Conservation Biology: an editorial

by Addicus L. Izard (1995)

The now readily apparent need to preserve biodiversity was catalyzed by documentation of the fact that many species and habitats have become increasingly scarce or are now extinct. The perceived rapid losses in biodiversity have alarmed the scientific community and the general public and resulted in public and political pressures to maintain biodiversity at the highest level possible. It was from these emotional and political foundations that conservation biology was born. As the ranks of conservation biologists swell with individuals from diverse backgrounds, so do the perceptions of the purpose of conservation biology as a discipline. Conservation biology is now riding the groundswell of public and scientific popularity. But for conservation biology to persist as a recognized and respected branch of science, its central objectives and boundaries must clearly be established and adhered to with uncompromising rigor.

Conservation biology is the branch of science concerned with maintenance of the highest practical level of biological diversity. This definition of the discipline brings with it many implicit responsibilities and limitations. First, because it is a science, it is understood that null and alternative hypotheses are developed based upon observation of phenomena in question. These hypotheses are then tested and conclusions are drawn based upon evidence produced by testing. When conservation biology is practiced as a science, conclusions drawn by conservation biologists and professional recommendations made by them should be based upon fact and evidence (albeit within a specified confidence interval) rather than upon rhetoric, personal views, or public opinion. Conservation biologists should use the impressive array of tools at their disposal to formulate management strategies for species, habitats, ecosystems, or biospheres whose objective is long-term management of viable populations of the greatest number of species possible. If conditions exist that are likely to cause a reduction in the level of biodiversity, they should be clearly identified and investigations concerning their predicted impact upon the biota, and ways to reduce or eliminate the impact should be initiated.

Conservation biology must bridge gaps between such diverse biological sub-disciplines as systematics, evolution, genetics, ecology, and such non-biological disciplines as economics, psychology, and marketing. A conservation biologist thus should draw on the expertise of people with in these fields as well as any others that are necessary to develop workable management plans well grounded in scientific evidence. The development of such coherent, integrated management strategies is conservation biology – the systematic, taxonomic, genetic, or psychological studies which must be done prior to, or incidental to development of the management plan are not; neither is conservation biology consonant with environmentalism or eco-terrorism.

If the central theme of conservation biology is to be management of biological systems such that the highest practical level of biodiversity is maintained, then the highest priority is development of management plans based upon existing knowledge of species-habitat interactions that minimize short-term loss of biodiversity. These management plans can be refined by additional data as they become available. Two of the strongest tools for development of these management strategies are population viability analyses (PVA) and population modeling. These approaches should be established using existing data for the species present or "best guess" where necessary data do not exist. Additionally, monitoring the system after management initiation is essential and will provide more data to help refine management models. Such plans, based on available evidence, will provide policy makers with data concerning the probability of species loss under existing or projected conditions, and, more importantly, possible alternatives to extinction.

When this general approach is put into practice, special research needs will become obvious as management plans are developed and implemented. These needs will necessitate investigation by conservation biologist and members of associated disciplines. Because scientific hypotheses are based on observations, and the focus of conservation biology is biodiversity, one area in need of intense and continuous investigation is systematics. One cannot presume to conserve biological diversity in a given area unless some estimate of the area's diversity is available.

Such estimates are achieved through surveys of the area and subsequent systematic investigations of the specimens, including a consideration of taxonomic and genetic relationships and intraspecific variation. To further refine management strategies, the natural history of the component species and their ecological relationships warrant careful consideration. Indeed, the natural history of species is the foundation upon which any management scheme is built. With these basic data, a management plan for non-human species can be developed – but this is only a first step. Any management strategy that is to have a reasonable chance of success must not merely be palatable to the people it affects, it must be delectable! Thus, a significant component of the research involved in developing a management plan should center around selling the concept to the public. If there is a strong enough public demand for a product then private, political, and corporate policies can be brought into alignment with the desired goal. Fortunately, much of the information needed in this area is readily available from such non-biological fields as marketing and psychology. Furthermore, the developing environmental awareness of the public should be taken as an indication of growing receptivity to environmental management on an unprecedented scale.

Conservation biologists, with their current high public and political profile, are in a unique position to promote basic systematic, ecological, and natural history research through identification of these needs in management proposals. Their current profile also enables them to promote interdisciplinary interaction and integration. Conservation biology's present popularity enables practitioners to radically alter public opinion, but this ability must be used exceedingly judiciously and only in directions consistent with sound biological evidence.

One theme that runs through many contemporary conservation biology publications is that we are in need of a new paradigm before conservation of biodiversity can be successful and that our currently prevailing anthropocentric approach to biodiversity cannot work. The oft proposed biocentric approach is an alternative that I do not believe is viable. Maintenance of biodiversity under the anthropocentric view of the world that currently holds sway is considerably more realistic than attempting to change the views of the majority of the world's population. Furthermore, the mechanisms for maintenance of diversity are already in place. When costs are accurately computed for maintenance of severely disturbed systems and charged to the entity responsible for the disruption, and these costs are weighed against the benefit gained, an equilibrium should be quickly reached. The equilibrium can be altered by assigning value to, or weighting such intangibles as aesthetics, diversity, and "naturalness". However, for such an economic approach to produce results, policy makers must have at their disposal hard scientific data that estimates the cost needed to replace biological processes in a given system with synthetic manipulations. Research along these lines should be promoted and initiated by conservation biologists as vital to any comprehensive management plan.

These few goals and avenues of approach should provide a framework that allows competent scientists to construct and test hypotheses which in turn raise additional questions. Thus, scientific progress leads inevitably to rapid development of workable management schemes through a combination of deductive and inductive reasoning (see Platt, 1964). Conservation biology research along these lines has enjoyed considerable success in the forms of scientific design of reserves to maximize efficiency (Frankel and Soule, 1981; Diamond, 1986) and development of the conceptual framework of effective population size (Lande and Barrowclough, 1987).

The major problem with much of conservation biology (or what is presented as conservation biology) as it is currently practiced is the reliance on rhetoric rather than documentation in many instances. Proof of hypotheses through experimentation will carry more weight for policy determination than posturing and proclamations. It is imperative that the science of conservation biology should be maintained as such by stringent peer review of published research to prevent confounding of science with personal bias (see Deshmukh, 1989; Murphy, 1990).

A reply to Izard

Conservation Biology:
what it is not, what it should become

Eve Adams (1995)

Conservation biology, is not, as Izard suggests, a branch of science in the traditional sense of the word. Instead, it represents a radical departure from conventional science and the outworn illusion of the scientist as a dispassionate and fully objective agent. For conservation biology to have any lasting significance, its practitioners must abandon the tradition of a detachment from the object of their study and embrace the subjectivity underlying value centered decision-making.

Conservation biology is inherently and necessarily value centered. As Izard correctly suggests, conservation biology is "concerned with maintenance of the highest practical level of biological diversity." However, the key word in this definition is 'practical' – the level of biological diversity deemed practical by a corporate executive or an international banker will often be far different from that judged practical by an ecologist, an artist, or a leader of an indigenous culture. We must face the fact that there are no objective standards of practicality. Conservation biology is therefore necessarily value-centered and values are inherently subjective, culturally based, and emotionally linked. To be effective, conservation biology must become a "practical passion" with science as one among several means to some chosen, desirable end.

Does this mean that science loses it special status and becomes no different than propaganda? Certainly not! Science, that grand abstraction resulting from individual endeavors of working scientists, retains it collective objectivity precisely by abandoning false objectivity at the level of the individual. The phenomenon of scientific objectivity is a result of honest inter-subjectivity. Such transcendent inter-subjectivity is best attained by recognizing the subjective foundations of observations and research goals and advocating strong positions based on those foundations.

The most direct route to sound consensus is honest and open subjectivity. Hiding behind a screen of false and unattainable objectivity often results in a political impasse. In such cases, not to decide is to decide to do nothing – and deciding to do nothing is a luxury not afforded to conservation biologists given the goal of maintaining maximum biological diversity and the fact that we are currently eliminating species at unprecedented rates. A conservation biologist can and should state with conviction and confidence the subjective values guiding research efforts. Precisely because these values are compelling and convincing, bold advocacy by committed individuals can preserve the possibility of maintaining both biological diversity and collective phenomenological objectivity.

According to an emerging consensus among sociologists of science, neither reason nor the evidence of nature can provide a sufficient foundation for scientific judgements. What counts as rational and what counts as evidence varies from setting to setting, from individual to individual. Consider, for example, Izard's claim that the "scientific design of reserves to maximize efficiency" has enjoyed considerable success. Implicit in his praise is the belief that efficiency is an unquestionably worthy goal. This subjective belief in the intrinsic value of efficiency cannot be fully justified by recourse to either empirical evidence or reason. It is an article of faith, an implicit and unexamined element of a particular worldview.

As Paul Feyerabend and others have correctly observed, "the scientific method," as a rigorously imposed monolithic procedural code, does not exist in individual practice. The tidy scientific method of textbooks is at best a *post hoc* reorganizing of subjective experiences and processes. It is a retelling aimed at providing the air of objectivity and certainty that the public has come to expect from a scientific priesthood. Part of this retelling has been to devalue the subjective and emotive aspects of the scientific process. Hard data and empirical evidence must outweigh passion and feeling. As eco-feminists claim, characterizing feeling and emotion as feminine and then devaluing them in science has contributed to both oppression of women and the ongoing assault on biodiversity (Merchant 1985). We are living out the legacy of a science grounded in Francis Bacon's infamous dictum that, "nature is a witch and a whore and it is the task of science to torture her secrets from her."

Anyone who studies complex systems knows that certainty is a most elusive quality. Nevertheless, given the stakes involved, it remains critical that conservation biologists confidently express the fullness of their subjective convictions. No conservation biologist need be shamed away from a position of honest advocacy. For Izard, "the major problem with ...conservation biology as it is currently practiced is the reliance on rhetoric rather than documentation ..." Far from being a weakness, this as a strength of conservation biology. While rhetorical arguments can becomes quagmires of semantics and wordplay, they still strike much closer to central values than reliance on what must often remain inconclusive empirical evidence.

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Two views of conservation biology: disparate opinions as a teaching tool[1]

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The future of conservation biology depends on the values and morays of society. People who believe in the value of biological diversity and ecological integrity will make the investments and sacrifices necessary to support conservation efforts. However, the complexity of many conservation situation can lead people to conclude that they lack power to effect any real change. Consequently, clearly presenting the case for our capacity for conservation is crucial to our discipline and perhaps even to the very sustainability of life on our planet.

Undergraduate teaching offers a particularly fertile opportunity for shaping conservation commitments. Student learning can be enhanced by participating in structured dialogues. This is particularly true in readings courses and recitations sessions. Presenting contrasting opinions stimulates student participation because it underscores vitality of the subject.

Because authors of primary literature often recognize and incorporate many subtle points into their presentations, major differences of perspective can be obscured. Therefore, to present the sharpest possible contrast between two perspectives on conservation biology, authored a pair of contrasting papers under pseudonyms. We have used these papers in several courses and have found them to be very useful in stimulating dialogue and in bringing contrasting views into sharp relief.

[1]*This pair of essays may be freely copied and used providing that attribution to the original authors remains attached. Comments and suggestions are welcome and appreciated.*

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