CHAPTER 2

Values and Valuation for Sustainability

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Last year, I chaired the U.S. National Academies' Committee that produced the report, "The Hidden Costs of Energy" (2010). Using the most advanced methodology and the best available data, the Committee estimated a lower bound of US$120 billion per year in non-climate damages to Americans from producing and using energy in America. Taking into account impacts of climate change would conservatively double this number. Furthermore, this was just damages *to* Americans from energy use *in* America, and the estimate did not include a wide range of ecological and other impacts. Clearly, the world is incurring enormous uncompensated and largely unrecognized damages from its production, distribution and use of energy.

Sustainability is ill defined, but I think a solid claim, not dependent on a crisp definition of sustainability, is: sustainability in the use of energy, or any other resource, will not and cannot be attained until external effects are internalized. Doing so is relatively straightforward in a conceptual sense, with taxes or other policy measures. I don't know of a single economist who would dispute this; but, I also don't know of a single Republican member of Congress and relatively few Democrats who would publicly support a carbon tax or a policy like a cap and trade system. We clearly have a political and governance problem or at least a disconnect between what we know to be correct and what we're able to achieve in national policy.

Furthermore, while the idea of internalizing externalities is straightforward conceptually, policy prescriptions based on this idea are limited by our assumptions about values. I believe that achieving sustainability will require us to move toward a broader notion of value, one not based solely on human consumption.

THE ECONOMICS OF SUSTAINABILITY

External effects or externalities represent impacts of actions that are not captured by the prices set by markets. In general, whenever an agent (say, a power company) takes actions (say, the generation of electricity from a coal-fired power plant) which produce impacts (health effects of air pollution) on others (people living downwind) that are not reflected in market prices, an externality is said to exist. The existence of an externality is evidence of a market failure which can be corrected through taxes or regulations.

Internalizing externalities or "getting the prices right" is a longstanding idea in environmental policy circles. If the prices that consumers pay, which are reflective of the costs producers incur, are aligned with the "true social costs" of the goods they purchase, then people's choices — consumers and producers — will appropriately reflect the full impact of their actions. This is in some sense a socially optimal state which we fall short of if environmental impacts are not accurately reflected in prices.

Correcting market failures by internalizing externalities is a theoretically non-controversial prescription. It's been a common feature of neoclassical economics theory for a century, and it has been invoked many times in American policy-making and courts. A theoretical justification is one thing; the practical quantification of externalities is quite another. The "Hidden Costs" study cited earlier is the most recent and probably best attempt to date at doing this for energy production, distribution and use. Yet, there were many assumptions that had to be made, and, even putting these aside, quantifying externalities is inherently controversial.

Specific examples are the best way to demonstrate my point. The dominant non-climate external effect (or "damage") of energy use is health effects on humans, primarily excess deaths from air pollution. Putting these in monetary terms requires the valuation of a human life. Although this is well-travelled territory by economists, who have come up with the notion of the "value of a statistical life", this can be treacherous ground. Consider the trouble that the IPCC's social science group got into when, in following common methodology, they produced results that implied higher values for American and European lives than African or Indian lives.

Another example which gives people pause is coal-miner deaths. (The extraction of coal is a part of the life cycle of generating electricity from coal-fired power plants, and, thus, the impacts of mining must be considered in evaluating the impacts of electricity generation.) Coal-mining is among the most dangerous occupations. There is ample evidence that U.S. labour markets capture this risk through higher wages paid to miners. Our committee concluded, therefore, that coal-miner deaths do not represent uninternalized

externalities of coal use in America. Try to explain this to the widow of a coal miner or the senator from a coal-mining state.

Some significant effects of energy use are not externalities. A good example is the impact of ethanol production on food prices. Vast amounts of land in the American corn belt are now devoted to producing corn for ethanol rather than for consumption by humans or animals. But this represents a response by farmers to price signals from well-functioning markets and thus higher food prices are not, therefore, an externality.

Other impacts are conceptually very complicated, and it's not clear-cut as to whether they are externalities. For example, the U.S. undoubtedly maintains a larger military and has been involved in more military operations because of the nation's dependence on oil from foreign sources. Is this an externality of oil use in America? It would seem to represent a subsidy to the oil industry, but declaring it an externality is not straightforward, nor is quantifying it.

Consider ethanol from corn again. Would the conversion of the Amazon rain forest into corn fields to produce ethanol for cars in the U.S. be an externality? We've already decided that high food prices from conversion of U.S. farmland to corn ethanol was a market impact, not an externality. What's different about a Brazilian jungle?

This last example leads to another important set of issues which are, in my view, the most significant if we are to "get the prices right" and achieve sustainability. The Amazon *is* different from an Iowa farm, but why? And, if it is, how do we capture, measure and monetize the difference?

The rain forest of the Amazon is different for at least three reasons. It plays a crucial role as a carbon sink, the "lungs of the world". It is a place of ecological distinctiveness and unique biodiversity. And, some would argue, it has value just by being there in its present, "undisturbed" state. Each of these three reasons represents a challenge for economics and our ability to value natural resources and environmental assets.

The notion of the Amazon as a carbon sink raises the question of how we value climate change and its impacts. The fact is we are at a very early stage of understanding any of the consequences of climate change, let alone assigning monetary value to them. In addition to the physical and biological complexity of predicting consequences, there is tremendous uncertainty due especially to the long time periods into the future over which climate changes will occur. Economists have a very long way to go before they can produce reliable estimates of impacts from climate change.

The second and third dimensions of the value of the Amazon, or any environmental asset, get into basic questions of what do we mean by "value"? Attempts by economists to deal with this have tended to cast environmental values in terms of the human benefit derived from the "services" an ecosystem

provides. Thus, the ecosystem services approach would associate a value with, for example, the high-quality water that downstream Amazon communities enjoy. The quality of the water depends to an extent on the integrity of the ecosystem, so, in valuing the water, which humans use, we are capturing some of the value of the ecosystem. The implication of this approach is that something has value only if humans use it. But, doesn't the Amazon have a value just by virtue of being there, so-called "existence value"? There is a philosophical question here, not unlike "what is the sound of a tree falling in a forest with no humans around to hear it?"

A BROADER NOTION OF VALUE

I believe that sustainability will be illusive so long as we value everything only in terms of human consumption. The ecosystem services concept basically implies that if I can't reduce an environmental asset into a service that produces a benefit for humans, it necessarily must have a value of zero.

Economics, as it's generally understood and practised in free-market societies, is predicated on the notion that each of us is "rational". This means that each of us seeks to maximize our utility, which is generally taken to mean our consumption, i.e. consuming and acquiring more things increases our utility. However, there have been those who have argued that this view of human behaviour and decision-making is too narrow and unrealistic. One of the most prominent proponents of this broader and more realistic view was Herbert Simon, a long-time Carnegie Mellon faculty member, (see, for example, Simon, 1955; and Simon, 1957.) In fact, this broader, more realistic view of human behaviour goes back to the origins of neoclassical economics. In two beautiful papers (Loewenstein, 1999, and Ashraf *et al.*, 2005), another colleague at Carnegie Mellon, George Loewenstein, has argued persuasively that Jeremy Bentham and Adam Smith themselves were what we would call today "behavioural economists". We've basically simplified and assumed away what they first conceived as a much more complicated view of human decision-making. As Loewenstein put it (Loewenstein, 1999, p. 335): "The issue is not whether economics will be based on psychology or not, but whether it will be ground in good psychology or bad psychology."

The broader view of what makes people tick has emerged in some recent national policy discussions. Recently, Prime Minister David Cameron called for the U.K. to adopt the notion of "General Well-Being" as a broader measure of national prosperity than Gross National Product. This is not a new idea — it's been around for more than 20 years (see, for example, Repetto *et al.* 1989) — but it's getting talked about more and more in the popular press (see, for example, Friedman, 2011). It's an uphill battle, especially in a global culture that firmly believes that you can't manage what you can't measure, but

surely a broader view of human satisfaction and happiness will be necessary. I don't think GNP-driven efficiency-based prices — even if they're "right" in an orthodox economic sense — will take us to sustainability. I think they inevitably undervalue nature, because all value is framed by direct contributions to human consumption.

I don't believe it's an unthinkable leap to imagine an economic response to more than the instrumental value of nature. Elsewhere (Cohon, 2011), I noted the dramatic shift in the drivers of the American economy. Google, which didn't exist ten years ago, is much bigger in market capitalization and revenues than almost all of the major companies of 20 years ago (if they even exist today.) Of course, Google doesn't "make" anything; it provides information. I acknowledge that the company's main revenue source is still advertising, a conventional and even depressing observation from the perspective of social value. But, does Google's success say something about a shift in what we value? And, if it does, what might be coming in the future? As I queried in the other paper: "Might it be that consumers in 2050 will value natural resources in a way that allows companies to make money without exploiting them? Will there be a Google of 2050 — maybe Google itself — that converts the existence value of a resource into monetary value for its shareholders?"

VALUES AND POLITICS

Dealing with the value of natural resources and the environment and related public actions is necessarily and appropriately a political matter. But, there is a real and serious question as to whether America's political system is up to the challenge of sustainability. As Bocking (2004, p. 13) put it: "Environmentalists and some environmental scholars argue that the environment cannot survive democracy."

In America today we see gridlock in Washington on almost all environmental issues including and especially climate change and energy policy. Recent survey results suggest, however, that this is not just an "inside-the-Beltway" issue; in fact, Washington's posture matches that of the American public.

In a recent publication, Matthew Nisbet (2011, available on-line) reproduces a graph which shows a strong negative correlation between the unemployment rate and the portion of the American population for which environment, including global warming, is a top priority. Nisbet cites the social psychological notion of a "finite pool of worry" (p. 62) to explain this. "As one perceived risk gains attention, other risks are bumped from concern." We only have so much worry to go around, and when you don't have a job or you're worried about keeping one, everything else gets pushed aside.

In addition, there is a strong ideological element to people's views of environmental issues, the consequence of which is that our current highly partisan politics become a roadblock to action. We've become used to ideological and political disputes, but Nisbet (2011) provides some survey results which are sobering if not downright shocking. He uses data from the Pew Center for People and the Press to show that members of the American Association for the Advancement of Science (AAAS), the publisher of *Science*, are similarly ideological and partisan about science issues as the American public. When asked whether the Earth is getting warmer due to human activities, AAAS members said yes depending on their ideological leanings to a surprising degree.

Strong Liberals	95%
Liberals	94%
Moderates	80%
Conservatives	44%

When asked if global warming is a very serious problem, the spread was even larger:

Strong Liberals	88%
Liberals	83%
Moderates	62%
Conservatives	26%

Similar spreads were observed in the general public, most of whom were presumably not scientists.

All of this can make one despair about our capacity to achieve or move toward sustainability, and sometimes I do. But, I'm an engineer, trained to solve problems. The solution to this problem, it seems to me, will come only when our values shift.

CHANGING OUR VALUES: THE ROLE OF UNIVERSITIES

I don't know how people's values are shaped, or when in one's life that happens. I am certain there is a large literature on the topic. However, while I am ignorant about the origin of values, I do know this: virtually every member of almost all governments and almost all CEOs and leaders of every sort spent some part of his or her life in our universities. Surely, we, the academic community, have contributed to the way society values nature, for good or ill, and we can help to shape how it will view nature in the future.

It is controversial to suggest that universities should dictate values to their students. We have to be careful to distinguish between values and ideology. I think we're all comfortable with promoting, for example, good citizenship and

community service, while we would all be opposed to preaching liberalism to our students (even though we in America are routinely accused of doing so.)

As a starting point, we can make environmental literacy a basic requirement or goal of our curricula. Being sure that every student has some basic understanding of environmental issues and phenomena seems desirable. Interestingly, however, ecology is one of those fields in which it can be hard to avoid ideology, an issue explored by Bocking (2004, especially Chapter 3.) He notes, for example, that Aldo Leopold, one of the great pioneers of ecology, wrote in *Sand County Almanac* (probably second only to Rachel Carson's *Silent Spring* among the great popular works of ecology): "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

I believe one can separate out value judgments from the facts of ecology, i.e. the impacts on ecosystems of a disturbance like destroying habitat from the question of whether it's "right" to destroy the habitat in the first place, but it's fair to ask: Should we? This is a basic question that we need to debate.

CONCLUSION

Achieving sustainability is possible only if the decisions we make and the actions we take reflect the true value of the natural resources we use. Current markets don't do that. Correcting these market failures — as difficult as that is — would move us in the right direction, but not enough, for current ideas of value capture only consumption. We need both a broader notion of the value of natural resources and mechanisms for communicating appropriate signals. Universities have a crucial role to play through their research and as the educational institutions in which future decision-makers are formed.

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