Conservation strategies – are we only addressing symptoms?

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Introduction

We have spent much of our careers working to protect provincial biodiversity. Similarly, *BC Nature* chronicles the efforts of 4,500 naturalists in 50 BC Nature clubs working tirelessly to do the same, often in a volunteer capacity and sometimes at great personal expense. Yet, evidence suggests that the environmental situation is worsening, not only here in British Columbia but globally: biodiversity is under greater threat today than ever before.

For example, the most comprehensive review, to date, of ecosystem change for human well-being was conducted by the Millennium Ecosystem Assessment. This audit of the Earth's natural capital involved the work of more than 1,360 experts worldwide. In a summary report, they wrote:

> *Human activities have taken the planet to the edge of a massive wave of species extinctions, further threatening our own well-being* (Millennium Ecosystem Assessment 2005, p. 3).
>
> and
>
> *The provision of food, fresh water, energy, and materials to a growing population has come at considerable cost to the complex systems of plants, animals, and biological processes that make the planet habitable.* (Millennium Ecosystem Assessment 2005, p. 5).

Further, we know that biodiversity loss is exacerbated by climate change (Parmesan 2006), so one conclusion of a recent Intergovernmental Panel on Climate Change summary report should not be surprising:

> *Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C* (Adger et al. 2007).

How can this be happening when, today, there are more environmental groups working on more awareness, education, and stewardship programs; more rules and regulations in place to protect biodiversity; more ecological research; more conservation and restoration projects; and more protected areas than ever before?

In this article, we discuss some aspects of why we believe biodiversity remains at risk or is still in decline despite concerted, conservation efforts by naturalists and others. Specifically, we contend 1) that there is a fundamental conflict between economic growth—the root cause of these declines—and biodiversity conservation and 2) this root cause is not being addressed by most conservation organizations.

Orthodox conservation solutions: two successful projects

Two, high-profile conservation projects that we have worked on—the Strait of Georgia Black Brant Monitoring and Conservation Project and the Wildlife Tree Stewardship Project (WiTS) on Vancouver Island—serve to illustrate successful conservation efforts by conventional standards. Each project has roots extending back more than 20 years and each has achieved many of the traditional milestones of success (e.g., project partnering, information sharing, increased regulations, extensive public outreach, protected habitat, stewardship agreements).

Black Brant Monitoring

The Brant project began in the Parksville-Qualicum Beach area in 1988 when the senior author, then with the Canadian Wildlife Service, recruited local naturalists from the Victoria, Parksville-Qualicum Beach, Courtenay-Comox, and Campbell River areas to read colour-coded leg bands on the migrating geese. These data would allow researchers to determine turnover rates in the numbers of Brant using the area, how individual birds made use of the local habitat, and how effectively the birds were preparing for their long journey to the breeding grounds (Nygren and Dawe 1992).

The initial project—now in its 20th year—spurred a number of initiatives including further research and monitoring of Brant in the Parksville-Qualicum Beach and Boundary Bay areas; the launch of the Brant Wildlife Festival, now in its 17th year of celebration; the designation of the Parksville-Qualicum Beach Wildlife Management Area in 1993 (PQBWMA; Lanarc 2003); and for the past three years, multi-agency outreach and compliance monitoring of three spring beach closures, the goal of which was to allow the Brant to rest and feed free from dog disturbances.

These efforts have been in concert with ongoing research in the arctic by the US Fish and Wildlife Service, Canadian Wildlife Service, and flyway-wide partnerships. A number of technical and scientific papers have also been completed (e.g., Sedinger et al.

1994; Reed 1997; Hagmeier 2002; Ward et al. 2005; Boyd et al. 2005). By any standard measure, the project has been highly successful.

Wildlife Tree Stewardship Project

The Wildlife Tree Stewardship Project (WiTS), for which the junior author is the program biologist on Vancouver Island, evolved from extensive efforts in the 1980s by the BC Ministry of Environment on Vancouver Island to assemble a master database on Bald Eagle nest tree locations from all sources (including provincial and federal aerial surveys and registries, industry data, and naturalist sources). There was recognition that even though Bald Eagle numbers were increasing (primarily from historic lows as a result of persecution and poisoning), the Strait of Georgia breeding population was at risk from severe and accelerating habitat loss – especially the liquidation of mature trees along the seacoast that the birds need for nesting (Blood 1989; Blood and Anweiler 1994). Elliot et al. (1998) determined that eagles in the Strait of Georgia produce more young than other areas and that this surplus is likely an important source of recruits to the regional population.

Detailed Bald Eagle nest tree inventories along southeast Vancouver Island are now in their 20th year. Since inception, many more government and non-government partners and naturalists (now over 200 volunteers, with their labour valued at $70,000 in 2006), have joined the ranks. A website was launched (2001; www.wildlifetree.org) as well as an online wildlife tree atlas (2003). Data sharing agreements have helped to increase nest tree protection through a variety of mechanisms available to local governments including development permit areas in place in the Comox-Strathcona Regional District, the development of provincial guidelines (e.g., Demarchi et al. 2005), and public outreach/landowner contact, which is at an all time high. In 2001 the project became a BC Nature initiative and it is now one of the organization's flagship programs. Much like the Brant project, this project has been considered a success.

Measuring success: are orthodox solutions enough?

In ecosystem management, ecologists make use of a process called adaptive management, a structured, ongoing process of "learning by doing," (Christensen et al. 1996). Objectives are established and results are monitored so that management activities can be modified when deemed necessary. "If decisions are not made based on the results of monitoring and evaluation, learning will not take place" (Hilborn 1992). So, while the Bald Eagle nest tree and Brant projects themselves have been considered successes, what about the objects of their efforts?

In the PQBWMA, peak daily totals of migrating Brant today are less that half those we recorded in the early 1990's. Indeed, the Pacific flyway Brant population is in decline:

the January 2006 mid-winter index for Black Brant was 133,900 birds, and although this is near the long-term (1964-2004) average of 131,000 birds, it is considerably below the long-term average of 161,000 birds from 1961-1970 (Pacific Flyway Council 2002) and well below the North American Waterfowl Management Plan goal of 150,000 birds (Canadian Wildlife Service Waterfowl Committee 2006).

Despite the creation of the PQBWMA, which secured virtually all the critical staging habitat for this little sea goose in the Parksville area and despite extensive public outreach and compliance monitoring in order to reduce disturbance to the birds (Merriman et al. 2006), the disturbance rate there, to 2006, has roughly stayed the same since it was first measured in 1996. At that time, it was the highest Brant disturbance rate reported in the scientific literature. In spring 2007, human and dog disturbances increased further to reach an all-time high (Martin and Monty 2007). It may not be an insignificant factor that Parksville's population experienced a 50% increase, growing from 7,306 to 10,993 over the period 1991 through 2006 (BC Stats 2007).

This disturbance was reflected in Brant body condition, which is also in decline (Boyd et al. 2005) and could be having a negative effect on the Brant's breeding success. Flyway-wide, cumulative threats have been assessed as medium to high at every major coastal area used by Brant and for all aspects of the Brant's needs (e.g., nesting, moulting, wintering, and staging) from Mexico and California to Alaska and Arctic Canada and to the Russian Far East (Pacific Flyway Council 2002).

And what of the Bald Eagle nest trees? Along southeast Vancouver Island, the most detailed information exists in the area from just north of Campbell River to the south boundary of the Regional District of Nanaimo (South Wellington). In this area, at least 25% of the known breeding territories have lost one or more nest trees over the project's history and land use activities associated with development and industry have played a key role in 63% of these losses. Almost half of the territories (42%) have recently or are currently under development pressure in the core area around nest trees or will face extensive land development in the very near future (WiTS unpublished data). Save a handful of stewardship agreements, and a few conservation covenants (not through WiTS and many already breached), virtually no recruitment nest trees or perch trees have been officially protected.

In the absence of veteran Douglas-fir trees suitable for supporting massive nests (trees 100+ years old with a diameter at breast height >1.0 metre), the eagles are increasingly making smaller nests in younger grand fir trees with deformed tops and crown die-back (trees <100 years old with a diameter at breast height <1 metre). Unlike the veteran Douglas-firs, which may remain viable nesting sites for decades, these younger grand

firs regularly deteriorate in just a few years, once in decline, leaving the pair in search of another short-term nest tree (WiTS unpublished data). With projected growth rates in the study area, many WiTS participants are wondering how many high quality trees will be left in the near future (e.g., In the Comox Valley area, the population has doubled in size in the past 12 years and it is expected to double again in the next 15 to 18 years (Anonymous 2006).

The span of orthodox conservation techniques and measures practiced in the above local examples and over the globe for the past century – from stewardship to land acquisition to restoration activities and recovery plans, even factoring in our technological advances – seems impressive. In addition, the sheer numbers of us around the world working to protect global biodiversity must be staggering. In the United States alone, for example, Best (2006) notes "...that since 1970, the environmental movement has increased in funds and membership by about 5,000%. Today [2003], the movement is a multi-billion dollar industry – worth $6.95 billion …."

However, if we are to practice adaptive management and "learn by doing," we must reflect on the results of all this effort. In doing so, we have no choice but to conclude these orthodox actions alone, are not conserving biodiversity at a scale anywhere near what we'd hoped – and certainly not at the level needed for our own continued survival, as suggested by the results of the Millennium Ecosystem Assessment (2005). We believe we've been too intent on addressing only the symptoms; all the while the source of the problem continues to erode the natural ecosystems and their attendant biodiversity.

The real problem: our perennial demand for economic growth

Orthodox conservation measures, alone, are falling short of our expectations. Why? Because they are aimed at only the symptoms of biodiversity loss instead of the root cause: our perennial demand for economic growth.

After all, habitat loss and the resulting biodiversity declines are not occurring spontaneously – they are the result of ecosystem loss or conversion that is facilitated by economic activities such as urbanization, forestry, and agricultural practices, among others – significant sectors in our ever-growing economy. To understand this fully, one must have some appreciation of our conventional economic model and economic growth itself.

Economic growth is an increase in the production and consumption of goods and services and is a function of increasing population and per capita consumption (Czech

2000). Thus, it is an increase in throughput, or flow of natural resources, through the economy and back to the environment (Daly and Farley 2004).

Since everything humanity depends upon comes from the environment, economic growth only occurs when natural capital from the *economy of nature* is appropriated for use by the *human economy* where it is converted to manufactured capital and consumer goods (Czech 2000). Because of the tremendous breadth of the niche that humans occupy, the human economy grows at the competitive exclusion of wildlife in the aggregate (Figure 1). This is fundamental to our understanding of the current problem of biodiversity loss.

When the world was relatively "empty," the abundance of nature obscured the shortcomings of an economic model that ignored basic principles of physics and ecology. Now, however, the world is "full," and the 6.6 billion humans are beginning to see the effects of this faulty economic model and feel the pinch of shortages as nature's stockpile runs ever lower, a result of the continual increase of our per-capita consumption.

Studies show that we likely exceeded the carrying capacity of the planet sometime in the mid-1980s (World Wide Fund for Nature 2007). We have been harvesting renewable resources faster than nature can replenish them and are now eating into our natural capital. Further, our wastes are being dumped such that dwindling natural ecosystems are unable to assimilate them. Our pollutants are everywhere. This behaviour is not sustainable.

As conservationists, we can no longer ignore the fact that an economic model based on infinite growth on a finite planet with finite resources—a model with no connectivity to the biosphere—is fatally flawed.

Yet, the conventional or neoclassical economic model, under which much of the global economy operates today, assumes that infinite economic growth on a finite planet is possible; the economy is a perpetual motion machine that can run forever on its own output (Costanza 2004).

But the flow of economic throughput is not circular (Daly and Farley 2004). It flows one-way from low entropy (useful) resources to high entropy (used-up-ness) waste, according to the Second Law of Thermodynamics. To grow, the economy must take evermore useful matter and energy from the finite biosphere to produce goods and services; wastes are inevitable by-products. Thus, the economy cannot function simply by using only its own labour and waste as input.

While mainstream economists may think we can ignore the Second Law of Thermodynamics—perhaps the supreme, physical law of the universe—as Huxley observes: "Facts do not cease to exist just because they are ignored."

Czech (2000) has an insightful approach that looks at biodiversity loss using an ecological analogy, where he identifies economic growth as a *limiting factor* to wildlife conservation.

Recall that a *limiting factor* is a factor, such as food or water that controls a process, such as species population size. The key point is that if the limiting factor is not addressed, it doesn't matter what else you do; the effect you're after is unlikely to occur.

If economic growth is the limiting factor to biodiversity conservation—and we're convinced it is—economic growth is what has to be addressed. Otherwise, everything else we do to try and conserve biodiversity will be for naught, as the economy continues to steamroll over more and more ecosystems further reducing biodiversity and the ecosystem services that support all life on the planet. Sadly, addressing symptoms rather than the cause is where most conservationists, including us, have directed their energies.

Even if we continue to address non-limiting factors with extra vigilance, the best of intentions, super technologies, and an ever-increasing budget, it is clear that such actions alone will have little effect on biodiversity conservation because they do not address the limiting factor or the cause of the problem.

For example, even when we achieve the ultimate conservation strategy of securing biological habitats through the purchase of important conservation lands, one might ask: how did the funds for the purchase arise? If the funds arose as a result of economic growth, then, by definition, we know that some ecosystem somewhere, along with its attendant biodiversity has already been degraded or lost. As Czech (2000) asks, what then have we gained?

Even were it possible to acquire conservation lands through a means separate from economic growth, as long as society's overall goal is perennial economic growth, that growth will ultimately cave in the political boundaries of those "secured" habitats or pollute them from the outside as is now happening with a number of United States National Wildlife Refuges (National Wildlife Refuge Association 2005) and our own Wildlife Management Areas (Martin and Monty 2007).

The real solution: A steady state economy

The solution to this dilemma is to move towards a sustainable economy with a reasonably stabilized population and levels of consumption: a "steady state economy" (Daly 1996). Daly and Farley (2004) summarize the concept:

> *The main idea of a steady-state economy is to maintain constant stocks of wealth and people at levels that are sufficient for a long and good life. The throughput by which these stocks are maintained should be low rather than high, and always within the regenerative and absorptive capabilities of the ecosystem* [our emphasis].

The scale of the economy must also be sufficiently below the ecological limits (Figure 1) so that enough natural ecosystems and biodiversity remain to allow normal ecosystem functioning, which provides the ecosystem services necessary for life on Earth. Biodiversity is humanity's most important insurance policy.

A position statement from BC Nature?

Across North America, an increasing number of professional and conservation organizations have taken a position on the fundamental conflict between economic growth and biodiversity conservation recognizing the disparity between what conventional economists are promising and what's really happening to the biodiversity of the planet (see, e.g., Naidoo and Adamcowicz 2001). These organizations include the North American Section of the Society for Conservation Biology (2004), the United States Society for Ecological Economics (2005), The Wildlife Society (2005), British Columbia Field Ornithologists (2007) and the Lillooet Naturalist Society (2007). A similar position taken by the Center for the Advancement of the Steady State Economy has been endorsed by 19 organizations and signed by over 1,300 individuals on the internet (CASSE 2007).

Politicians, too, are now recognizing that without addressing economic growth, efforts to reduce carbon emissions to counter global climate change will be futile. Recently, a group of over 80 British MPs, members of an All-Party Parliamentary Climate Change Group, concluded that although government policies in Britain were lowering carbon emissions, more and more industrial plants resulting from economic growth were swamping the reductions. The group called for the abandonment of the two hundred year old, business-as-usual pursuit of economic growth (McCarthy 2006).

Below the masthead of each edition of *BC Nature* is the Federation motto "To know nature and to keep it worth knowing." We encourage BC Nature to join these illustrious organizations and forward-thinkers and adopt a position statement on the fundamental

conflict between economic growth and biodiversity conservation as a first step in addressing the causes of biodiversity loss in British Columbia. Only by addressing the causes of our environmental problems will we be able to "keep nature worth knowing."

How would BC Nature adopting such a position statement help? Here is how Czech (2007) explains it:

> *Imagine … the effects of such a campaign undertaken by a number of organizations such as the World Wildlife Fund, Sierra Club, American Rivers, and many others big and small, national and international in scope. This is how a conservation movement grows to adulthood …*
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> *Indeed, a collective position on economic growth … will empower reform in virtually every relevant venue. Letters to editors, university curricula, government agency briefings, congressional testimony, academic symposia, town hall meetings, books, political platforms, political campaigns—the sky is the limit. Ultimately, … the global community will acknowledge the fundamental conflict between economic growth and environmental protection. Only then will policy be formulated accordingly, and only then will we truly have environmental protection for the sake of biodiversity, human health, and posterity's economic security.* [Our emphasis.]

Again, we encourage BC Nature and its membership to become engaged in this collective effort.

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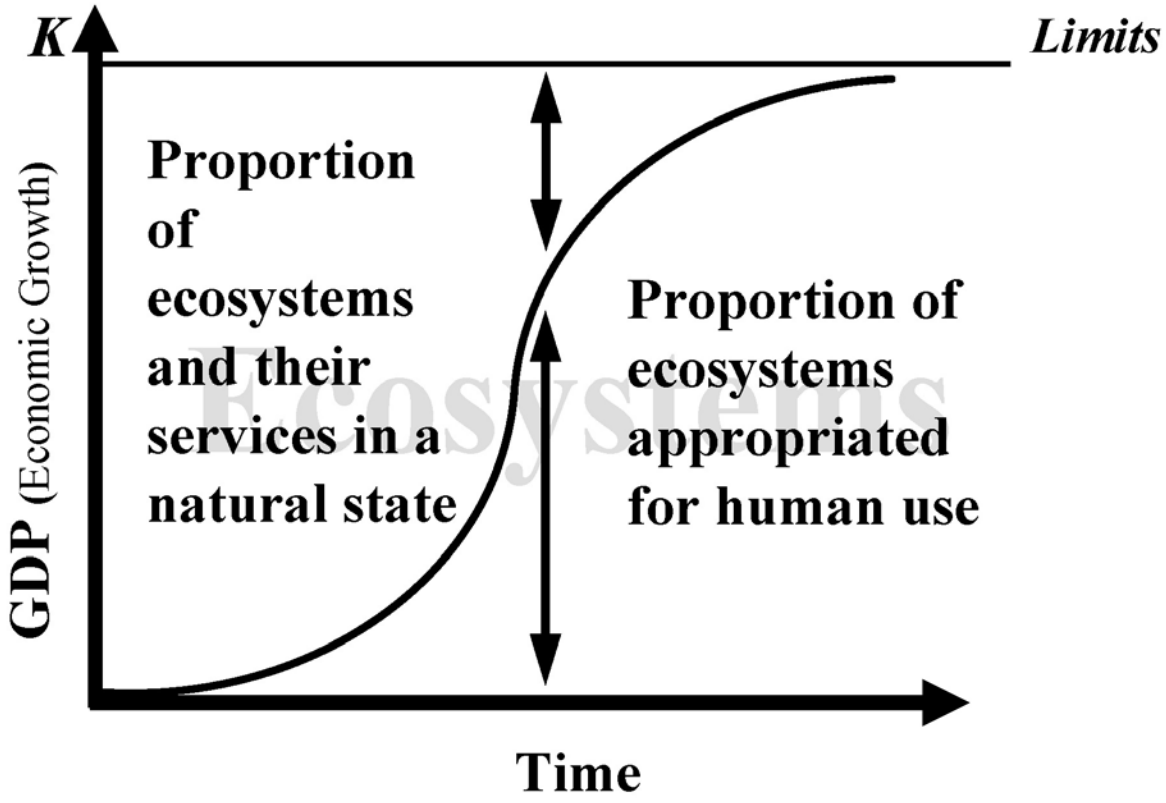

Figure 1. A fundamental conflict between economic growth and biodiversity conservation occurs because as the economy grows over time it appropriates a greater and greater proportion of natural capital from the economy of nature for use in the human economy. The tremendous breadth of the niche that humans occupy means that the human economy grows at the competitive exclusion of wildlife in the aggregate, thus a loss of biodiversity. K is carrying capacity (limits) for the human economy. A steady state economy would maintain the economy sufficiently below the limits so that the areal extent of ecosystems would be adequate to maintain biodiversity and thus allow proper ecosystem functioning (Adapted from Czech 2000).