Is Wealth Green? Examining the Relationship Between Wealth and Environmental Conservation

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Abstract

This study tests an aspect of the environmental theory of Peter Huber outlined in his book *Hard Green: Saving the Environment from the Environmentalists: A Conservative Manifesto* (1999). Huber's thesis is that wealth leads to environmental conservation in two ways: 1) that wealthy nations develop and implement technologies to maximize the efficiency of land use, and 2) that wealthy individuals pour their wealth into the conservation of nature. Using secondary data analysis, I test the first national-level hypothesis with regressions of the variables "Gross National Income" and "ecological footprint," and test the second individual-level hypothesis with logistic regressions of the variables "income" and "donation to environmental groups," from both the General Social Survey and the World Values Survey. The results strongly refute Huber's national-level theory, with evidence that wealthy nations are actually less efficient at using land, but on an individual level the evidence suggests that the wealthy are indeed more likely to donate money to environmental groups.

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Chapter 1: Introduction and Problem Statement

1.1 Introduction

Since the publication of Rachel Carson's *Silent Spring* in 1962 and the subsequent birth of the modern environmental movement, environmental problems have come to the forefront of social and political consciousness around the world. Like a branching tree, environmentalism has splintered into many different factions with conflicting goals and interests, raising questions about the meaning of nature and the environment, and the relationship between our activities and the well-being of the earth. Environmental issues exist in both scientific and political arenas, each of which influences the other.

While there are several prominent forms of environmental ideology whose adherents would disagree about many things, most of these groups have been associated with liberal politics in the United States since the 1960s (Buttel and Flinn 1978; Colarelli 2002). The typical modern conservative stance seems to be that environmentalism is alarmist quackery standing in the way of jobs, energy, and good business. Considering this climate, a wrench flew into the works of environmental discourse in 1999 with a book that urges conservatives to reclaim their place as the true environmentalists and save nature from the hands of supposed liberal pseudoscience.

My research will be a test of one aspect of this new conservative environmental theory of Peter Huber, author of *Hard Green: A Conservative Manifesto: Saving the Environment from the Environmentalists.* One of Huber's major assertions is that there is a positive relationship between wealth and environmental conservation (1999). This is an interesting position because it is both supported and undermined by various theories from environmental science and social science. While standard environmental science implicates affluence in the degradation of the environment (Collins 2002; Foster 1999; Gale and Mendez 1998; Gore 2000), other voices assert that wealth can be beneficial and even necessary for ecological well-being (Grossman and Krueger 1995; Sheehan 2000).

Huber assigns the effect of wealth to both individual and aggregate causes, touting the rich man's desire to pour money into nature and the rich country's desire to become land-efficient. The focus of my research will be to empirically test this aspect of Huber's theory using secondary data analysis on both individual and national levels.

A peculiarity about Peter Huber's stance is that it is based on pure conservationism, hailing from the days of Theodore Roosevelt, the father of our national parks. Huber's brand of environmentalism is "hard green," which means that it is concerned solely with the conservation of nature and land. It is not concerned whatsoever with "soft green" issues such as global warming, ozone depletion, acid rain, genetic erosion, or pesticide runoff. While there is a rather weighty opinion from the natural sciences that such soft green issues do exist, that is a debate far beyond the scope of this paper. Therefore I will treat Huber's theory in the hard green context in which it was intended, focusing on the role of wealth in conservationist terms.

Huber's book *Hard Green* is a purely ideological treatise, based only indirectly on research and history. This paper, therefore, is not a challenge against existing research but rather an initial attempt to operationalize and test a rather imprecisely formulated theory. It is also not a test of the validity of the conservationist stance itself. I will simply try to create a starting point from which we can approach the true relationship between wealth and conservation.

1.2 Statement of the Problem

While wealth is generally considered to be related to human effects on the environment, there are currently no studies which empirically test the nature of the relationship. The literature is limited to the connection between wealth and environmental attitudes, not actual environmental effects. Therefore a study testing the effect of wealth on actual environmental outcomes is unprecedented, and perhaps sorely overdue.

The fact that this subject remains untested is troubling due to its possible policy implications. Does debt among developing nations, for example, lead to ecosystem disturbance, and if so would forgiving that debt ameliorate the problem? Does prosperity breed environmentalism? Is capitalism killing nature? Do tax breaks for the rich ever actually trickle into the forests? Is developing a strong economy the best thing for the environment in the long run? We cannot conscientiously develop a good society without knowing the answers to these questions, and that in itself is an important reason for taking up this line of inquiry.

Chapter 2: Review of the Literature

2.1 Introduction

The industrial revolution brought about great changes in the forms of our technology, the structure and range of our economy, and our effects on the natural environment of the world. Economic growth exploded, and despite a quintupling of the world population since 1820, per capita income grew from $650 to over $5000 today (Firebaugh 2000). But as new modes of production ushered in greater wealth, they also heralded a period of widening income inequality across the globe and new dangers to the natural environment. J.R. McNeill (2000) refers to our current form of energy and technology as the "motown cluster" which is characterized by the heavy use of fossil fuels, electricity, cars, planes, assembly lines, chemicals, plastics and fertilizers, all forms of energy and technology that are held responsible for many environmental problems. McNeill reminds us, though, that "technology... merely modified the consequences of social forces" (2000:306). The following is a brief review of how social forces, and wealth in particular, relate to environmental well-being.

2.2 The IPAT Formula

A debate stirred in the early 1970's concerning whether population size or production technology were more damaging to the environment (York, Rosa, and Dietz 2002). Paul Ehrlich and John Holdren made the case that population growth is the most damaging factor, noting the exponential nature of fertility (Ehrlich 1968; Ehrlich and Holdren 1971; Ehrlich and Holdren 1972). On the other side, Barry Commoner insisted that population growth could not account for the ecological damage wrought since World War II in the United States, and that the effects of modern technology are far more important to consider (Commoner 1971; Commoner 1972; Commoner, Corr, and Stamler 1971). Ehrlich and Holdren (1971) took it upon themselves to construct a formula to take into account the effects of each factor and measure the total environmental impact. Interestingly, while each was arguing for the importance of one factor over the others, the

formula they developed to test their theories is a function which undermines any monocausal explanation of environmental impact.

This equation for calculating environmental impact (I) is the product of the effects of population (P), affluence (A), and technology (T), or $I=P\cdot A\cdot T$. Affluence is measured as per capita consumption or production of material resources (capital stock/person x throughput/capital stock). Technology is measured as the environmental damage done per unit of energy used to produce that which is consumed, i.e. the material throughput (energy/throughput x environmental impact/energy) (Foster 1999:30; York, Rosa, and Dietz 2002:22). The environmental impact of affluence and technology combined far outweighs the effect of population (Foster 1999; Preston 1996), but at the same time there is a negative covariance between affluence and technology (Preston 1996), meaning that more affluent countries tend to use technologies that are less polluting and vice versa. While many criticize this formula as being too simplistic, there is widespread agreement that it covers the most important causes of environmental degradation (Dietz and Rosa 1994; Dunlap 1994).

There is plasticity in the IPAT formula, meaning that there are certain effects that are more closely tied to one factor than the others (York, Rosa, and Dietz 2002). For example, the emission of chlorofluorocarbons (CFCs) is associated strongly with poor technology but only tenuously with population or affluence; the effects of agriculture, though, are most closely related to population size; and energy consumption and carbon emissions are most strongly tied to affluence. While people in the United States consume only 1.8 times the calories of people in Bangladesh, they consume 121 times as much energy (York, Rosa, and Dietz 2002). It is tempting to oversimplify the equation and say that affluence is the problem in developed countries and population is the problem in less developed countries, but in fact affluence and population play a role in both. While developed countries tend to have smaller populations, their high level of affluence amplifies the environmental impact of small changes in population. Similarly, while less

developed countries are less affluent, their larger or faster growing populations give greater weight to whatever affluence they may have. The impact of technology is the most difficult to predict. So far developments in technology have had more impact on pollutants than energy consumption, and replacing old technology is a slow process due to the costs of infrastructure and implementation-- it is limited by social and economic constraints (York, Rosa, and Dietz 2002).

According to Barry Commoner, "economic growth and development is always accompanied by increased use of natural resources and intensified environmental degradation" (1993:520). Rather than economic growth being the direct cause of environmental deterioration, though, he proposes that it is production technology that causes *both* economic development and environmental degradation. Population size then dictates the activity and development of production technology, with affluence being a mere side effect of the technology.

2.3 Population

As noted above, population growth is not the sole nor the most important cause of environmental degradation, but at the same time it is an important factor to consider as it magnifies the environmental effects of other variables. Wealth is strongly related to trends in population growth due to an effect known as the demographic transition (Kirk 1996). Population growth today is dramatically lower in affluent, industrialized nations such as the Netherlands compared to the sky-high population growth in impoverished nations such as India. The demographic transition theory explains this in terms of differential rates of fertility and mortality. All societies at their beginning are isolated and poor with typically high fertility rates but also high mortality rates, so that their population sizes remains stable. As the population develops resources and technology, though, its mortality rate suddenly decreases due to developments in medicine, hygiene, agriculture, crime control, and other improvements in general standards of living. This abrupt drop in mortality combined with the original high fertility rate produces a sudden

surge of population growth. At a zenith of growth, however, fertility decreases until it reaches equilibrium with low mortality, and growth restabilizes (Chesnais 1992). Theoretically all societies should eventually arrive at this final stage of low fertility and mortality rates.

Modern affluent nations with low population growth are at the final stage of the demographic transition, whereas poor nations with high population growth are trapped in the second stage, in which mortality has dropped but fertility remains high. While it is easy to identify the causes of mortality reduction, the causes of fertility reduction in affluent nations are less clear. Some possible explanations are that urbanization increases the cost of child rearing while limiting the economic productivity of children; that women in urban industrial societies tend to work more outside the home; and that advanced cultures favor egotistical self fulfillment over traditional family roles (Kirk 1996). The greatest individual factor known to limit fertility is the education of girls and women, which itself is strongly related to affluence (Fernando 1979). In the long run, general prosperity is considered to be the key to societal-level population stability.

2.4 Postmaterialism

In 1971 sociologist Ronald Inglehart published a study suggesting a widespread change in the values of new generations socialized in affluent, postindustrial, secure nations after World War II. Based on Maslow's theory of a hierarchy of needs, Inglehart argues that those who grow up in a long period of economic security take material needs for granted and set their desires on higher quality-of-life goals, a phenomenon he named "post-bourgeois values" but which has come to be known as "postmaterialism." Postmaterialist values came to be accepted as the cause of environmental concern, and it was assumed that only affluent nations and wealthy individuals would have the luxury to experience such concern (Brechin 1999; Dunlap and Mertig 1995).

In 1994 Brechin and Kempton challenged this theory by demonstrating that there is strong environmental concern within low-income countries where postmaterialist values were not expected. Their study examines Third World [sic] grass roots environmental organizations and two cross-national opinion surveys, one by Harris and Associates for the United Nations Environmental Programme, and the other by Gallup International Institute entitled *Health of the Planet*, or HOP (Brechin and Kempton 1994). Both surveys showed that environmental concern exists globally, and that in a majority of the significant survey items the citizens of poor nations actually expressed more environmental concern than those of wealthy nations.

This article became the center of an argument about the importance of postmaterialism to environmental concern. Most have replicated or supported Brechin and Kempton's work, e.g. Dunlap and Mertig (1995; 1997), Pierce (1997), and Klein and Potschke (2000). The only major criticism comes from Kidd and Lee (1997a; 1997b), who argue that Brechin and Kempton misapplied and overgeneralized Inglehart's theory, focusing too much on national aggregate features which obfuscate the various levels of postmaterialism within nations, as well as the correspondence between individual postmaterialism and environmental concern.

Diekmann and Franzen (1999), on a somewhat middle ground, found that the type of question matters a great deal when measuring environmental concern. Comparing their own data from the International Social Survey Program (ISSP) with those of Dunlap and Mertig (1995) from the Health of the Planet survey (HOP), they found that respondents in poorer nations express a greater degree of concern for the environment when asked to rate its importance alone, but respondents in wealthier nations give greater economic priority to environmental issues when asked to rank it among other problems. Additionally, when comparing wealthy and poor nations, the wealthy are more willing to donate money while the poor are more willing to volunteer time (Diekmann and Franzen 1999). When considered alone, the ISSP confirms the hypothesis that affluence is

necessary for postmaterialism, and yet the HOP refutes that hypothesis. When the two are considered together, though, it becomes apparent that postmaterialism and environmentalism may be expressed in different ways under different economic circumstances.

Abramson (1997) reevaluates Inglehart's original research and concludes that environmentalism can actually be either a materialist or postmaterialist value depending on the context. This does not imply, however, that postmaterialism is unrelated to environmentalism. Overall, the role of postmaterialism and wealth in the formation of environmental concern is complicated and uncertain, and remains a contentious area of research.

2.5 The Role of Capitalism

It is through the economic processes of consumption and production that we affect the world with our technologies, so that in a sense the economy is the root of both the production of wealth and the degradation of the environment. While there is evidence that every economic system of every major human civilization has led to environmental catastrophes (Brown 2001; Foster 1999), it is the current world system of capitalism that has attracted the greatest attention in terms of its environmental effects. In the words of John Bellamy Foster, capitalism has a destructive drive which leads to the "systematic degradation, transformation and absorption of all elements of existence outside of the system's own orbit" (1999:32). Lester Brown (2001) also attributes the destructiveness of capitalism to the fact that it is an economic system that considers the environment to be a part of the economy, rather than the economy a part of the environment, meaning that our economic decisions are made without regard for environmental well-being.

The environmental problems caused by capitalistic processes are considered to be externalities. Externalities are the non-market side effects of market activities-- they can be either good or bad, but the term generally refers to negative externalities (Brook

2001). Industrial pollution, deforestation, and genetic erosion are some examples of environmentally-related negative externalities. Private businesses benefit from the fact that the monetary consequences of externalities are absorbed by the public. For example, deforestation caused by lumber companies inhibits the transfer of rainfall inland, bringing about floods in some areas and droughts in others (McNeill 2000). The taxes and personal losses of citizens spent in the face of these hardships are external to the market but realistically can be considered a subsidy to the companies that benefited from the lumber (Moore 2000). The capitalist market benefits by being absolved of the costs and consequences of its adverse activities.

One of the tendencies of capitalism that Marx (1954) noted was that it is constantly in danger of self-destructing through overproduction. The ways in which it deals with overproductive tendencies are to 1) destroy productive forces, 2) find new markets, and 3) further exploit existing markets. The tendency to competitively seek out, create, and saturate new markets is of particular environmental importance because it means that capitalism deliberately encourages people to consume more than they need, requiring excessive materials, production processes and transportation systems to satisfy these superfluous needs. The point of capitalism is not to sustain life but to turn a profit, diminishing the importance of the welfare of mankind or the planet while at the same time encouraging consumptive and polluting activities.

Marx also identified capitalism's tendency to create antagonism between rural and urban centers, resulting in a "metabolic rift" depleting the fertility of the soil (Marx and Engels 1967; Moore 2000). The end of feudalism and the beginning of capitalism brought about a change in the division of labor between town and country, subordinating agriculture into a branch of urban industry subject to the laws of value with the primary imperative of increasing productivity. The institutions of specialization and monoculture in farming increased output but progressively depleted vital nutrients. At the same time the freed serfs became a surplus population in the cities dependent upon a large nutrient

flow from rural to urban areas, with no nutrient flow going back in return. Both the industrialization of the agricultural process and the export of almost all farm products to faraway destinations resulted in massive degradation of the soil. As time goes on the metabolic rift between city and country grows wider, so that nutrients cycle continuously away from their rural origins. Before the 20th century this problem was addressed by consuming more and more land, such as the expansion into the Americas to grow sugarcane and tobacco. The exhaustion of this strategy has led to a struggle to artificially ameliorate the damage to the soil through chemical fertilization and green revolution technologies (Foster 1999). Ultimately, capitalism's quest to maximize productivity and maintain its urban workforce leads to the systematic depletion of nutrients from the soil and the necessity to either break new soil or find artificial ways to secure nutrients.

Barry Commoner posits that there are four informal laws of ecology, each of which have a corresponding contradiction in capitalism (Foster 1999:118-124). First, in ecology "everything is connected to everything else," which is contradicted by the capitalist tenet that "the only lasting connection between things is the cash nexus." This reflects the notion of externalities mentioned above-- that capitalism does not count any consequences that do not directly affect the flow of capital, including environmental damage. The second law of ecology is that "everything must go somewhere," whereas in capitalism "it doesn't matter where something goes unless it re-enters the circuit of capital," another expression of externalities. The third law of ecology states that "nature knows best," meaning that major man-made changes are generally detrimental to natural systems. The capitalist analogue is that "the self-regulating market knows best," meaning that there is a cybernetic relationship between production and demand, but without regard for natural resource consumption or ecological disruption. The fourth law of ecology is that "nothing comes from nothing," which is contradicted by the capitalist stance that "nature's bounty is a free gift to the property owner." Whether or not the wealthy maintain environmentalist values is a moot point if their means of achieving wealth are damaging to the environment (Brown 2001; Foster 1999; McNeill 2000).

After having made a point of the destructiveness of capitalism, it is also important to note that other economic systems have proven to be just as damaging. Ancient Rome, which based its economy largely on slave labor, suffered from toxic heavy metals in the air and water (Foster 1999). The former Soviet Union, with its resolutely communist aspirations, dried up the Aral Sea and saw the meltdown of Chernobyl, some of the most infamous environmental blunders of our time (McNeill 2000). The only reason to point fingers at capitalism is that it is the foundation of the current world economy and the means to wealth. The processes and side effects of capitalism are specifically relevant to a modern conception of the relationship between wealth and conservation.

2.6 Globalization and World Systems Theory

While there has always been widespread trade around the world, the rise of capitalism changed the relationships among nations and gave impetus to the search for new markets and materials. World systems theory conceives of the modern world as a system characterized by a "multicultural territorial division of labor in which the production and exchange of basic goods and raw materials is necessary for the everyday life of its inhabitants" (Wallerstein 1974, as cited in Chase-Dunn and Grimes 1995:4). The system is divided into nations which are categorized as core, peripheral, or semi-peripheral based on their economic standings and levels of industrialization. Core nations are the most industrially developed, powerful and affluent. One of their major roles in the world system is to exploit the peripheral nations, which are generally poor, less industrially developed, and structurally constrained from escaping their poverty. A minority of countries are in the semiperiphery, having features of both core and peripheral countries, and functioning as intermediaries in core-peripheral networks (Chase-Dunn and Grimes 1995).

The environmental significance of this situation is that core countries exploit the natural resources of peripheral and semi-peripheral countries, leaving behind pollution,

scarcity, genetic erosion, deforestation and desertification in addition to global environmental effects (Foster 1999; McNeill 2000). In this way, wealthy nations may protect their own local environments by destroying others'. This is an important point to consider when measuring the "greenness" of a country-- whether and how to measure environmental effects across borders.

Modern core-peripheral relationships between countries originated in the 16th century with the embarkation of Europe's vast exploration of the world, particularly that of Portugal, England, and the Netherlands, resulting in the colonization of many places in the Americas, Asia, and Africa. Cecil Rhodes, the founder of Rhodesia, summed up the British motivation for imperialism thus: "We must find new lands from which we can easily obtain raw materials and at the same time exploit the cheap slave labour that is available from the natives of the colonies. The colonies would also provide a dumping ground for the surplus goods produced in our factories" (Foster 1999:87-88). His statement exemplifies the feeding and dumping behaviors typical of core nations.

The first environmentally-related consequences of imperialism were due to commercial and scientific interest in tropical crops and plant life, leading to the proliferation of monoculture and genetic erosion, and eventual soil nutrient depletion. The effect of soil nutrient depletion was particularly pronounced in America, where tobacco farmers had to constantly seek new soil farther and farther west, even leading them to infiltrate and raze Native territories in search of fertile ground (Foster 1999).

Imperialism also led to the disruption of native agricultural techniques which were habituated to local soil types. The land in Northern Europe is highly resistant to erosion due to its heavy consistency, low slopes and mild rainfall. When Europeans colonized new lands they dismissed local farming techniques and instituted their own methods. This triggered massive soil erosion in many areas due to the lighter soil, steeper slopes and heavier rainfall of more equatorial climates (McNeill 2000).

Just as environmental racism ravages the health and lives of relatively powerless and impoverished minorities in the United States (Foster 1999), a type of global environmental racism destroys the powerless and impoverished nations to the benefit of richer countries and multinational corporations. While the world's former imperialistic powers have officially given up claims to most of their colonies, the economic relationships remain from those bonds and do not show any sign of reaching an equitable resolution (Foster 1999).

2.7 The Hard Green Philosophy

In *Hard Green*, Peter Huber (1999) presents a conservative philosophy which emphasizes the conservation of wilderness and denies the harmfulness of "soft green" micro-level, invisible problems such as global warming and ozone depletion, or problems based on limits such as fuel scarcity and waste disposal. While most soft greens fear a fate in which humans can no longer survive, hard greens only fear that humans will come to live in a world devoid of the beauty of nature. Considering that there is a lack of consensus among scientists about the nature of environmental problems (Lomborg 2001; Lovelock 1979), Huber's denial of soft green issues is not entirely without support, though certainly outside of the mainstream.

Since the hard green discourse emphasizes saving green (i.e. nature), its object is simply to keep human activity off the land as much as possible. In this sense, the solution to saving the environment is to develop the technology to live in the *third dimension*. This means, for example, consolidating our housing into skyscrapers rather than suburban sprawl, and digging deep in the ground for fuel rather than laying waste to acreage for wind farms. It means engineering the most efficient agricultural techniques and breeding the most hardy crops to keep farm area to a minimum. In general, it means using our ingenuity and technology to leave the land intact as much as possible.

Huber asserts that wealth is the key to realizing the hard green mission. Wealthy nations have the resources to develop and implement green technology, and wealthy individuals have the resources and inclination to pour their personal wealth into green. His arguments suggest that wealth is both necessary and sufficient to conserve green. Wealth is *necessary* because those who are struggling economically are not in a position to conserve green. For example, it is starvation and poverty that lead to slash and burn agriculture. This argument is fairly common and follows from the postmaterialist and hierarchy-of-needs literature. The more interesting part of Huber's argument is that wealth is a *sufficient* condition for green behavior. He believes that wealthy nations inevitably use their wealth to develop and implement green technology and policy, and that wealthy individuals inevitably pour their wealth into environmental conservation. In fact, he says that the money "has nowhere else to go" (Huber 1999:150). This idea that wealth is a direct, sufficient route to green behavior will be the primary object of my analysis.

There is scarce other literature that treats environmental problems in the purely conservationist sense that Huber uses. Environmental science as a whole is squarely in the soft green camp, if only because it would not deny the usefulness of science in evaluating the state of the world. The reader should therefore keep in mind that the existing literature may not be directly relevant to Huber's particular environmental framework, which bases the value of nature on beauty rather than its inherent worth or necessity for mankind's survival.

From Huber's perspective, wealth is the key to the preservation of nature. While poverty is certainly not the answer to our ecological problems, the evidence surrounding the IPAT formula, capitalism, and globalization seems to deny the possibility of wealth itself playing a role in environmental health, while the case for affluent postmaterialism is also questionable. The only thing wealth seems to be good for is controlling population growth, and interestingly enough Huber doesn't see population control as a necessity.

While he believes it would be easier to conserve green with fewer people, he also believes that human ingenuity can allow us to survive prosperously with any number of people. The only evidence in his favor is therefore disregarded as superfluous. Overall, Huber's belief in the positive environmental effects of wealth goes against almost all scientific and historical evidence on the subject, and I do not expect my own research to find otherwise.

Chapter 3: Hypotheses, Data, and Methods

3.1 Hypotheses

The object of my research will be to test Peter Huber's conservative environmental theory that wealthy nations and individuals use their wealth to conserve the environment. I will test the following six hypotheses, the first concerning national-level wealth and land use, and the second concerning changes in nations' land use over time:

> **Hypothesis 1**: Current Gross National Income per capita will be negatively related to ecological footprint per capita;
> **Hypothesis 2**: Current Gross National Income per capita will be negatively related to growth of ecological footprint per capita from 1997-1999.

Based on the existing literature, I expect to find no significant support for either hypothesis. If hypothesis 1 is supported then it will mean that more affluent nations are indeed more land efficient as Huber suggests. If hypothesis 2 is supported then it means that wealthy nations are reducing their use of land per capita over time and/or poor nations are increasing their use of land per capita over time, trends which would follow from Huber's theory.

The third hypothesis concerns individual-level wealth and its relationship to environmental conservation:

> **Hypothesis 3**: Individual income will be positively related to donating to environmental groups.

If hypothesis 3 is supported then it will provide circumstantial evidence for Huber's thesis that the wealthy pour their money into green. I say it would be circumstantial evidence because it would not necessarily demonstrate that wealth *causes* donation, but that it is simply associated with donation.

In addition to these basic tests of Huber's theory, I will test to see if wealth is still a significant predictor of greenness on the individual level when political views, environmental concerns, and postmaterialism are taken into account. My fourth, fifth, and sixth hypotheses will then be:

Hypothesis 4: Income will remain a significant predictor of donating to environmental groups while accounting for political views.

Hypothesis 5: Income will remain a significant predictor of donating to environmental groups while accounting for environmental concern.

Hypothesis 6: Income will remain a significant predictor of donating to environmental groups while accounting for postmaterialism.

I am testing these hypotheses because it is possible that wealth might be a *selection* factor rather than a *causal* factor for determining donation behavior. For example, there may be an interaction such that donation behavior might actually be *caused* by liberal political orientation rather than high income, but high income makes it easier for the liberal person to donate. Hypotheses 4, 5, and 6 are an attempt to eliminate the selection effect and see how wealth compares to other factors that may be related to donation. If hypotheses 4 and 5 are supported, then it means that wealth is a strong predictor of donating regardless of political orientation or general environmental concern, supporting Huber's theory. Hypothesis 6 is more complicated because Huber believes that wealth causes a form of postmaterialism, which then causes green spending. Nevertheless, if wealth loses its significance as a predictor of donating money when postmaterialism is introduced, it may demonstrate that wealth is not a necessary condition for postmaterialism or spending money on green.

3.2 Data

3.2.1 Dependent Variable: National Greenness: The Ecological Footprint

I will measure the greenness of nations with the ecological footprint, an index used by Redefining Progress and the World Wide Fund for Nature (WWF) to measure the amount of area a country uses to support itself in global acres per capita (Redefining Progress, 2002). A global acre is an acre of average biological productivity. The ecological footprint is the total area per capita that a country requires to produce the food and fibers it consumes, to sustain its level of energy consumption, and to accommodate its infrastructure. This includes cropland, grazing land, forest products, fishing grounds, and energy needs. This measure is relevant to Huber's notion of green because it converts all consumptive activities into the area of land required to sustain them, and Huber's primary concern is the surface area of the earth used to support man's activities. Huber asserts that wealthy nations will utilize technology to move into the third dimension off the land, and therefore they should use less area per capita than poor nations. If Huber's theory holds up, the more wealthy and technologically advance a nation is, the smaller its ecological footprint per capita should be.

The Ecological Footprint of Nations is a publication of Redefining Progress, a nonprofit organization dedicated to developing tools and policies to reorient the economy to value people and nature (Wackernagel, Monfreda, and Deumling 2002). The publication is an annual update of ecological footprint information since 1997. The most recent issue became available in November of 2002, with data entries for 146 nations, though it should be noted that their calculations are still based on data from 1999. Ecological footprints are calculated based on data from United Nations agencies and the Intergovernmental Panel on Climate Change. For hundreds of categories such as cereals, coal, and cotton, the total amount consumed in a country is divided by the product's ecological productivity or yield, translating resource use into global acres. Imports and exports are added and subtracted respectively to account for area used in one country by

another. In my calculations I will actually use ecological footprint per capita to make different nations comparable regardless of population size.

For my analysis of change in ecological footprint size I will use data from the Ecological Footprint of Nations report from the year 1997 as a comparison to the 1999 data. This is a very short time span, so it may not be truly representative of the changes occurring among nations' land consumption, but unfortunately there are no older or more recent data available. I will calculate change in ecological footprint as a percent increase, i.e. [(1999-1997)/1997]*100. Using a percent change rather than absolute change is more sensitive to the fact that a certain amount of change could have different impacts in different circumstances. A change from 16 to 15 acres is less dramatic than a change from 4 to 3 acres, and probably less indicative of technology at work.

A great advantage to using the ecological footprint is that it is a measure of consumption rather than production. A country's footprint is measured by what it consumes and imports rather than what it produces and exports. For example, when the United States imports cotton from Egypt, the land used to grow the cotton is counted in the total footprint for the United States rather than Egypt. This is important because it controls for the effect of core countries exploiting the land in peripheral countries. Consumption-based measures are also commonly equated with affluence for IPAT calculations (York, Rosa, and Dietz 2002).

A disadvantage to using the ecological footprint in a hard green context is that it measures some items with which Huber would disagree. For example, carbon dioxide emissions are converted into global acres by estimating the biologically productive area that would be needed to capture enough carbon emissions to avoid an increase in atmospheric CO_2 (Redefining Progress, 2002). Huber does not believe in global warming; he is simply concerned with preserving natural spaces, so the level of atmospheric CO_2 would never enter into his own reckoning of human land use.

Likewise, he would not consider the theoretical area needed to sustain fishing yields to be relevant to the hard green mission. Overall, though, most of what goes into the calculation of the ecological footprint is a fair representation of the actual human land use with which Huber is concerned.

3.2.2 Independent Variable: National Wealth: Gross National Income

I will measure the wealth of nations as gross national income (GNI) per capita, which measures the income claimed by all residents of a country, plus income from its citizens abroad, and minus income earned by resident foreigners (World Bank 2001; Central Intelligence Agency 2002). I will use GNI per capita rather than total GNI in order to account for the different population sizes in different countries. GNI has recently come to replace gross national product (GNP) as a primary indicator of national wealth. GNI is essentially the same as GNP, but it is based on the more recent 1993 System of National Accounts (SNA) guidelines, whereas GNP is based on the 1968 SNA guidelines (World Bank 2001). The data will come from the World Bank's most recent public set of World Development Indicators for the year 2000, and I will divide the actual dollar values by 1000 to make the analyses easier to interpret.

The World Bank provides GNI figures derived from two different methods-- the Atlas method and the Purchasing Power Parity (PPP) method (World Bank 2002). The Atlas method presents GNI in US dollars based on official exchange rates, whereas the PPP method gives GNI in international dollars, which have the same actual purchasing power within each country as US dollars have in the United States. I will use the GNI data based on PPP because it is a better indicator of economic strength and well-being between countries (Central Intelligence Agency 2002).

Gross national income is a good variable for this research because, like the ecological footprint, it looks at the resources that actually benefit a country regardless of actual physical borders. Gross domestic product (GDP) is more commonly used than

GNI, but it can be a misleading measure of economic strength because it simply measures resident income, including income that will actually leave the country, and excluding income that is coming in from abroad. GNI is preferable because it reveals how much income actually "belongs" to each country, which is useful when considering the potential for each country to develop technologically.

A major drawback to using GNI as an indicator of national wealth is that it obfuscates the distribution of income within nations. The GNI is a mean, which is a measure of central tendency that is vulnerable to being strongly influenced by outliers. It is possible, for example, for there to be a few extremely rich families in a country that is largely destitute. In this case the GNI would be higher than the median income. Nevertheless, Huber's theory does not include a specific mechanism for national wealth to lead to conservation, and therefore I cannot discount the possibility that a few rich families might constitute a wealthy nation for his purposes. GNI per capita is certainly not a perfect measure of national wealth, but it is the best recent estimate available for a large number of countries.

3.2.3 Dependent Variable: Individual Greenness: Donating to Environmental Groups

Huber avers that the wealthy man "pours his wealth into green" (1999:150), but he is vague about how the money will be spent. He suggests that the wealthy would buy land, but questions remain unanswered. Would the land be part of a private estate or part of a public reserve? Would the wealthy man buy it alone or as part of a cooperative effort? Are these green-buyers supposed to be conservative hard green supporters or anyone with wealth and a desire for nature's beauty?

Due to the ambiguity of Huber's claim and the limited availability of good data, I feel it is acceptable to measure individual greenness as whether or not the respondent has donated money to an environmental group. There are numerous environmental groups which fit Huber's mission, and donating to such groups is a very accessible and effective

way to practice conservation. Finding data on donation rather than private land ownership is also much more feasible and reliable, although one drawback to my measurement is that it will be based on the respondents' own reporting of whether or not they donated. Reported donating and actual donating are not necessarily the same due to the influence of social desirability, so the reader should keep in mind that rates of reported donating may be somewhat inflated compared to reality.

One other drawback to this type of measurement is that there are many environmental groups which are *not* dedicated to land conservation. Huber would not consider a clean-air campaign to be green at all. Nevertheless, the basic premise is that these people are spending money on nature, and this seems to be the best data available to test that. I will take items from the General Social Survey (GSS) (National Opinion Research Center 2000) and the World Values Survey (WVS) (Inglehart 1999) in order to measure donation behavior both within the United States and across different countries.

The item I will take from the GSS was limited to the years 1993 and 1994, among a module of other environmental questions. The question reads as follows:

> GRNMONEY 949: In the last five years, have you… B... given money to an environmental group?
> Yes, I have; No, I have not; Don't know; No answer; Not applicable (National Opinion Research Center 2000).

This will be recoded as a dummy variable with Yes = 1, No = 0, and the remaining answers as missing. The 1993 sample size is 1606, and the 1994 sample size is 1386. As mentioned above, this is only a crude measure of Huber's notion of individual green spending.

The GSS is administered by the National Opinion Research Center at the University of Chicago, a non-profit academic survey research facility. Its target

population is all resident adults in the United States, i.e. those who are at least 18 years of age and not institutionalized. Interviews are conducted face to face in the home of the resident. In 1993 a split sample transition design was used so that approximately one half of the sample came from the 1980 frame, and the other from the 1990 frame. The 1994 sample was chosen based entirely on the 1990 frame. Both 1980 and 1990 frames are three-stage full-probability sampling procedures (National Opinion Research Center 2000).

The WVS item I will use comes from the Third Wave, 1995-1998 (Inglehart 1999); the question reads:

> v.46: Which, if any, of these things have you done in the last 12 months out of concern for the environment? Have you contributed to an environmental organization?
> Have Done; Have Not; Don't Know (Inglehart 1999).

As in the GSS, this item will be coded as a dummy variable with 1=Have done, 0=Have not, and Don't Know as missing. This question is more restrictive than the GSS item, covering the last 12 months rather than five years. The Third Wave includes 53 countries, with a total sample size of 77,737 (Inglehart 1999). Sampling procedures vary by country.

The World Values Survey (WVS) is a cooperative effort of many organizations around the world, each conducting the survey within their own country and then reporting results to the organizer at the University of Michigan (Inglehart 1999). The sample of countries is diverse, including societies with per capita incomes as low as $300 to as high as $30,000. Due to the fact that not all countries are represented, this is not meant to be a generalizable representation of all nations but rather an exploration of the possible differences among different types of countries.

3.2.4 Independent Variable: Individual Wealth: Income

Huber's definition of wealth is vague. His reasoning for the wealthy man's green spending seems to be based on a postmaterialist or hierarchy-of-needs model, in which one's bodily needs must be met before higher-order desires become important. If this is the case, being "wealthy" does not necessarily mean being filthy rich, but simply being comfortable enough to have the resources to support one's desire for a higher quality of life. Huber also does not clarify whether wealth should be a discrete or continuous variable-- i.e. are people either "wealthy" or "unwealthy," or are there varying degrees of wealth? For my purposes I am going to assume that wealth is a continuum, and that Huber is not just talking about the wildly rich.

The GSS and WVS do not measure wealth per se, so I will use income as an approximation of wealth. This is reasonable considering that Huber does not specify exactly what he means by wealth, except that the wealthy man's "basic Malthusian desires are satiated" (1999:149). The GSS reports actual income in varying increments, while the WVS measures income in deciles calculated for each different country.

I will use the GSS item RINCOM91 47:

> Respondent's income on the 1991-1996 surveys. Did you earn any income from (OCCUPATION DESCRIBED IN Q.2.) for last year - [1990/92/03]- fall? That is, before taxes or other deductions. Just tell me the letter. HAND CARD J. (National Opinion Research Center 2000).

Income is coded as 1-21 which stand for increments from under $1000 to $75,000 or over. The categories represent very uneven value intervals, so I will combine some of the categories to even them out. The first four categories will be combined to represent $0 to $4999, the next four will combine to make $5000 to $9999, the next two for $10000 to $14999, the next two for $15000 to $19999, the next two for $20000 to $24999, and the rest will retain their original intervals. Finally, instead of coding the intervals as

levels 1-12, they will be recoded as the actual dollar values of the midpoints of each income range and then divided by 1000 for easier interpretation, making this data ratio-level rather than ordinal-level, although it will still only be an estimate of the respondent's actual income. The remaining Refused, Don't Know, No Answer, and Not Applicable will become missing.

For the highest category, $75000 and above, I will estimate the midpoint by using 1990 census data which indicate that there were 4704808 households in the $75000 to $99999 bracket and 4035799 households in the $100000 and above bracket (Bureau of the Census 1990). When these are combined this places the median household, number 4370304, in the $75000 to $99999 bracket. I will estimate the income of this household by simply finding the percentile of the 4370304th household within the total number of households in the bracket, and then applying that same percentile to the range of income in the bracket, thus: median of top income category = 75000 + (99999 - 75000) * (4370304 / 4704808), giving an estimate of $98222, which will be coded as 98.

Due to the fact that the WVS is an international survey and deals with different currencies and economies, income is measured by dividing the income distribution of each country into deciles and identifying into which decile the respondent falls. The question reads as follows:

> v.236 Here is a scale of incomes. We would like to know in what group your household is, counting all wages, salaries, pensions, and other incomes that come in. Just give the letter of the group your household falls into, before taxes and other deductions (Inglehart 1999).

The answers were originally coded as 1 through 10, with No Answer as missing. I will subtract one from each category so that the range is 0 through 9 for the sake of interpreting the results, and I will consider the scale to be ratio-level data for the sake of my analysis.

3.2.5 Independent Variable: Individual Political Views

I will test two other variables from the GSS to see how much they account for donation behavior compared to income in the United States. The first is a measure of political ideology. As noted in the introduction, modern environmentalism has been associated with liberal political views. It follows that a cause of donation behavior might be liberal political ideology. Huber insists that wealth itself is enough to lead to green spending, but I suspect that liberalism would be a better predictor of donating, and there might also be an interaction going on in which wealth makes liberals more likely to spend money on the environment, whereas wealth would have less of an effect on conservatives.

My measure of political views will be the GSS item POLVIEWS 65:

> We hear a lot of talk these days about liberals and conservatives. I'm going to show you a seven-point scale on which the political views that people might hold are arranged from extremely liberal--point 1--to extremely conservative-- point 7. Where would you place yourself on this scale?
>
> HAND CARD K. 1. Extremely liberal, 2. Liberal, 3. Slightly Liberal, 4. Moderate, 5. Slightly Conservative, 6. Conservative, 7. Extremely conservative (National Opinion Research Center 2000).

I will recode this variable in reverse, making a scale with "extremely conservative" worth 0 and "extremely liberal" worth 6, which will actually make this a measure of liberalism. I will also treat this as ratio-level data.

3.2.6 Independent Variable: Individual Environmental Concern

The second control variable will be an index of traditional "soft" environmental concern. While liberalism is an indirect measure of environmental attitudes, this index will be an actual estimate of the respondents' concern about environmental problems.

These are all "soft" problems with which Huber in unconcerned, and which should not matter in his theory of wealthy green spending. If the significance of income diminishes when environmental concern is also considered as a predictor of donating, or if there is an interaction in which wealth only increases donating among high levels of environmental concern and not low levels, then it will call into question the role of wealth as a cause of green-spending.

I will construct the index of environmental concern from the answers to these six questions:

CARSGEN 940. A. In general, do you think that air pollution caused by cars is...

NUKEGEN 941. A. In general, do you think that nuclear power stations are...

INDUSGEN 942. A. In general, do you think that air pollution caused by industry is...

CHEMGEN 943. A. In general, do you think that pesticides and chemicals used in farming are...

WATERGEN 944. A. In general, do you think that pollution of America's rivers, lakes, and streams is...

TEMPGEN 945. A. In general, do you think that a rise in the world's temperature caused by the `greenhouse effect', is...

... 1. Extremely dangerous for the environment, 2. Very dangerous, 3. Somewhat dangerous, 4. Not very dangerous, 5. Not dangerous at all for the environment, Can't choose, No Answer, Not Applicable (National Opinion Research Center 2000).

I will use an index of environmental concern called envconc which I created using these six questions. A factor analysis for the six items reveals a single component, and the value of Alpha for them is .7775. When calculating the index, all of its values started at 0, and then I added 1 for every time the respondent answered "Not very dangerous" for

each of the six questions. Then I added 2 for "Somewhat dangerous," 3 for "Very dangerous," and 4 for "Extremely dangerous." "Can't choose," "No Answer," and "Not Applicable" were combined into a missing values category. The response "Not dangerous at all" simply added 0 to the index. The lowest possible score is 0, for those who answered "Not dangerous at all" for all six questions, and the highest possible score is 24, for those who answered "Extremely dangerous" for all six questions. Higher scores are therefore indicative of greater environmental concern. This procedure eliminated half of the original sample from 1993 and 1994, but there are still 2280 respondents remaining.

3.2.7 Independent Variable: Individual Postmaterialism

Huber does not explicitly use the term postmaterialism in his work, but his theory does seem to rest on the concept. He believes that the man who is wealthy enough to satiate his immediate material desires comes to wish for a higher quality of life, and therefore will pour his wealth into green. This is basically in line with the postmaterialist argument described in the review of the literature above, and therefore I will use an index of postmaterialism as part of my analysis.

The index of postmaterialism will come from the 1995-1998 waves of the World Values Survey. The index is variable v1010MPM, coded from 0 to 5, rating from materialistic to postmaterialistic, which I will rename postmat. It was constructed by summing the number of postmaterialistic goals given first or second priority in the following three questions.

> Show Card FF
>
> There is a lot of talk these days about what the aims of this country should be for the next ten years. On this card are listed some of the goals which different people would give top priority. (a) Would you please say which one of these you, yourself, consider the most important? (b) And which would be the next most important?

v257(a)	v258(b)	
1	1	Maintaining a high level of economic growth
2	2	Making sure this country has strong defense forces
3	3	Seeing that people have more to say about how things are done at their jobs and in their communities
4	4	Trying to make our cities and countryside more beautiful
9	9	Don't know

Show Card GG

(a) If you had to choose, which one of the things on this card would you say is most important? (b) And which would be the next most important?

v259(a)	v260(b)	
1	1	Maintaining order in the nation
2	2	Giving people more to say in important government decisions
3	3	Fighting rising prices
4	4	Protecting freedom of speech
9	9	Don't know

Show Card HH

(a) Here is another list. In your opinion, which one of these is most important?

(b) And what would be the next most important?

v261(a)	v262(b)	
1	1	A stable economy
2	2	Progress toward a less impersonal and more humane society
3	3	Progress toward a society in which ideas count more than money
4	4	The fight against crime
9	9	Don't know

The postmaterialism index counts the following five goals towards the total score. These five goals were chosen for the index because they all had Postmaterialist polarity in all but one of the 43 countries surveyed in 1990 (Abramson and Inglehart 1995).

1. Seeing that people have more to say about how things are done at their jobs and in their communities
2. Giving people more say in important government decisions
3. Protecting freedom of speech

4. Progress toward a less impersonal and more humane society
5. Progress toward a society in which ideas count more than money.

This variable will be treated as ratio level data and left in its original form for my analysis.

3.2.8 Data Summary

I have identified ten variables above which will be used in my analysis. For the sake of simplicity I may refer to the variables by their mnemonic names listed in Table 3.1 below.

Table 3.1 Data Summary

Mnemonic	Label	Measures	Units	Sample N	Year	Data Type
ecofoot	Ecological Footprint per capita	national greenness	global acres	146	1999	ratio
ecochg	Change in ecological footprint per capita	increase in ecological footprint per capita	percent increase	48	1997, 1999	ratio
gnippp	Gross National Income per capita	national wealth	1000s of int'l dollars	168	2000	ratio
donate5	Reported donating to environmental groups (GSS)	individual greenness (past 5 years)	Yes/No	2158	1993-1994	nominal, dummy
donate1	Reported donating to environmental groups (WVS)	individual greenness (past year)	Yes/No	66854	1995-1998	nominal, dummy
ecoincom	Income (GSS)	individual wealth	1000s of US dollars	1882	1993-1994	ratio
incomdec	Income deciles (WVS)	individual wealth	deciles of national income range	65168	1995-1998	ratio
libviews	Scale of political ideology (GSS)	individual liberalism	Scale of 0-6	2729	1993-1994	ratio
envconc	Index of environmental concern (GSS)	individual concern about soft environmental problems	Score of 0-24	1853	1993-1994	ratio
postmat	Index of Materialism/ Postmaterialism (WVS)	individual postmaterialism	Score of 0-5	66665	1995-1998	ratio

3.3 Methods

The first hypothesis states that GNI per capita will be negatively related to ecological footprint per capita. Since both variables are ratio-level data I will run a linear regression to test for a significant slope between the independent variable gnippp and the dependent variable ecofoot.

ecofoot = a + b•gnippp

$H_0 = b \geq 0$
$H_1 = b < 0$
at $p<.05$

The second hypothesis is that current GNI per capita will be negatively related to growth of ecological footprint per capita from 1997-1999. I will test this with a linear regression with gnippp as the independent variable and ecochg as the dependent variable. This does not allow for changes in gnippp over the time period-- it is based on the assumption that the wealth of each nation was constant over the two year period.

ecochg = a + b•gnippp

$H_0 = b \geq 0$
$H_1 = b < 0$
at $p<.05$

The third hypothesis is that individual income is positively related to donating to environmental groups, for which I will analyze the GSS and WVS data sets separately. Income is the independent variable and donating to environmental groups is the dependent variable in both tests. I will test this hypothesis with logistic regressions since the dependent variables are dichotomous variables and the independent variables are continuous. For the first I will regress ecoincom on donate5 from the GSS data, and for the second I will regress incomdec on donate1 from the WVS data.

$\ln(\text{donate5}) = \alpha + \beta \bullet \text{ecoincom}$

$H_0 = \beta \leq 0$
$H_1 = \beta > 0$
at $p<.05$

$\ln(\text{donate1}) = \alpha + \beta \bullet \text{incomdec}$

$H_0 = \beta \leq 0$
$H_1 = \beta > 0$
at $p<.05$

The fourth hypothesis is that income will remain positively related to donation behavior while accounting for political views. To test this I will run another logistic regression with the GSS variables ecoincom and libviews as the independent variables, and donate5 as the dependent variable. In addition I will run the same analysis including an interaction term incomlib (ecoincom*libviews) to see if there is an interaction between ecoincom and libviews.

Model 1:
$\ln(\text{donate5}) = \alpha + \beta_1 \bullet \text{ecoincom} + \beta_2 \bullet \text{libviews}$

$H_0 = \beta_1 \leq 0$
$H_1 = \beta_1 > 0$
at $p<.05$

Model 2:
$\ln(\text{donate5}) = \alpha + \beta_1 \bullet \text{ecoincom} + \beta_2 \bullet \text{libviews} + \beta_3 \bullet \text{incomlib}$

$H_0 = \beta_3 \leq 0$
$H_1 = \beta_3 > 0$
at $p<.05$

The fifth hypothesis states that income will remain positively related to donation behavior while accounting for environmental concern. I will test this by running a logistic regression with the GSS variables ecoincom and envconc as the independent variables, and donate5 as the dependent variable. I will also check for an interaction between the two variables by including an interaction term incconc (ecoincom*envconc) in a second test.

Model 1:
$\ln(\text{donate5}) = \alpha + \beta_1 \bullet \text{ecoincom} + \beta_2 \bullet \text{envconc}$

$H_0 = \beta_1 \leq 0$
$H_1 = \beta_1 > 0$
at $p<.05$

Model 2:
$\ln(donate5) = \alpha + \beta_1 \bullet ecoincom + \beta_2 \bullet envconc + \beta_3 \bullet incconc$

$H_0 = \beta_3 \leq 0$
$H_1 = \beta_3 > 0$
at $p<.05$

The sixth hypothesis states that income will remain positively related to donation behavior while accounting for postmaterialism. I will test this by running a logistic regression with the WVS variables incomdec and postmat as the independent variables, and donate1 as the dependent variable. I will also test for an interaction by running a second test with an interaction term incmpm (incomdec*postmat).

Model 1:
$\ln(donate1) = \alpha + \beta_1 \bullet incomdec + \beta_2 \bullet postmat$

$H_0 = \beta_1 \leq 0$
$H_1 = \beta_1 > 0$
at $p<.05$

Model 2:
$\ln(donate1) = \alpha + \beta_1 \bullet incomdec + \beta_2 \bullet postmat + \beta_3 \bullet incmpm$

$H_0 = \beta_3 \leq 0$
$H_1 = \beta_3 > 0$
at $p<.05$

Chapter 4: Results, Discussion, and Conclusion

4.1 Results

I will summarize my results briefly before elaborating on the details. The models for hypotheses 1 and 2 show that there are actually positive relationships between ecological footprint and GNI per capita, and between growth in ecological footprint and GNI per capita. This preempted the need to test for a negative slope as indicated above, so I followed up with two-tailed tests on both models and found the positive relationships to be significant. Hypothesis 3 is supported by both the GSS and WVS data sets, demonstrating that income is directly related to reporting donating to environmental groups. The tests of hypotheses 4 and 5 both reject the null as well, meaning that income is a significant predictor of reported donation regardless of liberalism or environmental concern. There are also no interactions between income and liberalism or income and environmental concern when predicting donating. The test of hypothesis 6 shows that income and postmaterialism are both independently significant predictors of reporting donating to environmental groups, and there is also a significant positive interaction between the two variables.

Table 4.1 gives some brief descriptive statistics on each variable. Note that despite the convenience sampling method used for the national-level variables ecofoot, ecochg, and gnippp, the ranges and standard deviations for these variables are large, suggesting that the samples are representative of a diverse group of countries. Other noteworthy items from this table are the sample sizes from the World Values Survey variables incomdec, donate1, and postmat. The samples are extremely large, which will give their statistics very high power and sensitivity to small differences. Overall all of the variables appear to be suitable for these analyses.

Table 4.1 Descriptive Statistics for All Variables.

	Min	Max	Mean	Std Dev	Sample Size
ecofoot	1.2	25	6.235	5.209	146
ecochg	-46.43	34	-1.573	20.593	48
gnippp	.48	45.47	8.661	9.115	167
donate5	0	1	.627	.484	2158
donate1	0	1	.141	.348	66854
ecoincom	2.5	98.2	25.523	21.139	1882
incomdec	1	10	4.621	2.670	65168
libviews	0	6	3.19	1.515	2729
envconc	2	24	16.51	3.872	1853
postmat	0	5	1.97	1.25	66665

Table 4.2 shows the results of the test of hypothesis 1, and Figure 4.1 shows the regression model. In the regression of ecofoot on gnippp the slope is positive, automatically indicating a failure to reject the null of hypothesis 1, and therefore GNI per capita is not inversely related to ecological footprint. A two-tailed follow-up test reveals that in fact the opposite of hypothesis 1 is true-- that GNI per capita is significantly positively related to ecological footprint at $p<.001$. While the regression is heavily weighted at the low end of GNI and the error is not consistent, there is also no evidence at all of an inverse relationship that might question the significance of the

Table 4.2 Regression of Ecological Footprint on Gross National Income Per Capita (unstandardized coefficients; n = 135).

gnippp .510***

constant 2.287***

$R^2 = .757$

Two-tailed significance test:
*** $p < .001$

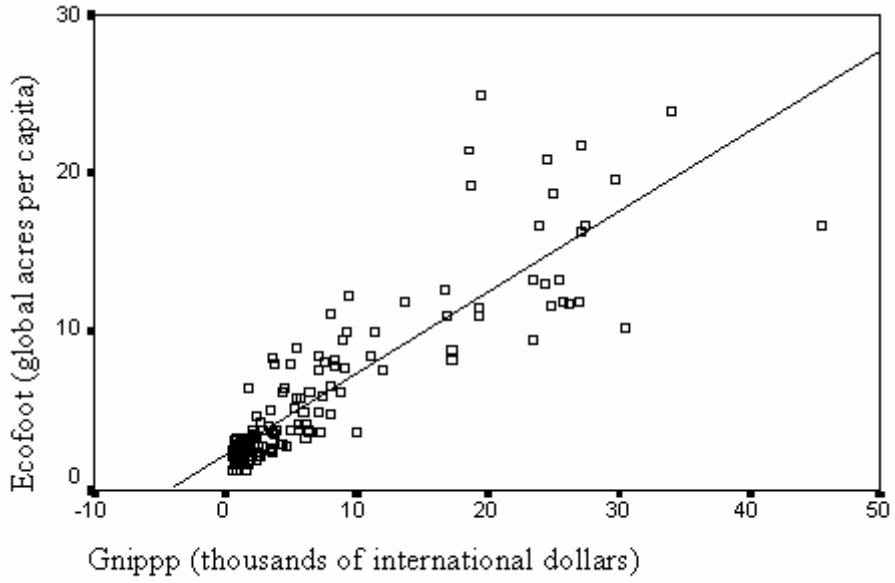

Figure 4.1 Regression of Ecological Footprint on GNI Per Capita

Table 4.3 shows the results of the test of hypothesis 2, and Figure 4.2 shows the regression model. Here the slope was also positive in the regression of ecochg on gnippp, so I automatically failed to reject the null of hypothesis 2, meaning that GNI per capita is not inversely related to growth of ecological footprint. In this case a two-tailed test also reveals that GNI per capita is significantly positively related to growth of ecological footprint at p<.01.

Table 4.3 Regression of Change in Ecological Footprint on Gross National Income Per Capita (unstandardized coefficients; n =47).

gnippp	.798**
constant	-13.053*

R^2 = .149

Two-tailed significance test:
* p < .05
** p < .01

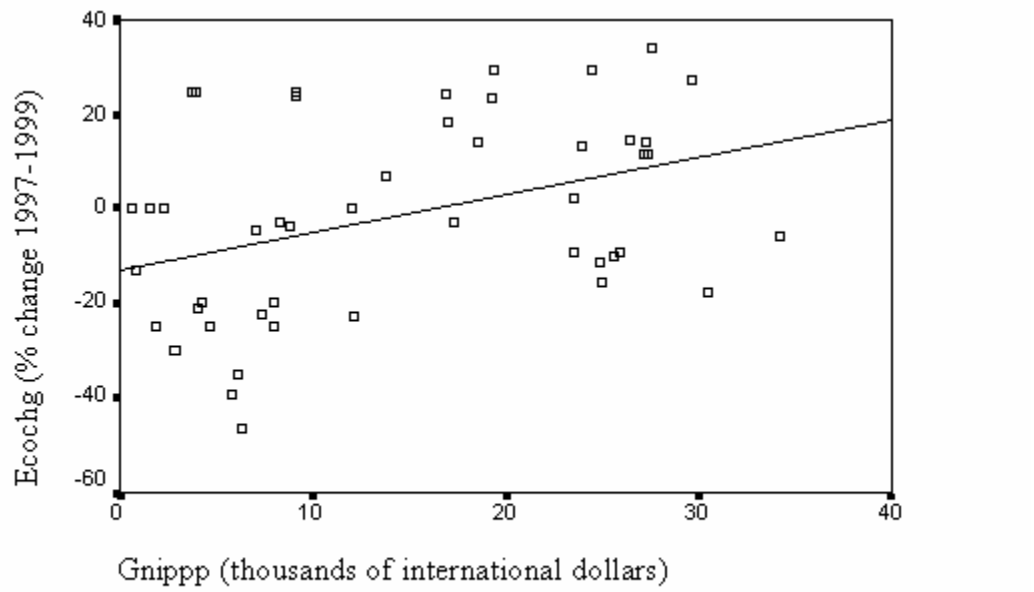

Figure 4.2 Regression of Change in Ecological Footprint on GNI Per Capita

Tables 4.4 and 4.5 show the results of the tests of hypothesis 3. Both tests support hypothesis 3, showing that income is a predictor of reported donating to environmental groups in both the GSS and WVS data sets at high levels of significance.

Table 4.4 Logistic Regression of Environmental Donating on Income (GSS data, n = 1458).

	Logit coefficient	Odds ratio
ecoincom	.020***	1.021***
constant	.032	1.032

One-tailed significance test:
*** $p < .001$

Table 4.5 Logistic Regression of Reported Environmental Donating on Income (WVS Data, n = 55684).

	Logit coefficient	Odds ratio
incomdec	.091***	1.095***
constant	-2.202***	.111***

One-tailed significance test:
*** p<.001

Table 4.6 shows the results of the test of hypothesis 4. Ecoincom remains a highly significant predictor of donate5 even while accounting for libviews, and libviews itself is not a significant predictor of donate5 when accounting for ecoincom. This finding rejects the null of hypothesis 4, meaning that income is still a significant predictor of reported donating to environmental groups while accounting for political views. In addition, there is no interaction occurring between income and political views.

Table 4.6 Logistic Regression of Reported Environmental Donating on Income and Liberalism (GSS Data, n=1436).

	Model 1		Model 2	
	Logit coefficient	Odds ratio	Logit coefficient	Odds ratio
ecoincom	.020***	1.020***	.014*	1.014*
libviews	.034	1.035	-.020	.980
incomlib	-----	-----	.002	1.002
constant	-.073	.930	.085	1.089

One-tailed significance test:
* p<.05
*** p<.001

Table 4.7 shows the results of the test of hypothesis 5. Ecoincom remains a highly significant predictor of donate5 even while accounting for envconc, and envconc itself is not a significant predictor of donate5 while accounting for ecoincom. This finding rejects the null of hypothesis 5, indicating that income is still a significant predictor of reported donating to environmental groups while accounting for environmental concern. There is also no interaction between income and environmental concern.

Table 4.7 Logistic Regression of Reported Environmental Donating on Income and Environmental Concern (GSS Data, n = 1218).

	Model 1		Model 2	
	Logit coefficient	Odds ratio	Logit coefficient	Odds ratio
ecoincom	.021***	1.021***	.003	1.003
envconc	-.007	.993	-.034	.967
incconc	-----	-----	.000	1.000
constant	.199	1.220	.640	1.896

One-tailed significance test:
*** p<.001

Table 4.8 shows the results of the test of hypothesis 6. Here incomdec remains a significant predictor of donate1 while accounting for postmat, but postmat is also a highly significant predictor while accounting for incomdec. That is, income and postmaterialism both have strong independent positive effects on reported donating to environmental groups. This supports hypothesis 6 since the effect of income is not explained by postmaterialism, but at the same time the effect of postmaterialism is not explained by income. There is also a significant positive interaction between the two variables, showing that the effect of postmaterialism increases as income increases, and vice versa.

Table 4.8 Logistic Regression of Reported Environmental Donating on Income and Postmaterialism (WVS Data, n = 52735).

	Model 1		Model 2	
	Logit coefficient	Odds ratio	Logit coefficient	Odds ratio
incomdec	.082***	1.085***	.068***	1.070***
postmat	.228***	1.256***	.201***	1.222***
incmpm	-----	-----	.006*	1.006*
constant	-2.625***	.072***	-2.567***	.077***

One-tailed significance test:
* p<.05
*** p<.001

4.2 Discussion

The analyses above suggest that Huber's theory is supported at the individual level but refuted at the national level. At the individual level income is directly related to donating money to environmental groups, and this relationship stands even when the effects of political views, environmental concern, and postmaterialism are considered. This finding may translate into an association between personal wealth and private conservation. At the national level wealthy countries consume more land per capita than poor countries, and their land use is also growing at a faster rate than that of poor countries. This is at odds with the idea that wealthier countries utilize their wealth and technologies to use land more efficiently.

It is important to note here that the individual- and national-level aspects of Huber's theory are conceptually entirely different, and that there is no contradiction or theoretical rift due to the fact that one is supported and the other is not. The individual act of donating money is a *proactive* form of environmental conservation, whereas

national ecological footprints are measures of consumption or *preventive* environmental conservation, so the two are not conceptually comparable even though they both derive from the idea that wealth is good for the environment. I am testing the two approaches separately and not trying to create a link between them. That having been said, I will now look more closely at each aspect.

4.2.1 National-Level Findings

The national-level findings are straightforward and clearly do not support Huber's claim that wealthy countries use land more efficiently than poor countries. A follow-up analysis even shows that wealthy countries use dramatically more land per capita than poor countries. The first inference I can make from this is that superior technology and wealth have not led to superior land efficiency as Huber believes. It is possible that such land-conserving technologies and infrastructures might come about in the future since the development and effects of technology are not linear or predictable, but such speculations on remote possibilities are not the stuff upon which to build a theory.

The question remains as to why a nation's wealth is directly associated with its land consumption, to which I will pose a few possible explanations. The first addresses the connection between wealth and consumption. There isn't a perfect one-to-one relationship between earning and spending, since there are many who go into debt and others who hoard their money, but it's safe to say that earning money is directly related to spending it. My measure of national wealth is GNI, a cumulative measure of the incomes of a nation's members. It follows that nations with high GNI's will also be nations with high spending, i.e. consumption. While not all consumption is material consumption, especially with such service-oriented economies in much of the world, I suspect that nevertheless income is directly related to material consumption, which of course is related to land use. Consequently the most simple explanation for why rich countries consume more land than poor countries is because those who have more money tend to spend more money, and spending more money means consuming more natural resources.

This explanation fits nicely with the assumption made in the IPAT formula about the environmentally harmful effect of affluence.

A second possible explanation for why wealthy nations consume more land is based on the effects of capitalism. The world economy and the economies of most countries are based on capitalism, a system with many adverse environmental effects as discussed above. Capitalism is the current mechanism through which we both negotiate the use of land for resources and accumulate wealth. Wealthy countries are wealthy because they are home to successful centers of capitalistic activity, and at the same time capitalistic activity is land-consuming for many reasons. Therefore, because capitalism causes both wealth and land-consumption there will be a natural correlation between the two. This is a somewhat oversimplified formula, though, considering that wealth in turn fuels capitalism as well.

Wealthy nations are the core of the world system. They are likely to have been involved in imperialistic relationships with peripheral countries whom they continue to exploit in terms of natural resources and labor power. This means that core nations not only have more land available to them, but it is also land that is expendable to them because it is outside of their borders. Core nations are more cavalier about destroying and polluting other countries' natural habitats than their own, which is a situation totally outside the grasp of peripheral nations. Therefore wealthy countries, due to their relationships with poor countries, may have more land available to them and fewer consequences to abuse that land.

Lifestyles in wealthy countries are also very different from lifestyles in poor countries. People in wealthy nations, for example, eat more meat, consume more paper, and drive more cars, guzzling more oil and emitting more carbon dioxide, than those in poor nations (Brown 2001). The meat industry, especially of beef, pork, poultry, and mutton, is a very inefficient use of land compared to other forms of agriculture. Cattle

require 7 kilograms of grain feed to produce 1 kilogram of live weight; for pigs the ratio is nearly 4 to 1; and for chickens 2 to 1. Fish are relatively more efficient at less than 2 kilograms of feed per kilogram of live weight. Livestock overstocking is also a leading cause of soil erosion and conversion of rangeland to wasteland (Brown 2001). Clearly, the most efficient use of land is to grow crops for ourselves to eat, which is a proportionately more common practice in poor countries. Another commodity associated with affluence is paper, and from 1980 to 1999 world paper use climbed 86 percent (Brown 2001), which translates into a growing number of forest acres being felled and an increasing demand for forest plantations to support the needs of wealthy nations.

The widespread use of personal automobiles among affluent nations consumes land directly because it calls for the construction of roads and parking lots, but it also requires oil extraction and leads to carbon dioxide emissions. Oil extraction has harmful effects on the surrounding ecosystem which are conspicuously absent from Huber's book but which nevertheless consume land in addition to causing other ecological problems (McNeill 2000). Carbon emissions from vehicles do not directly consume land, but they are measured in the ecological footprint based on the forest area required to absorb them, and will have therefore affected my results. Industrialization in general is also associated with forms and magnitudes of land use that are not associated with pre-industrial lifestyles. Overall, the difference in land use between rich and poor countries is not only a question of quantitative differences but qualitative differences between the ways of life in each type of country.

This study might be better informed if there were a minimum ecological footprint used as a reference point to represent basic physical needs, and a maximum footprint showing what level of consumption can be sustained by the global ecosystem. So far I have been assuming that the smaller the ecological footprint, the better. This may be a mistake considering the fact that many people around the world live in conditions of serious deprivation. Just because some countries have very low ecological footprints

does not mean that those countries are healthy or that other countries should aspire to live that way. Dividing resources into per capita measurements can hide the fact that there may be overcrowding or too few resources to share. A maximum per-capita footprint based upon world population and global productivity would also be helpful to demonstrate which countries are exceeding sustainability levels. Redefining progress has already calculated that humankind as a whole uses 120% of the sustainable capacity of the earth (Wackernagel, Monfreda, and Deumling 2002), so it seems inevitable that the nations with higher ecological footprints are exceeding their share.

Huber's theory is that wealthy nations have the technology to develop ways to let us live without disturbing the land. My data show that this is not true of the current situation because wealthy nations actually use more land per capita than poor nations and their land consumption is growing, though this does not necessarily mean that Huber's theory won't pan out in the future. The development and effects of technology are unpredictable, and it might well be that wealthy nations will pioneer the way to living in the third dimension. But while the development of technology is unpredictable, the implementation of technology is well known to be a slow process. Since Huber is hoping to change the entire infrastructure of human habitation and food production, there might not be any land left to save by the time we would be ready to leave it alone.

One of the characteristically conservative aspects of Huber's writing is its avoidance of policy as a tool of change. His dependence upon the eventual organic development of technology and the cumulative conservation efforts of the individual nature-lover attest to his distaste for regulatory intervention by the government on behalf of the environment. I can't say that he's wrong, but I believe that environmental conservation is a time-sensitive matter, and that in order for meaningful changes to occur in time there needs to be governmental intervention. Certainly capitalism alone, without any conscientious policy in place, would ravage this world posthaste.

4.2.2 Individual-Level Findings

There is strong support in my analyses for the hypothesis that income is directly related to donating to environmental groups. This could be interpreted several different ways. First, there is Huber's theory that wealth leads to a postmaterialistic mentality and desire for quality of life, which then leads to spending money on the environment. This amounts to wealth causing conservation. Second, there is the possibility of a third variable causing both high income and environmental spending, such as the subjects' or their parents' education. Third, there is a possibility that a third variable causes environmental spending when income is high but not low, i.e. an interaction is occurring, which seems to me to be the most plausible explanation. My inclusion of political views, environmental concern, and postmaterialism was an attempt to test this third explanation. Finally, it is possible that the wealthy are simply more likely to falsely report donating to environmental groups, perhaps because they feel self-conscious about being conspicuously affluent and not donating. While this is a possibility that should be kept in mind, I will put it aside for the sake of deriving some conclusions from the data in hand.

I chose to control for liberal political views because the modern environmental movement is associated with the current construction of liberalism (Buttel and Flinn 1978; Colarelli 2002). It seemed that liberalism should have been a better predictor of donating to environmental groups than income, and there should have been an interaction such that the donators should have been high-income liberals and the non-donators should have been low-income liberals and all conservatives. The results of my analysis indicate, though, that liberalism is not a significant predictor of reported donating to environmental groups while accounting for income. Income, on the other hand, remains a significant predictor of donating while accounting for liberalism. Essentially, when political views and income are both used to predict whether a person reports donating to environmental groups, income has explanatory power and political views do not.

The fact that libviews was not a significant predictor of donate5 was so surprising that I checked the crosstabulation to examine the relationship. I found that of those who are extremely conservative 32.3% had reported donating to environmental groups and of those who are extremely liberal 58% had reported donating, which seems to fit with my original intuition that liberals should have been more likely to donate. The relationship is disturbed, though, by the fact that conservatives, slight conservatives, and moderates each had higher rates of reported donating than slight liberals, liberals, or extreme liberals. The donation rate jumps dramatically from 32.3% among extreme conservatives to 67.4% among conservatives, a difference which I cannot easily explain. As strange as it may seem, in this sample there is no clear relationship between political views and reporting donating money to environmental groups. This may indicate that low income is associated with liberalism and high income is associated with conservatism. It may also be possible that political views are only relevant predictors of donating at the extremes of liberalism and conservatism, and everyone in the middle donates for other reasons. There may also be an effect of conservatives preferring to "throw money at a problem" and liberals preferring to take other action. This is all speculation. The key idea to take away from this analysis is that there is strong support for a positive relationship between income and donating to environmental groups, which is not diminished when accounting for political views.

I expected environmental concern, like liberalism, to be strongly associated with donating to environmental groups, and even more so because environmental concern is much more directly related to the environmental movement. If there were an interaction it should have worked out so that donators should be high-income high-concern people while non-donators should be low-income high-concern people plus all low-concern people. I was extremely surprised to find that environmental concern, like liberalism, is not a significant predictor of reported donating to environmental groups when accounting for income.

The lack of significance of environmental concern in this model is puzzling, which led me to look at crosstabulations for envconc and donate5. The situation is similar to that of liberalism. Here the lowest two categories of environmental concern had a reported donation rate of 0%, and the highest two categories had reported donation rates of 73.6% and 67.2%. Based on these extremes one would surmise that environmental concern is directly related to donating. The pattern disintegrates, though, when looking at the middle 18 scores, where donating seems to be more associated with low environmental concern. Concern scores of 5 and 6 had reported donation rates of 66.7% and 100%, whereas concern scores of 21 and 22 had reported donation rates of 57.8% and 55.7%. Granted, there are very few respondents with low concern scores, but even those with middle range concern scores reported donating more than those with high concern scores. This leads me to consider that high environmental concern is associated with low income. Assuming that income is related to age, there may be a cohort effect reflecting the fact that older generations were not raised in a culture of environmentalism, or an aging effect in which environmental concern diminishes with age. It may also be possible that it takes only a low threshold of environmental concern for almost anyone to be concerned enough to donate money.

When income and postmaterialism are both used to predict reported donating to environmental groups, both turn out to be independently significantly positive, and the strong effect of income is not diminished at all. There is also a significant interaction between income and postmaterialism when predicting reported donating. This means that as income increases, the effect of postmaterialism increases, and as postmaterialism increases, the effect of income increases. This actually fits very well with Huber's model of private conservation. While Huber does not specifically state that the wealthy are "postmaterialistic," his description of their graduation from material needs to higher-order desires is much like the framework for postmaterialism. The finding that postmaterialism and income are both directly and interactively related to reporting donating to environmental groups lends support to Huber's argument in this regard.

Overall the results for my individual-level data seem to support, or at least not refute, Huber's arguments about the role of individual wealth in environmental conservation. But does it matter? Is individual spending and donating to environmental groups an effective form of conservation? It seems that donating money to environmental groups is associated with having a high income, which implies a high-consumption lifestyle. If so, it would seem that those who are most likely to spend money on conservation are also most likely to consume a disproportionately large share of natural resources. It seems strange to approve of people fulfilling their desire for the beauty of nature *after* they've consumed enough to fulfill their every material desire. As Diekmann and Franzen (1999) point out, both the wealthy and the poor express environmental concern, though the wealthy garner more attention for their concern by virtue of the fact that it is an economic priority for them. It's encouraging that the wealthy are showing their concern for environmental problems, but the question is whether their money and concern are enough.

4.2.3 Limitations of this Study

The greatest limiting factor in conducting this study was the availability of variables that would truly reflect the concepts I was trying to test. Income and GNI are not bad representatives of wealth, but donating to environmental groups is only loosely related to the type of conservation that Huber expects of the wealthy. My sources of data on donating are also questionable due to the fact that they are self-reported measures. The ecological footprint is a widely used measure of nations' land consumption, but it includes measurements that do not truly represent Huber's idea of land consumption. Sample sizes and distributions were good for the General Social Survey and World Values Survey samples, but for national-level data they were incomplete and not fully representative. Nevertheless, I think that anyone would be hard pressed to find better existing measures to represent Huber's theories.

This study did not fully explore the possible reasons for the link between income and reported donating to environmental groups. The relationships among income, liberalism, environmental concern, and postmaterialism could be more thoroughly examined. Better topics to pursue, however, might be the utility of private conservation, the impact of activities of conservationist organizations, and the possibility and implications of conservation being an apology for high consumption. The commodification of nature seems to be a part of what Huber is selling us, and it deserves some attention from both theoretical and practical perspectives.

There is also longitudinal research that needs to be done to follow the relationship between national wealth and land consumption. Comparing ecological footprints from 1997 and 1999 is not enough to see a real pattern emerging, so hopefully Redefining Progress will continue to calculate ecological footprints for many years in the future. I'm sure that as environmental issues become more and more pressing, the relationship between affluence and conservation will continue to be a topic of scientific interest which will hopefully in turn bring about constructive policy applications.

4.3 Conclusion

The relationship between wealth and environmental conservation varies based on the way wealth and conservation are conceptualized and measured. This study demonstrates that wealth among nations is strongly associated with greater consumption and more inefficient use of land, and at the same time wealth among individuals is associated with higher rates of reported financial contribution to environmental causes. These findings are not contradictory, and perhaps show that the prosperous are better at apologizing for their high consumption than preventing it. There is a general agreement in the literature that poverty leads to poor environmental decisions, as desperate situations do not lend themselves to long-term planning, but based on the research presented here I find that wealthy nations are also highly culpable with respect to environmental abuses. The goal should not be wealth itself, but rather prosperity for all

nations in the context of a sustainable level of consumption. Huber's speculation that wealthy nations' technologies will shape them into nature-conserving societies is not in evidence today, but while it seems remote, such a possibility cannot be ruled out for the future.

Huber's prediction that the wealthy man will "pour his wealth into green" is supported by my surrogate variables, but the question still remains as to the effectiveness of this conservation strategy. Individual donations to environmental groups presumably do not go nearly as far in the fight for conservation as wide-ranging public policy, and those who do donate may be doing more harm than good if they continue to carry on a highly consumptive lifestyle despite their newfound love for nature.

The idea that wealth is the key to saving the environment is a dangerous one because it gives a green light to businesses and governments to prioritize development and profit-making in the name of environmentalism. If this idea were to become widely accepted it might jeopardize current and future environmental policy. United States President George W. Bush has already based regressive environmental legislation upon the idea that businesses must be given free reign to emit gaseous pollutants with the expectation that their unfettered economic prosperity will eventually lead to cleaner technologies (Gardiner and Jacobson 2002). Huber's book *Hard Green: Saving the Environment from the Environmentalists: A Conservative Manifesto*, though well intended, supports an ethic of consumerism and capitalistic expansion which is irreconcilable with the goal of environmental conservation.

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