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CHOOSING OUR LEGACY: OVERCOMING VALUE CONFLICTS THAT FRUSTRATE SOCIETY'S EFFORTS TO DEAL WITH ENVIRONMENTAL CHALLENGES

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In recent years the range of problems and concerns that we categorize under the banner of environmental issues seems to grow in number, magnitude and scale. We now can identify problems occurring on regional and even global scales. We have determined that many of the humanitarian failures in the developing world have their causes rooted not just in the political or economic systems but also in the need to accommodate the ecological systems that sustain life. We have identified that in many parts of the world the very fabric of those ecological systems, the biodiversity, is itself threatened. And, we have established that the combined impacts of the activities of seven thousand million souls on this planet have begun to alter the fundamental processes that distribute energy and moisture around the planet. We are changing the climate.

At first glance these problems appear to be so large and involve such complex international negotiations that it is easy to conclude that solutions will evade us. Yet that has not been the case. At the World Summit on Sustainable Development in 1992, and in the years following, the international community successfully negotiated Agenda 21 (a plan to deal with the

humanitarian crisis in the third world and to lead us all to a sustainable form of development), the Convention on Climate Change and the Convention on Biological Diversity (United Nations Department of Economic and Social Affairs, 1992; United Nations Framework Convention on Climate Change,1992; United Nations Convention on Biological Diversity, 1992). Indeed, what may have seemed the greatest hurdle, the formation of an international consensus to deal with these issues, was completed with relative ease (as these international conventions go).

Unfortunately, little has become of these diplomatic successes. Shining local examples of the implementation of all of these initiatives exist, but they remain limited in magnitude and scope. Most of the world, and certainly North America, has not embraced concepts of sustainable development and therefore not restructured their policies and economic activity accordingly. Biodiversity continues to decline almost universally in the Americas despite some notable efforts, both heroic and nominal. And atmospheric climate change progresses in a political climate in which senior people in the American government continue to question its very existence and other countries give it only token acknowledgement (to date).

So it is at the national implementation stage that attempts to deal with large-scale environmental problems fail. These complex problems are understood, and solutions are proposed, but applying those solutions either falls on deaf ears or meets with such resistance that democratic governments cannot deliver the necessary policy changes.

This paper will examine the nature of the conflicting values, beliefs and opinions that characterize the national debates over environmental initiatives in North American cultures. Based on the assumption that the international positions expressed in these major environmental treaties are the correct ones, the paper will further examine the conceptual deficiencies that underlie opposition arguments with a view to how educators could address these concepts in curricula to help prepare their students for the public debate that will lead to resolution of these conflicts.

The (winning) case against the environment

It is not the intent of this paper to suggest that there is no support for efforts to advance policies that reduce environmental impacts and improve sustainability. Clearly there are articulate champions of these causes and significant constituencies for these views. However, the fact that the public policy structure has not been sufficiently altered to respond to environmental imperatives is *prima fascia* evidence that the dominant political position in the North American jurisdictions is essentially anti-environment. It is therefore, useful to examine in detail the successful arguments used to thwart proposals to become more sustainable or to reduce our ecological footprint.

Certainly, the most powerful argument used is that spending money on environmental initiatives or forgoing opportunities to exploit natural resources will limit or reduce economic growth. And, it is a widely accepted truth that resisting or constraining economic growth harms society. This is an argument with great resonance in the general population and wide-ranging support in the media. It is useful to dissect the underlying assumptions and prejudices implicit in this argument. First, is an inherent contradiction that environmental policy, designed for the benefit of society, will in fact harm society by constraining economic growth. Certainly, both points are not true. But, this contradiction can be rationalized if one considers the timeframe within which the proponents of the arguments frame their positions. The metric called economic growth is measured over a very short time span. Usually, growth in GDP is considered over a quarter, and certainly no longer then one year. Environmental benefits, by contrast, are a measured over years, decades, and centuries. Thus, the economic metric only

measures the short-term economic pain and not the long-term environmental gain. When one argues that economic growth is more important then environmental policy, one is really saying that the present is more important than the future.

Of course, the fatal flaw in the economic growth model is that it is inherently unsustainable. Our economies are based largely on consumption of energy and materials. We try to achieve a compound growth rate of about 3% per annum. That rate represents a doubling time of 23 years. To put this into perspective let us consider an Ontario example. Ontario is currently facing a shortage of generating capacity for electricity. If we were to assume a growth rate in demand of 3% per annum, as some would suggest is realistic, that would mean that during the next 23 years Ontario would have to build new generating capacity that is the equivalent to all the hydroelectric capacity plus the fossil fuel fired capacity plus the nuclear generating capacity that the province has constructed over the past century. The capital, materials and labour requirement for such a feat would be enormous and the time available for construction simply inadequate. And, if this were not sufficient to make the point, consider that in the subsequent 23 years the accumulated construction would have to be four times the present capacity. Like the parable about the king agreeing to give a reward of one kernel of grain for the first square on a chess board, two kernels on the second and so on, doubling each square, we will not make it to the 64th doubling. There was not enough grain in the country for the king to meet his commitment and there will not be enough energy, capital and resources for us to sustain a constant compounding growth in consumption.

Another argument successfully used to thwart environmental initiatives is the belief that we must always do the cheapest thing. Such reasoning often masquerades as cost-benefit analysis but it is not.[1] In fact it is simply the box store paradigm that the lowest price is all that matters. Such businesses focus their advertising only on price, ignoring questions of quality, durability, service support and environmental issues like recyclable materials content. The coal lobby advances the equivalent argument in the greater world of environmental policy. For electrical generation, they argue, coal is cheaper. And, of course, it is cheaper if one only considers the price of coal and does not include the effects of smog created in downwind cities by the NO_x emissions or the mercury that bioaccumulates in the fish, otters and loons across the continent.[2] And, it is also necessary to exclude the costs to society of the CO_2 emissions that exacerbate global warming. Such is the logic of public debate on environmental decisions. Regrettably, too often in public policy decisions, like the box store, the lowest price is the law.

A third argument advanced to frustrate environmental initiatives is to trivialize the significance of individual undertakings so as to make the environmental policy seem petty and bureaucratic. How can clearing one more woodlot affect the viability of a threatened species? How can one more water taking seriously threaten the sustainability of an aquifer? How can a few more automobiles make any difference in the air quality of a whole region or, indeed, the planet?

The logic in these arguments is powerful because it causes the public to focus on a specific local situation that is familiar and well understood. In this context allowing just one more seems reasonable. Conversely, it distracts attention from the larger more abstract context of

[1] Cost-benefit requires that all costs are considered and that these costs are balanced against the value of the benefits. For many environmental policy issues costs are externalized or impossible to evaluate in economic terms. In addition, the benefits often accrue more than 50 years into the future a timeframe that normal future discounting techniques value at virtually zero.

[2] Not to mention the long-term re-volatilization of mercury at lower latitudes which is gradually moved north by the atmosphere until it finally precipitates in the high arctic regions where it concentrates in the food chain of the aboriginal peoples.

social and ecological concerns. In legal policy the concept of "just one more" often leads to the conclusion that there must be one more for everybody. And, the creation of such a right can often override ecological imperatives. Allocation of water rights and fishing rights in this manner has led to rivers that no longer reach the sea and collapsed fish populations.

The final type of argument put forward in debates about environmental policy is one of need or, restated, one of value to the activities of human beings. One hears the position that there is lots of nature left in the parks and that is where people should go to see it. Or, with respect to issues of protecting threatened species on private land, prominent voices use the expression "shoot, shovel and shut up" implying that biodiversity is a triviality with respect to private economic interests. In the west coast rainforests the position expressed by logging interests is that valuable timber is being wasted in the name of protecting the spotted owl, a creature of no value to humans. All of these positions, aside from being anthropocentric, share a common belief: they all are founded in the belief that humans and human society are detached from the natural ecosystems of the earth. Since humans are apart from nature it follows that they can co-opt land and resources from nature at will without fear of repercussions. Biodiversity is something that is nice to have where it is practical as long as it does not interfere with commerce or recreational activities.

The conceptual deficiencies underlying the debate

Given the above analysis it can be seen that the dominant arguments used to defeat policy changes intended to protect or improve the environment are all flawed. Yet, it is worth restating that they are normally successful. Which is to say that these arguments are easily sold to politicians, other policy makers and the general public and the flaws in the logic behind them are not apparent. If this is so there must be some widespread deficiencies among the public's understanding of the concepts at issue. And, if true, that points to the need to alter educational curricula at the secondary level to better equip the public of tomorrow to engage in these debates.

Certainly one of the primary conceptual deficiencies relates to our concept of time. Our society's planning horizon, that point in the future where we can see the consequences of our actions, is surprisingly close. We live for the present and rarely think about things beyond a few years. Even for such obvious future expenses as our children's' education the government has to offer tax incentives to get us to save. Mortgages are things that we "carry" not pay off because we will sell and upgrade to a better place long before they expire. Arguably this horizon has been compressing closer in recent years as ever accelerating technological change causes us to live our life faster[3]. This means that we aren't really considering events and consequences in timeframes that are in synch with the ecological and climatological rhythms of the earth, which involve decades, centuries or millennia.

Oddly, there are abundant examples in the historical record of the kind of problems that have befallen societies that have not considered the long-term implications of their actions or lifestyles. The Romans founded a great city in Asia Minor called Ephesus, which supplied timber and wheat to the empire. But, forest clear cutting and poor agricultural practices in the watershed of the Cayster River caused such severe siltation of the harbour that ultimately the city was kilometres from the sea, where it became economically unfeasible and had to be abandoned (Perlin, 1989). In eighteenth century Britain the forests were cut for charcoal to support iron smelting with such recklessness that there were not enough oak and tall pines to maintain the navy. It had to import this strategic commodity from Scandinavia (Perlin, 1989). Britain would have succumbed to a blockade of the Baltic by the Dutch in 1658 (Perlin, 1989)

[3] A topic described by James Gleick in his book, "Faster"

had she not had access to her North American colonies. And a century later, economic turmoil occurred in maritime economies around the world when the whaling industry collapsed as a result of the increasingly efficient and expanding whaling fleets hunting the great whale species to near extinction (Whale and Dolphin Conservation Society, 2005). The lessons are there and well documented, but, regrettably, our sense of the past is no more illuminated than that of the future.

Perhaps it is the job of a history curriculum to instill this concept of time. As we improve students' sense of the past we could impress upon them the need to think in longer scales of time and in doing so give them a better sense of the future.

Another deficiency is our inability to comprehend the fallacy of compound growth without limits. This concept appears within the curricula of both mathematics and biology. In math it is difficult to make the case for limits on exponential growth because one can plot the curves and the numbers just get bigger and bigger. Such numbers are abstract and don't relate to real life experiences. Perhaps the only exception is compounding bank interest (once called the miracle of compound interest) which, it could be argued, supports the economists' paradigm of everlasting growth in our savings. But that was before bank service charges, taxes and inflation made such claims irrelevant.

In biology, however, the fallacy of perpetual compound growth is easily shown. Exponential growth, whether it be in cells or populations, once plotted forms a "J curve" on a graph. However, there is nothing in nature that continuously grows on an exponential basis.[4] There are always limits whether posed by resources, space, or interaction with predators or competitors. "J" curves don't persist in nature; they either collapse to minimal numbers or they become "S" curves as the compounding growth invariably levels off. This is a good lesson for all to learn including budding economists.

There are several conceptual inadequacies that support the flawed mythology around consumption and price. Our parents' generation shopped for value, not price. They knew that what really mattered was how long things lasted, how reliable they were and if they could be maintained in good repair. They believed that you could not get ahead if you constantly had to replace goods already purchased. In business this is the notion of considering a capital equipment purchase. And, I would assume, it would already form part of the curriculum of business courses. However, its value as a concept is far more general. All students should be challenged to think about the true costs of the goods we purchase over time and thus reflect on the lowest price imperative. Unfortunately, it is not clear where such material would fit into existing programs outside of business courses.

Beyond the direct costs is the idea of "external costs" such as described with the coal example earlier[5]. External costs are a fundamental consideration of classical economics. The problem is that economists try to reduce everything into terms of today's dollars and most external costs, especially ecological ones, are difficult if not impossible to express in dollars. How does one put a dollar value on the death of a loon? Nonetheless, educators could set assignments to review some proposed project and try to identify and quantify the external costs. The task could be made more challenging if the intergenerational implications of the project were explored. What is the value that people a generation hence will place on a forest that is set aside for protection now? Such assignments would be educational exercises that broaden students' understanding of environmental decision-making.

[4] Bacterial populations may display this behaviour for many cycles to impressive population sizes but ultimately even they reach limits of resources that restrict further expansion.

[5] In the jargon of sustainability a similar concept is called "full cost accounting."

A third conceptual deficiency is our limited understanding of the complexity of the ecological systems of nature. This allows the naive to trivialize the impacts of an individual undertaking and ignores the true nature of all complex systems, especially ecological systems and climate systems. The effects of a number of individual disturbances are not independent of each other nor short term in nature. They are not even additive; they are cumulative in a non-linear manner. Numerous impacts on an ecological system accumulate through time and alter the system in complex, unpredictable ways that may eventually lead to dramatic, often sudden changes in the ecosystem that are often catastrophic. This is the phenomenon described by the term "cumulative effects" and it is the root cause of some of the more startling events we have observed in natural ecosystems.

The more conspicuous examples of such events often involve rapid changes in abundance of prominent species. We tend to assume, for instance, that species under some adverse pressure or exploitation will decline in a gradual manner roughly in proportion to the strain upon them. That was not the case with the passenger pigeon, so numerous that reportedly their flights blocked out the sun for hours, nor was it the case for the northern cod, equally abundant. Both species withstood heavy exploitation for many years and then, without warning, started a precipitous decline from which they never recovered.

Another well-known example has been Lake Erie, which in the past 125 years has seen its biological system restructured twice and may be in the process of a third. In the 19th century Lake Erie was a crystal clear, nutrient poor lake supporting a fishery based on whitefish and blue walleye as top predators highly prized for human consumption. With over-exploitation, poor land use practices, pollution discharges and exotic species introductions, the blue walleye became extinct and the whitefish rare. The lake rapidly switched to a soup of green algae with no top predator and vast numbers of plankton-feeding smelt and alewife. The latter periodically died off and washed up on the shore in great numbers. Sincere efforts to reduce pollution from many sources and the artificial introduction of salmon species as top predators led to the water clearing again and disappearance of the smelt runs and alewife die-offs. Yellow walleye became a major commercial and sports fish spawning new economic activity. But the arrival of the zebra mussel, round gobie and other exotics is transforming the ecology of Lake Erie yet again with a vast and expanding anoxic zone and major waterfowl kills.

The point is that natural systems are more than just interrelated; they are inherently complex and thus, often unpredictable. And, that point has to be understood by the greater portion of our students even if the nature of the complexity is beyond their training. That is not as tall an order as it seems. There are many good examples of natural processes that could be studied that would be interesting and stimulating as subject material yet would clearly impress the students with the inherent complexity. The Gaia hypothesis[6] proposed by James Lovelock would be an example for a geography curriculum. Lovelock proposes that the earth itself behaves as a single living organism he calls Gaia. Under this proposition the ecosystems of the earth function like the internal biological systems of the body, each functioning to serve the health of the whole. Even the climate and chemical composition of the atmosphere are determined and regulated by Gaia. Studying Gaia would be a stimulating exercise in scientific inquiry into a complex system.

The most profound conceptual deficiency predominant today is the failure to recognize that humans and their economic and social systems are integral to and dependent upon the ecological processes of nature. This dependency is fundamental to the whole question of sustainability. We rely on the ecological services

[6] The Gaia Hypothesis is not sufficiently supported by empirical evidence to be widely accepted at this time. See *The Ages of Gaia* by James Lovelock.

of our natural systems to provide us clean water and treat our wastes. Without forests the air is not cleaned. Without photosynthesis the oxygen is not restored to the atmosphere. We rely on natural systems for basic commodities such as wood products and protein from the ocean. Even our agriculture is not independent of the ecosystem. Our crops, all domesticated from the wild forms, will not flourish without the natural microbiological processes of the soil, the control of pests and disease vectors by natural predators and parasites, and the essential ecosystem service of pollination. In addition, we mine the vast biochemical and genetic resources of nature with our elaborate technology and, when we figure out how nature does something useful, we claim it as our own discovery.

The perception that humans are somehow separate and apart from nature is not only incorrect, it is regressive. Twenty-five years ago humanity's integration with nature was generally accepted and reflected in educational curricula and social policy. A flurry of environmentally progressive legislation had been passed. Environmental programs and curricula were emerging and expanding at secondary and post-secondary institutions. Somehow that awareness of our relationship with nature has slipped away as we have become increasingly urban. This new myth of detachment from nature is the basis of the most egregious public policy decisions of the time and casts dark shadows on our ability to achieve sustainability in the future.

The tragedy for our biological diversity inherent in this myth is self-evident, but even more tragic is that this sense of detachment induces our blind expectations of climate stability. Despite all the discussions that have ensued relating to the expected climate changes resulting from global warming, people have not grasped that for many areas of the continent, climate change means profound economic, as well as ecological, disruption. The simple fact that human economic activity and quality of life are inextricably tied to both climate and the ecosystem is not widely understood.

Perhaps the solution to this deficiency is the obvious one, to study climate change itself. Analyzing what appear to be the effects of climate change implicitly demonstrates the close ties between human societies, economies and nature. There are lots of good examples. Students could study the phenomena of the rapidly disappearing glaciers that feed the streams that are the water supply for cities in western North America or look at the social and economic disruption caused by permafrost melting in the far north. The impact on Europe of the possible collapse of the Gulf Stream would be another excellent topic which makes the point. One does not even have to embrace as orthodoxy that these phenomena are indeed caused by anthropogenic greenhouse gas emissions to study them. It is sufficient that by their nature they shatter the myth of detachment.

Conclusion

Our North American societies continue to live the paradox where we understand that much of our social and economic activity is unsustainable and self-destructive, and we have determined what better practices and solutions are needed, and yet we are unable to change our ways. This paper concludes that a solution to this public policy impasse may lie within the curricula of secondary education where certain fundamental concepts could be instilled within a broader range of students. This is not to imply that these ideas are absent from current curricula or that current teaching methods are deficient, but rather it stems from a recognition that these concepts are not sufficiently informing the public debate. They need to be more emphasized in our educational systems. The long-term benefit would be that the fallacious anti-environmental arguments of the naive and the narrow-minded will no longer find support in the public forum.

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