pollution. A product of coal-fired electricity generation, SO₂ causes acid rain. Similarly, ozone emissions contribute to smog, a great concern in urban areas such as Los Angeles.

3.1.1.1 National Air Trading: The Acid Rain Program

Title IV of the 1990 Clean Air Act Amendments outlines the first national cap and trade pollution abatement program. This approach mandates that annual SO₂ emissions must be ten million tons less than 1980 levels by the year 2000. Phase I of the program began in 1995, targeting utilities that contribute the most to acid rainfall problems. Phase II, scheduled to begin on January 1, 2000, expands the scope of the program and enacts more stringent requirements. It caps annual SO₂ emissions at 8.95 million tons and distributes emissions allowances accordingly.

The Clean Air Act gives firms the flexibility to select the most economical method of compliance, including use of low-sulfur coal, installation of sulfur scrubbers, implementation of customer energy-conservation programs, adoption of alternative energy sources, or purchase of allowances from other utilities. Currently, the Chicago Board of Trade holds an annual auction, which allows utilities, brokers, environmental groups, private citizens, and municipalities to actively participate in SO₂ emissions regulation.

After only two years, the SO₂ trading program has realized almost perfect compliance, and SO₂ emissions are below the level established by the cap. In addition, the economic benefits are estimated to be very positive. A December 1994 Government Accounting Office (GAO) report estimates that fully implementing trading programs could reduce compliance costs by \$3.1 billion annually. It also predicts that trading will reduce SO₂ emissions to a level that is nearly two million tons less than required by law. The costs of such SO₂ abatement will be \$1.1 billion in 1997 and \$2.5 billion in 2002, which is several billion less than the current cost of command and control regulation. A more recent estimate pegs annual compliance costs savings at approximately \$720 million.³⁰

3.1.1.2 Regional Air Trading Programs

The 1990 Clean Air Act Amendments require state and regional air pollution boards to devise State Implementation Plans to achieve compliance with national emissions standards. The Regional Clean Air Incentives Market in California and the Emissions Reduction Market System in Illinois have pioneered the use of tradable permits.

³⁰ However, the GAO report does predict large cost-savings under the acid rain program that accrues from intra-utility trading, and questions a potential but significant redistribution of the SO₂ emissions problem.

The South Coast Air Basin, encompassing Los Angeles, Orange, San Bernardino, and Riverside Counties, is the most polluted airshed in the country. To combat this problem, the administrators for the South Coast Air Quality Management District (SCAQMD) instituted the Regional Clean Air Incentives Market (RECLAIM). RECLAIM is an annual emissions trading program for stationary sources of the smog precursors NO_x and SO_x. Each participant receives a number of tradable credits representing the right to emit one pound of either NO_x or SO_x annually. RECLAIM reduces the number of credits allocated each year to curtail aggregate emissions to half of the 1980 level by the 2000 deadline. Since the program's initiation on January 1, 1994 RECLAIM has attained its stated reduction goals.

The Midwest is home to another example of an emissions trading program. During the summertime, Northeastern Illinois experiences high concentrations of ground-level ozone. The region's ozone non-attainment area has adopted the Illinois Emissions Reduction Market System, a volatile organic material (VOM) cap and trade program, which seeks to reduce regional emissions by twelve percent. Approved by the Illinois Pollution Control Board, the Emissions Reduction Market System is scheduled to begin in January 1999.

The cap and trade paradigm for air emissions abatement is both environmentally and economically sound. The system owes its success to a number of factors: clearly defined environmental goals, carefully crafted programs with low administrative overhead, availability of reliable emissions data, clearly defined property rights through allowance allocation, finite emissions sources, and the flexibility to pursue least-cost compliance.

Guilt-Free Electricity: Retiring Allowances

Using a “take it out of circulation” philosophy, over twenty nonprofit organizations ranging from the Sierra Club to high school ecology organizations, have purchased over 1,400 emission allowances in the past few years. Each retired allowance represents a one-ton reduction of SO₂ emissions.

In conjunction with this report, the Woodrow Wilson School Policy Conference on Market Incentives for Environmental Reform purchased one SO₂ allowance from the Clean Air Conservatory. This one-ton allowance covers the 0.93 tons of annual SO₂ emissions attributable to electricity use by the members of the Policy Conference.

3.1.2 Water Use in the West: Increasing Freedom to Trade

The legal framework governing western water use has traditionally followed three rules: 1) the first water appropriator gains exclusive water rights, with subsequent rights assigned only after meeting prior rights; 2) water can be diverted on nonriparian lands; 3) if water is not used, the owner's right to it is forfeited.³¹ After a long period in which trading was banned, the ability to transfer water rights has only recently resurfaced in the West.

After 1902, water rights became inextricably linked with massive government dam projects that provided inexpensive irrigation for arid western lands. Farmers used this water to make the desert bloom and jealously defended their rights to subsidized water. Meanwhile, western cities already dependent upon imported water have grown rapidly, further increasing water demand. Additionally, parties ranging from environmentalists to fishermen demand that more water be left in-stream. The intensifying demand

for water underlies the burgeoning call for allowing water trading. Since agricultural users consume over 90% of the West's water, water trading will encourage farmers to sell their water rights to more efficient users.³²

Under the leadership of free market advocates at the Department of the Interior and a sympathetic Senate Committee on Natural Resources and Energy, the federal government has reduced its own control of western water supplies. It no longer prevents or encourages water transfers, but instead assigns states the responsibility for facilitating market trading.

The reliance on market incentives for water use management currently varies from state to state. Colorado and Arizona have emerged as leaders in redefining water rights and promoting transfers among private users. Arizona reduced its reliance on the federally operated Central Arizona Project, designed to carry water from the Colorado River to much of the state's population.³³ After a contentious ten-year dispute over initial rights allocation, administrators and municipal officials recognized that population growth would exhaust water supplies. The state government intervened, restructuring the water distribution networks into four active management areas, which act as local water marketing boards that allow private rights trading within and between districts. Other

³¹Terry Anderson and Pamela Snyder, *Water Markets: Priming the Invisible Pump*, (Washington, DC: Cato Institute, 1997), 35.

³²The percentages have been steady for the past quarter-century, with irrigation using 85% of the water in California, 90% in Colorado, New Mexico, and Arizona, and even more in the rest (even Washington, Oregon, and Idaho). Various sources, including Mark Reisner, *Cadillac Desert: The American West and its Disappearing Water*, (NY: Penguin Books, 1986), 9, and Barton Thompson, Jr., "Institutional Perspectives on Water Policy and Markets," *California Law Review*, 18, (3), 702.

³³Richard Wahl, *Markets for Federal Water: Subsidies, Property Rights, and the Bureau of Reclamation*, (Washington: RFF, 1989), 221.

innovative measures include an active market in groundwater access rights and a policy requiring the use of lower-quality water for high-consumption urban applications.³⁴

Despite high population growth and a lack of new reservoirs, California has been slow to implement water transfers because of the influence of federal water control and agribusiness lobbies. Contracts allocating 12 million acre-feet of water for the Central Valley Project and the Imperial and Coachella Irrigation Districts and 2.5 million acre-feet for State Water Projects limit water transfers in order to secure cheap access for farmers.³⁵ In 1992, Congress passed the Central Valley Project Improvement Act, which exchanged the long-term stability of the valley's agricultural water supply for the right of urban areas to purchase water through voluntary user transfers.³⁶ As economic advancement in the Western U.S. increasingly depends on water availability, future growth requires significant reform of institutional and regulatory barriers to water rights trading.

3.1.3 *Water Quality*

Although the 1972 Clean Water Act reduced the threat of point source pollution, non-point source pollution continues to contaminate our nation's waters. The failure of traditional regulation to control non-point sources has led policymakers to consider achieving water quality standards through tradable permits, privatization, and direct purchase of watershed lands.

Under a tradable permit system, polluters receive a license specifying the maximum amount of contaminated effluent they may emit. If one company produces less

³⁴One example of this regulation is the use of treated sewage to irrigate golf courses. Marc Reisner and Sarah Bates, *Overtapped Oasis: Reform or Revolution for Western Water*, (Washington: Island Press, 1990), 101-02.

³⁵Ibid. 103-04.

³⁶Ambiguities continue to fuel controversy and litigation as interest groups battle over regulations and implementation. "Symposium—Central Valley Project Improvement Act: Introduction," *San Joaquin Agricultural Law Review*, 3 (1993): 1, 1.

pollution than is allowed by its permit, it receives an Emissions Reduction Credit (ERC). It can then sell this ERC to other polluters who wish to exceed their own discharge allowances. In addition to trading between point sources, the program allows for point-nonpoint trading. This type of trading allows point sources to swap further effluent purification in exchange for cleaning a certain amount of non-point source pollution. Point source polluters pay to install buffer zones, fence off livestock, and restore wetlands in order to reduce the total amount of pollution in a body of water.

Privatization provides landowners with a direct stake in the maintenance of a water system. In England, fishermen buy rights to fish in a stream, and all owners within this cooperative coordinate to protect the water from pollution and preserve the value of their investment. The Anglers' Cooperative Association, founded in 1948, has fought polluters in court and maintained the health of England's streams.³⁷ The success of privatization in England encourages similar projects in the United States. Municipalities also have strong economic incentives to purchase and therefore protect the watershed that provides its water supply.

The most striking example of the application of market incentives to water pollution control is the Tar-Pamlico River Basin in North Carolina. The river basin was threatened by excess phosphorus and nitrogen accumulation, primarily the result of non-point agricultural runoff. The local point source dischargers united in a group called the Basin Association to defend themselves from further government regulation and reduce non-point source pollution in the region. The Basin Association created a plan that established a tradable permit system for point sources and assisted the creation of a non-

³⁷ Terry Anderson and Pamela Snyder, *Water Markets: Priming the Invisible Pump*, (Washington, DC: Cato Institute, 1997), p. 140.

point source pollution fund. The fund's revenue would be derived from fines levied upon point source polluters that exceed permitted amounts of effluent. In the future, the association plans to create a point-nonpoint trading system.³⁸

The New York City Watershed Program: An Economic Tradeoff to Control Non-Point source pollution

The quality of New York City's drinking water has steadily declined as non-point source agricultural and municipal runoff continues to contaminate the city's watershed. The city faced the prospect of constructing a \$6-\$8 billion filtration plant because of its failure to meet the standards established by the EPA's 1989 Surface Water Treatment Rule. Instead, the city created a less expensive solution by spending \$1 billion to purchase the land surrounding the Catskill and Delaware Watershed in upstate New York. Because the city now owned the watershed, it could restrict land usage and thereby control the amount of pollution that was reaching its water supply. Following rancorous debate, the watershed plan gained EPA approval and received an extension delaying EPA standard compliance until 2002.

Though the plan initially saves New York City more than \$6 billion, it will likely fail to reduce regulation. Public health officers must enact new regulations for land use in order to limit harmful effluents. Despite EPA support for such watershed programs in its battle against non-point source pollution, their success is far from assured. Consequently, officials must constantly monitor water quality to ensure that standards are being met.

3.1.4 Fisheries and ITQs

Today, the United States fishing industry faces both ecological and economic problems as a result of failed regulation schemes. An alternative to this traditional command and control style of fishery management is the individual transferable quota (ITQ). ITQs combine regulatory policies with market incentives to produce an effective hybrid

³⁸ "Office of Wetlands, Oceans, and Watersheds—Draft Trading Update: Tar-Pamlico River, North Carolina," Environmental Protection Agency. (December 1996, revised February 13, 1997).

tool for the management of harvestable resources. An ITQ is a share of the total allowable catch of a species, which the government then allocates to actors in a fishery.³⁹ An allocation formula is designed by scientists and economists to apportion the quota shares. A regulatory agency such as the U.S. National Marine Fisheries Service (NMFS) then implements the actual allocation of the quota shares and enforces participant adherence to these quotas. After these shares are distributed, they may be bought, sold, traded, or leased. Each fisherman is allowed to harvest the amount of fish designated by the shares that he possesses.

ITQ programs provide fishermen with an incentive to conserve because moderated fishing will ensure that future fish populations thrive. As fish stocks grow, the total allowable catch will be increased. The result is that shareholders benefit from a larger allowed harvest and the resultant increased value of their individual shares.⁴⁰ Currently, there are three federal ITQ programs in Mid-Atlantic and New England waters: the South Atlantic wreckfish fishery, the surf clam and ocean quahog fisheries, and Northwest Pacific halibut and sablefish fisheries.⁴¹ The Magnuson Fishery Conservation and Management Act Reauthorization has placed a moratorium on ITQ use in United States fish-

³⁹ Eugene H. Buck, "Individual Transferable Quotas in Fishery Management," *Congressional Research Service Report for Congress* (25 Sep. 1995), par. 1 (Committee for the National Institute for the Environment, <http://www.cnie.org/nle/mar-1.html>); Terry L. Anderson and Donald R. Leal, "Fishing for Property Rights to Fish," *Taking the Environment Seriously*, eds. Roger E. Meiners and Bruce Yandle (Lanham, MD: Rowman & Littlefield Publishers, Inc., 1993), p. 167; Rodney M. Fujita, D. Douglas Hopkins, and W.R. Zach Willey, "Creating Incentives to Curb Overfishing," *Forum for Applied Research and Public Policy* (Summer 1996): p. 32.

⁴⁰ Rodney M. Fujita, Julie Philip, and D. Douglas Hopkins, "The Conservation Benefits of Individual Transferable Quotas (ITQs)" (New York: Environmental Defense Fund, 1996), unpublished, p. 1.

⁴¹ Buck, "Individual..." par. 19.

eries until the year 2000.⁴² This act addressed concerns that ITQs were allocated unfairly, by affecting small family-owned fishing operations negatively.⁴³

ITQs have produced controversy over equity issues and promise resulting from their positive economic and ecological results. Across the globe, well-designed ITQ programs have successfully promoted resource conservation while improving the economic well being of fishery participants. The Australian southern bluefin tuna ITQ program reduced overfishing by thirty percent in the year after its introduction.⁴⁴ Participants in the British Columbia halibut ITQ program realized an average \$9,200 increase in per vessel income one year after the implementation of the program.⁴⁵ Clearly, the ITQ is a promising tactic that combines regulatory policies and market incentives to promote ecological and economic stability.

3.1.5 *Wetlands and Coastal Management*

Historically, the nation has relied upon command and control approaches to preserve its wetlands and coasts. Recently, policymakers have turned towards market incentives to achieve environmental objectives. A shift towards a free market emphasis is particularly appropriate in light of the negative impact of government subsidy and insurance programs on semi-aquatic environments.

The status of wetlands in the U.S. provides a sobering reminder of how subsidies can harm the environment. A 1986 Interior Department report described several direct and indirect agricultural subsidies that were found to harm wetlands; these included price

⁴² Eugene H. Buck, "95036: Magnuson Fishery Conservation and Management Act Reauthorization," *Congressional Research Service Issue Brief* (4 Dec. 1996), par. 34, (Committee for the National Institute for the Environment, <http://www.cnie.org/nle/mar-3.html>, 25 Oct. 1997).

⁴³ "EDF Praises Passage of Magnuson Bill," (New York: Environmental Defense Fund), unpublished, 1.

⁴⁴ G. Geen, W. Nielander and T.F. Meany, "Australian Experience with Individual Transferable Quota Systems," in *The Use of Individual Quotas in Fisheries Management* (Paris: Organization for Economic Co-operation and Development, 1993), 79.

and income supports, below-market rate loans, free technical assistance, discounted crop insurance and irrigation water, flood control and drainage projects, protection from low-cost imports, and forgiveness of environmental degradation.⁴⁶ By decreasing the costs of farming, these subsidies have compelled farmers to convert wetlands into croplands, disregarding the environmental impact of their behavior.

The Kissimmee-Okeechobee Everglades of Florida, an important watershed and wetlands area host to a dwindling waterfowl population, has been entirely reshaped due to agricultural expansion. The watershed's reduced water supply is contaminated with phosphorous. Much of this degradation is the result of subsidy provision: high sugar prices stimulate cane production, which causes the degradation of the wetlands of the Florida Everglades.⁴⁷ These sugar price supports are upheld by large corporations' lobbying efforts that fend off reformers.

Other attempts to exploit markets for environmental aims have been more successful. Under the Wetlands Reserve Program (WRP), the government rents environmentally vulnerable wetlands from farmers for ten-year periods, thereby preventing the conversion of these lands into croplands. Nevertheless, the WRP has suffered from poor targeting. Critics claim that the program should focus on protecting the most ecologically significant wetlands rather than those most cost effective to preserve. While some wetlands perform the crucial functions of water filtration, flood mitigation, and habitat en-

⁴⁵ Fujita, Hopkins, and Willey, 30.

⁴⁶ U.S. Department of the Interior, *The Impact of Federal Programs on Wetlands* (Washington, D.C.: Government Printing Office, 1994).

⁴⁷ Roodman 12

hancement, others are mere bogs and breeding grounds for pests.⁴⁸ Efforts to improve the targeting of the WRP are underway.

The United States' coastline has also been the subject of environmental scrutiny and debate. Coastal areas face harm in the form of natural forces such as coastal storms, erosion, and sea-level rise. This degradation has grave consequences for human presence on the shore.

The 1972 Coastal Zone Management Act provided assistance to states wishing to create comprehensive shoreline administration plans. The result was the formulation of individual state-by-state approaches within a command-and-control framework that contained development regulations and costly coastline reclamation strategies. The Federal Emergency Management Agency (FEMA) currently protects development by providing insurance for coastal landowners who adhere to established shoreline construction regulations. Overall, maintenance approaches vary between fully developed Atlantic states such as New Jersey and more pristine Pacific environments found in California.

Many states have recognized the extreme difficulty, expense, and danger of maintaining a shifting coastline. As a result, they have moved towards more restrictive coastal development policies. *Lucas v. South Carolina Coastal Council* demonstrated that such rules may be construed as takings, and would therefore require compensation. A Transfer of Development Rights (TDR) program has been employed in several coastal states as a method of remuneration. TDR severs saleable land-use rights from a sending parcel that are then purchased and applied to a receiving property. Some question the purpose of TDRs: do they provide compensation for a takings, or do they serve to miti-

⁴⁸ Jonathan Adler, ed., *Environmental Briefing Book* (Washington, D.C.: Competitive Enterprise Institute, 1996), Wetlands Policy Brief. The U.S. government has also used cost-sharing schemes to encourage coal-

gate the effect of a takings? The Supreme Court, in *Penn Central v. City of New York* and *Suitum v. Tahoe Regional Planning Agency*, has ruled that when a complete taking occurs, TDR is “a proper part, or indeed the entirety, of the compensation accorded a landowner.”⁴⁹ Nevertheless, if property use is merely restricted, not completely prevented, “TDRs can serve a commendable purpose in mitigating the economic loss suffered by an individual.”⁵⁰ Either way, TDRs can be effective land-use management tools.

Transfer of Development Rights programs have had the most success along undeveloped shores, where landowners are more willing to surrender their development rights. In states with well-developed coastlines, the political power that is concentrated along the water is strongly opposed to any policy that is perceived as coastal retreat. For these regions, only a severe crisis will force policymakers to use more creative environmental management options.

3.2 Research, Development, and Innovation

Other market-based approaches to environmentalism have sought to encourage industry to develop environmentally friendly behaviors and technology, which have resulted in notable innovation in the areas of waste disposal, eco-labeling, emissions reduction, and energy production.

3.2.1 Solid Waste Disposal

Governments within the United States have implemented a variety of market-oriented mechanisms aimed at reducing waste sources and increasing recycling.⁵¹ Sev-

burning facilities to install scrubber technology or to utilize low-sulfur coal.

⁴⁹ 438 U.S. 104 (1978); 117 S. Ct. 1659 (1997).

⁵⁰ *Suitum v. Tahoe*, 117 S. Ct. 1659 (1997).

⁵¹ Karen Palmer, Hilary Sigman, and Margaret Walls “The Cost of Reducing Municipal Solid Waste” Discussion Paper 96-35, (Washington, *Resources for the Future*, 1996), 1-2.

eral municipalities have experimented with disposal fees for curbside garbage pickup. In theory, such policies directly internalize disposal costs, giving consumers incentives to produce less waste. However, disposal fees have been problematic in reality; recent economic studies have questioned their effectiveness, finding that implementation costs often exceed program benefits.⁵²

The United States is currently examining advanced disposal fees (ADFs), which are surcharges levied on products based on anticipated disposal costs.⁵³ An ADF is a modified form of Extended Product Responsibility (EPR), a waste reduction and management strategy that has been widely applied in Europe. EPR forces producers to be responsible for their products' environmental impact from manufacture through disposal. EPR internalizes waste management costs into the price of the good and encourages manufacturers to design the product for more efficient disposal. Germany's Green Dot packaging collection system is the most comprehensive EPR program currently in practice. The most notable American EPR system is the Ni-Cad battery take-back and recycling initiative, which has been in effect since 1995. Despite limited experience, EPR policies are effective and will see greater implementation in the future.

Free market proponents support disposal fees for consumers, but are strongly opposed to advanced disposal fees and extended producer responsibility policies. They argue that EPR policies are redundant when consumers internalize costs by paying disposal fees. Supporters of EPR counter that consumer disposal fees are problematic in their im-

⁵² Fullerton, Don and Thomas Kinnaman "Household Responses to Pricing Garbage by the Bag" *American Economics Review* September 1996 and "Garbage and Recycling in Communities with Curbside Recycling and Unit-Based Pricing" NBER Working Paper No. 6021, April 1997 as quoted in "Garbage in, garbage out" *Economics Focus*, *The Economist* June 7-13, 1997, 92.

⁵³ Bette Fishbein *Germany, Garbage, and the Green Dot: Challenging the Throwaway Society* (New York, INFORM, 1994), 189-190

plementation, because it is difficult to make consumers bear the full costs associated with disposal, due to imperfect information about total disposal costs. EPR circumvents this potential difficulty by giving incentives directly to producers. The United States is beginning to make use of the wide range of market mechanisms available to deal with the solid waste dilemma. Many of these market mechanisms have the potential to significantly reduce the waste stream, at costs far below those of current regulatory approaches.

3.2.2 Eco-labeling: Harnessing the Power of the Informed Consumer

The growing movement to allow market incentives to govern environmental policy has focused attention on environmental labeling. Such eco-labeling is a “soft” market-oriented policy which rewards producers for exceeding legally required environmental standards. By increasing the amount of information available to consumers, a successful eco-labeling program introduces competition based upon environmental-friendliness.

Eco-seals, voluntary trademarks awarded by third parties, are the most effective type of eco-label. Eco-seals are easy for consumers to understand and do not require them to compare products; the consumer simply checks whether or not an eco-label is present when choosing between products. Unlike single-attribute labels such as *recyclable* or *dolphin-friendly*, eco-labeling programs consider multiple stages in a product’s lifecycle: a recyclable product may be manufactured by a company that leaks toxins into local rivers. By considering multiple stages in the product’s life, eco-seals take such discrepancies into account.

Because participation in eco-labeling programs is voluntary, the effectiveness of such programs depends almost entirely on industry’s expectations of consumer response.

Acquiring such labels is expensive for producers; companies that do not meet labeling criteria must invest in capital to upgrade their production processes. Eco-labeling programs also impose fees and significant administrative burdens. Nevertheless, benefits include premium prices for labeled products and improved market share.

Eco-labels have been denounced as barriers to trade because they favor domestic producers, fail to provide sufficient transparency, and require foreign producers to meet production process criteria not necessarily important to their home country's environment.⁵⁴ Eco-labeling can ensure that their labels do not pose trade problems by striving for clear determination of qualifications and working toward harmonizing their labels with other labels worldwide.

Unfortunately, the U.S. is not among the nearly thirty nations with effective eco-labeling programs. The Environmental Protection Agency actively supports single-attribute labeling programs such as the "Energy Star," but it has no plans for a national eco-label.⁵⁵ Green Seal, a nonprofit eco-labeling organization begun in 1990 by Earth Day Coordinator Denis Hayes, has attempted to create a national program. While respected internationally, Green Seal's success is limited because its non-governmental status makes it unattractive to producers and less credible among consumers. As a result, American consumers are provided with less information about the environmental impacts of the products they consume than residents of most other industrialized nations.

⁵⁴Anil Markandya, "Eco-Labeling: An Introduction and Review," *Eco-Labeling and International Trade*, eds. Simonettea Sarrilli, Venna Jha, Rene Vossenaar (New York: St. Martin's Press, Inc, 1997), 8.

⁵⁵Julie Lynch, United States Environmental Protection Agency, Office of Pollution Prevention, telephone interview by Nina A. Kohn. 30 Oct. 1997.

3.2.3 *The Special Problem of the Automobile*

Certain federal laws affecting automobiles include market incentives. During the phase-out of leaded gasoline in the 1970s and 1980s, gasoline refineries were permitted to average the lead content of their gasoline sales to meet mandated levels, sell lead-reduction credits to other refineries, and bank the credits for future use. These efforts succeeded in reducing gasoline lead content ahead of schedule, and the success gave the federal government the confidence to include market incentives for automobiles in the 1990 Clean Air Act and the 1992 Energy Security Act.⁵⁶ In it, some public and private vehicle fleet operators are required to purchase certain low-emissions vehicles by certain dates. Credits are offered to fleets that voluntarily exceed their requirements; these credits may be sold among fleets or banked for future years.⁵⁷

The United States has not significantly tried to use transportation pricing as a market incentive to reduce pollution. A tax among European nations makes gasoline three to four times more expensive than in the United States, resulting in significantly lower levels of energy consumption and vehicle-miles traveled.⁵⁸ A \$0.04 per gallon gasoline tax hike would cost the United States \$4,500 to reduce hydrocarbon emissions by one ton.⁵⁹

State and regional authorities have employed market incentives to reduce pollution from automobiles. Six states offer emissions reduction credits to vehicle fleets and individuals for voluntarily repairing vehicles, operating low-emissions vehicles, and ret-

⁵⁶ EPA, "United States Environmental Protection Agency Directory of Air Quality Economic Incentive Programs," <http://134.76.55.16:777/aa/programs.nsf>.

⁵⁷ Timothy T. Maxwell & Jesse C. Jones, *Alternative Fuels: Emissions, Economics, and Performance*. (Society of Automotive Engineers, Warrendale, PA, 1995), 164-165.

⁵⁸ Stacy C. Davis, *Transportation Energy Databook*, Edition 17, (Oak Ridge National Laboratory, August, 1997) Tables 1.10 to 1.20.

rofitting cars with emissions-reduction equipment. These credits can be sold on the open market to other fleets or to stationary sources. However, the effectiveness of these programs has not yet been determined.

Because a large amount of carbon monoxide and hydrocarbon emissions are produced by older cars, seven states have implemented *accelerated vehicle retirement programs*. Owners of older cars are paid about \$500 to scrap their vehicles. Emissions reductions have been substantial in areas where heavily polluting cars have been identified by emissions testing.⁶⁰ The cost-effectiveness of such programs is comparable to that of vehicle repair.

Other programs, generally targeted at commuters, have sought to decrease emissions by reducing miles traveled by automobiles. Employers encourage carpooling by eliminating parking subsidies for employees and by offering benefits to car-poolers. High-occupancy vehicle lanes on highways are open only to carpools during rush hours. These programs achieve high emissions reductions within small regions, but their cost-effectiveness varies. Another alternative would be a vehicle registration fee based on emissions and miles traveled, giving drivers an incentive to cut back on their car travel. Each ton reduction in hydrocarbon emissions would cost an extra \$1,650 with such a fee program.

⁵⁹ Winston Harrington, Margaret A. Walls, and Virginia McConnell, "Shifting Gears: New Directions for Cars and Clean Air," (Resources for the Future, Washington, D.C., 1994.), 19-20.

⁶⁰ EPA, "United States Environmental Protection Agency Directory of Air Quality Economic Incentive Programs," <http://134.76.55.16:777/aa/programs.nsf>.

How Market Flexibility Can Reward Innovation: The Case of Honda's Zero-Level Emissions Vehicle

The state of California requires automakers to sell each of four types of low-emission vehicles in specified proportions: Transitional Low Emission Vehicles (TLEV), Low Emission Vehicles (LEV), Ultra Low Emission Vehicles (ULEV), and Zero Emission Vehicles (ZEV), which are defined by their reduction in emissions levels over a standard 1994 model. The sales requirements for TLEV's, LEV's, and ULEV's are flexible enough that they can be satisfied by meeting an equivalent fleet-average standard if the vehicles are not sold in the specified proportions. So far, this has worked well, as automakers have sold 7 to 8 percent more low-emission vehicles than required in model years 1996 and 1997.⁶¹ However, the ZEV requirement, which will apply to 10% of new car sales in 2003, is not so flexible. It requires battery-powered electric cars, which are expensive and offer limited performance, range, and utility. Furthermore, electric vehicles may never be needed to address California's air quality problems.

Honda has recently announced that in two to three years it will introduce a current-generation Accord with radically low emissions. Called a *Zero Level Emissions Vehicle* by the company, this car's emissions will be just 10% of the Ultra Low Emission Vehicle standard. Indeed, this is equivalent to the emissions from electric power plants in California to charge the batteries of electric cars. The cost of the ZLEV is not expected to be significantly higher than that of today's Accord.⁶²

Ironically, this vehicle, while providing the same environmental benefit as a ZEV, will not qualify as a ZEV under the current California classification. It will count as a ULEV and its emissions will be calculated as a ULEV in Honda's fleet-average emissions, despite being 10 times cleaner than a ULEV. Honda will still have to sell electric cars in California.

The California Air Resources Board is currently considering a proposal to create a new vehicle category called the Equivalent Low Emission Vehicle (EZEV), whose emissions are equivalent to those of electric power plants in California. In the proposal, sales of EZEV's would satisfy ZEV sales requirements. This would be a wise policy, but concerns about EZEV's maintaining near-zero emissions levels throughout their useful lives must be addressed before the proposal can become law.⁶³

⁶¹ California Air Resources Board, "ARB Auto Reduction Program Proves Cost-Effective," nd.

⁶² Rachel Konrad, "Honda Engine Clears Air," *Detroit Free Press*, October 21, 1997.

⁶³ California Air Resources Board, *Preliminary Draft Staff Report: Proposed Amendments to the Low Emission Vehicle Regulations to Add an Equivalent Zero Emission Vehicle (EZEV) and Allow Zero Emission Vehicle Credits for Hybrid Electric Vehicles* (El Monte California: July 14, 1995), 1-10.

3.2.4 Electricity Generation

Tradable permits and innovative subsidies can be used to promote research and development of renewable energy technologies (RETs) for the electric utility industry. One proposed use of tradable permits takes the form of the Renewable Portfolio Standard (RPS). In a deregulated, competitive electric utility industry, a regional RPS could be implemented to mandate that a certain percentage of electricity generation use RETs.

An RPS requires electricity suppliers to utilize a minimum percentage of renewable energy sources. Tradable permits, called Renewable Energy Credits (RECs), would allow utilities to buy and sell their renewable energy obligations. RECs would ensure efficient development of RETs. Spending would occur in markets where RETs are most viable. Electricity suppliers would have the choice of either utilizing renewable energy sources or buying RECs from a broker or another firm. The government would continue to set the percentage of electricity that must be derived from renewable sources, but it would no longer mandate specific technologies, which would prevent government subsidization of impractical and costly RETs. For example, Arizona has approved a RPS that mandates that 0.5% of electricity produced between 1999 to 2002 be derived from photovoltaic or solar thermal-electric sources. After 2002, an increase to 1% of electricity would mean that renewable energy sources would produce up to 200 megawatts of Arizona's electricity.

Subsidies have been used to promote large-scale use of RETs. In 1994, Enron proposed a 100-megawatt photovoltaic power plant for Nevada. The Department of Energy (DOE) signed a contract with Enron to guarantee that the plant's electricity will be bought at a price of \$0.055 per kWh, which is \$0.015 above the current market price.

The DOE also provided \$150 million of tax-free bonds to finance the plant. The DOE's assistance rewards advances in low-cost solar cell production rather than unfruitful research and development, because Enron stands to lose money if the cost of solar electricity generation is greater than \$0.055 per kWh.

3.3 Ecology: Public Lands, Public Resources, and Biodiversity

Market incentives have also been applied to public lands, public resources, and biodiversity maintenance, resources that typically come into conflict with property rights issues.

3.3.1 Public Lands and Public Resources

The Federal Land Policy and Management Act of 1976 (FLPMA) declared that “the United States shall receive fair market value of the use of the public lands and their resources.” Nevertheless, the federal government allows ranchers, loggers, and miners access to precious public resources at below-market prices. Subsidies to public land users cause the nation's scarce resources to be utilized at unsustainable rates and result in widespread environmental damage on the 730 million acres of federal land.⁶⁴ While the government ought to favor the “farsighted, ecologically sensitive management of these resources over [short-term] exploitation,” in practice, its policies encourage a “use it or lose it” mentality within private enterprise. As a result, firms attempt to maximize the benefits of subsidies for grazing, logging, and mining while ignoring both the welfare of future generations and the “ecological, cultural, historic, and aesthetic” value of land and

⁶⁴ U.S. House of Representatives, Subcommittee on Oversight and Investigations of the Committee on Natural Resources, *Taking from the Taxpayer: Public Subsidies for Natural Resource Development: An Investigative Report* (Washington, D.C.: Government Printing Office, August 1994), 1.

forest.⁶⁵ The tenets of the free market encourage the elimination of harmful subsidies because of their economic inefficiency and their negative environmental impact. Additionally, subsidies should be expanded to encourage and to reward environmentally friendly practices in other industries.

Advocates of a free market approach promote a shift from the current system of restricted public lands access permits to a clearly defined access rights program that allows these privileges to be transferred. A conservationist organization could purchase access rights from grazers to preserve the grasslands. In 1996, an environmental organization called Forest Guardians successfully bid for the lease of grazing lands in New Mexico. The lease included an ecologically valuable riparian area along the Rio Puerco River. The Nature Conservancy has purchased 5,167 acres of ranchland in Utah, inheriting 250,000 acres worth of grazing permits. A free market approach would eliminate all restrictions on the holding of forage rights, including the “use it or lose it” requirement, the base property requirement, and the restrictions on the subleasing of lands.⁶⁶

3.3.2 *Endangered Species*

The rapid extinction of species is a major environmental problem in the United States and around the world. The most comprehensive endangered species legislation, the 1973 Endangered Species Act (ESA), is currently awaiting reauthorization. The ESA has implemented strict command and control legislation for species and habitat protection.

⁶⁵ Debra S. Knopman, "Easier to be Green: the Second Generation of Environmental Action," in Will Marshall, ed., *Building the Bridge: 10 Big Ideas to Transform America*, Progressive Policy Institute, 175.

⁶⁶ Robert H. Nelson, "How to Reform Grazing Policy: Creating Forage Rights on Federal Rangelands," (Competitive Enterprise Institute, December 1996), 15-20.

However, the ESA has a mixed track record. Ninety-nine percent of species protected by the ESA still exist. Nevertheless, after almost twenty-five years, only eleven species have recovered sufficiently to be de-listed. Free market advocates believe that the strict regulatory approach of the ESA creates powerful disincentives for private landowners to report endangered species found on their property. They contend that the ESA places too many uncompensated burdens on landowners.

Habitat Conservation Plans (HCPs), created by a 1982 amendment to the ESA, are meant to lessen the burden on private landowners. Prior to this amendment, any activity that resulted in harm to a listed species could lead to imprisonment and fines. The amendment allows non-federal entities to obtain a permit for an incidental taking of an endangered species as long as the landowner was engaged in an otherwise lawful activity. An HCP seeks to allow reasonable land development and to provide for endangered species conservation simultaneously. The landowner receives the certainty of no increases in regulation in exchange for a promise to properly manage the land. From 1982 to 1992, only ten HCPs were approved, but in the past five years, three hundred twenty HCPs are being implemented or are waiting approval. If HCPs are properly implemented, they can benefit both the economy and the environment.

Another market incentive applicable to endangered species protection is the use of tax credits to encourage habitat stewardship. “Land rich and cash poor” inheritors are often forced to clear-cut their land to pay costly estate taxes. Tax forgiveness allows these assessments to be deferred for as long as the owner properly manages the land.

4 CONCLUSIONS

Recent government deregulation and increased privatization have led policymakers and environmentalists to seriously consider the benefits of market-based environmental policy. In the extreme, free market environmentalists propose full privatization of all environmental goods, relying on common law to settle disputes; proponents theorize that private ownership will create an economic environment that will protect environmental resources. Based on our analysis, this type of free market environmentalism will not achieve several environmental goals. The unequal distribution of economic and political resources, the decision-making biases interfering with the identification and valuation of environmental goods, and the dependence on common law all suggest that complete privatization would reduce conservation, increase inequality, and bloat the judicial system.

In contrast, combining government control and market-based environmental policy shows promise with respect to both efficiency and equity. Tradable air permits, transferable fishing quotas, tradable development rights all demonstrate improvement over traditional regulation by fusing government restrictions of environmentally harmful behavior with market efficiencies. Implementation of more "free market" strategies (nearly completely privatizing ITQs or air pollutants) and access to improved abatement will demand additional technological innovation. Therefore, given industry's aversion to risk and fear of free-riding, the conference suggests the government renew its support of environmentally-oriented R&D through subsidies and tax incentives for energy and emission innovation.

Although market-based environmental policy outperforms command and control regulation, policymakers moved slowly to incorporate economists' recommendations due to unrealistic expectations and inappropriate comparisons of practical implementation with idealized prototypes. These misperceptions stem from frequent claims that incentive programs reduce social costs, avoid the negative stigma of command and control regulation, and offer mechanisms that are easier to design, administer, and enforce. Additionally, policymakers' expectations could be generalizations of one effective market program (tradable SO₂ permits) that have actually lowered social costs, minimized regulation and monitoring expenditures, accounted for control cost discrepancies, and met both industrial and environmental needs.

Our analysis confirmed that these positive generalizations are not applicable to all market-oriented environmental policies. Some programs, such as species conservation, may require regulation no less extensive and invasive than current measures. Moreover, new market policies may entail higher social costs in addition to more complicated design, administration, and enforcement.

Traditional regulation predicts definitive policy outcomes and places environmental stewardship in the hands of the government. By employing market incentives, policymakers will exchange their fine control over environmental quality for improved efficiency. Such an exchange may prove troublesome for policymakers, who are habituated to tight control and who still bear accountability for environmental damage.

Finally, the slow incorporation of market incentives into environmental policy may stem discrepancies between the goals of traditional regulation, which were to improve the environment, and those of incentive programs, which are to increase efficiency

and reduce costs. Policymakers would tolerate the imperfections of command and control regulations, as these tools still achieved some success in protecting the environment. In contrast, policymakers would not accept a market-based approach's failure to achieve its much-touted success in efficiency, given any concurrently flawed environmental results. This policy conference firmly believes that, despite such drawbacks, market incentives are excellent and useful environmental policy tools.