

Evaluating the Conservation Mission of Zoos, Aquariums, Botanical Gardens, and Natural History Museums

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Abstract: *Collection-based institutions—zoos, aquariums, museums, and botanical gardens—exhibit wildlife and thus have a special connection with nature. Many of these institutions emphasize a mission of conservation, and, undeniably, they do contribute directly to conservation education and conservation science. They present an exceptional opportunity for many urban residents to see the wonders of life, and they can contribute to education and habitat preservation. Because many collection-based institutions now hold a stated mission of conservation, we suggest eight potential questions to evaluate actions toward that mission: (1) Does conservation thought define policy decisions? (2) Is there sufficient organizational funding for conservation activities? (3) Is there a functional conservation department? (4) Does the institution advocate for conservation? (5) Do conservation education programs effectively target children and adults? (6) Does the institution contribute directly to habitat protection locally and internationally? (7) Do exhibits explain and promote conservation efforts? and (8) Do internal policies and activities protect the environment? These questions are offered as a place to begin discussion. We hope they will help employees and administrators of a collection-based institution (and citizens of the surrounding community) think about and support their institution's conservation activities. Public support and praise for institutions that are striving toward solutions for conservation problems and pressure on organizations that are moving more slowly toward a conservation orientation can help shift more resources toward saving nature.*

Evaluación de la Misión de Conservación de Zoológicos, Acuarios, Jardines Botánicos o Museos de Historia Natural

Resumen: *Las instituciones basadas en colecciones (zoológicos, acuarios, museos y jardines botánicos) exhiben vida silvestre. Por lo tanto, tienen una conexión especial con la naturaleza. Muchas de estas instituciones destacan una misión de conservación y, sin duda contribuyen directamente a la educación y la ciencia de la conservación. Brindan una oportunidad excepcional para que muchos residentes urbanos vean las maravillas de la vida, y pueden contribuir a la educación y a la preservación del hábitat. Debido a que en la actualidad muchas de las instituciones basadas en colecciones tienen una misión de conservación manifiesta, sugerimos ocho preguntas potenciales para evaluar las acciones hacia el cumplimiento de esa misión: (1) ¿Las consideraciones sobre la conservación definen las decisiones sobre políticas? (2) ¿Hay suficiente financiamiento organizacional para las actividades de conservación? (3) ¿Hay un departamento de conservación que funcione? (4) ¿La institución aboga por la conservación? (5) ¿Los programas de educación en conservación se*

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enfocan eficientemente sobre niños y adultos? (6) ¿La institución contribuye directamente a la conservación del hábitat a nivel local e internacional? (7) ¿Las exhibiciones explican y promueven los esfuerzos de conservación? y (8) ¿Las políticas y actividades internas protegen el ambiente? Estas preguntas se ofrecen como un marco para iniciar la discusión. Esperamos que ayuden a los empleados y administradores de una institución basada en colecciones (y a los ciudadanos de la comunidad en la que se encuentra) a reflexionar sobre las actividades de conservación de su institución y lograr que las apoyen. El apoyo y el reconocimiento público de aquellas instituciones que pugnan por soluciones para los problemas de conservación y la presión sobre aquellas organizaciones que se están moviendo más lentamente hacia una orientación de conservación pueden ayudar a destinar más recursos para salvaguardar la naturaleza.

Introduction

The complexity and magnitude of threats to nature are well documented (Soulé 1986; Wilson 1992, 2002; Meffe & Carroll 1997; Primack 2002). Human numbers grew from 2.5 billion people to 6 billion in the last two generations and may reach 12 billion in the next two (Wilson 1992, 2002). Our species uses 40% of all net primary productivity (Vitousek et al. 1986) and more than half of the world's renewable fresh water (Raven 2002). Those rates will increase as our numbers do. Over the last 50 years, our planet has lost 30% of its forests, 20% of its topsoil, and 20% of its agricultural land (Raven 2002). In two more generations, tropical forests will only be 5% of their original size (Primack 2002; P. Raven, keynote address to 2001 National American Zoo and Aquarium Association [AZA] Conference).

As this trend continues, humans increasingly invade and destroy the remaining natural areas. We are well on the way to losing between half and two-thirds of all species on our planet during the next four generations of human life (Wilson 1992, 2002; Raven 2002). Collection-based institutions—zoos, aquariums, botanical gardens, and natural history museums—can play a significant role in changing this trend.

Most collection-based institutions became interested in conservation issues during the last four decades, as society became more aware of losses to nature. Although these institutions contribute directly to conservation science and conservation education, various authors have urged them to do much more (Rabb 1994, 2001; Conway 1995, 2000; Hutchins et al. 1995; Wemmer 2002; P. Raven keynote address for 2001 National AZA Conference; Hutchins 2003).

This is not a comparative issue of whether collection-based institutions do more or less for conservation than other types of organizations. The point is that any not-for-profit organization should be held accountable to its mission. Just as universities should be held accountable to a mission of education, collection-based institutions that claim a mission of conservation should be held accountable to that mission.

Collection-based institutions acting on a mission of conservation can contribute much to the cause. For urban

populations, collection-based institutions offer an exceptional opportunity to see the wonders of life. When exhibits are presented in a meaningful context, and with an appropriate message, they can educate visitors about important conservation issues (Kellert 1996; Stoinski et al. 2002). About 50% of the world's people live in cities, and that proportion will continue to grow (Brown et al. 1998). Because urban life is so disconnected from nature, collection-based institutions have the potential to stimulate curiosity about wildlife, offer educational opportunities about nature, and improve the chances of winning support for its preservation.

Collection-based institutions have multiple missions, with many obligations and objectives, but if they claim a mission of conservation, they should allocate significant resources toward that goal. Indeed, an active conservation program can support—even markedly enhance—the ability to reach other institutional objectives. Results of an independent study sponsored by the Cleveland Zoological Society suggest that a significant source of new donor funds for zoos have come from their conservation, education, and scientific programs (Conway & Hutchins 2001).

We also wish to call attention to the fact that the U.S. Fish and Wildlife Service has recently emphasized its expectation that institutions seeking permits to own certain endangered species should demonstrate that approvals will enhance the survival of the species in the wild. Thus, a strong conservation role soon may be important to the future viability of institutions that rely on collections from nature.

Meaning of a Conservation Mission

In the United States, the mission statements of many collection-based institutions highlight conservation, but that means different things in different institutions. For this paper we follow Wilson (1992), Meffe and Carroll (1997), Primack (2002), and Soulé and Noss (1998) in defining conservation as a value-driven discipline based on the premise that the preservation of species diversity, ecological systems, and evolutionary processes in nature is important to the maintenance of life on our planet.

Conservationists seek ways to protect natural systems and heal the wounds of degraded systems (Soulé & Noss 1998). Conservation actions are ultimately unsuccessful if the amount of wild lands and wildlife continues to decline. Sadly, however, virtually all wild lands and ecosystems are continuing to decline—and ever more rapidly. It is clear that the nature and aspirations of conservation activities must deal with these realities.

If a collection-based institution has a mission of conservation, then that mission should be an integral *raison d'être* for the entire institution. A mission implies more than simply taking green actions when they are convenient. Although green actions are important, they do not necessarily preserve natural systems or biodiversity. Many corporations use green actions to promote a positive image. The corporate paradigm may provide room for green actions so long as such programs do not interfere seriously with profit. On the other hand, most collection-based institutions are not-for-profit organizations. Although not-for-profit organizations obviously need income to remain afloat, the purpose of the income is to perform the public services inherent in their missions.

If collection-based institutions choose a mission of conservation, then discussing a set of guidelines seems appropriate to ensure success. Specifically, what amount of effort reflects a true mission of conservation? On personnel performance evaluations, quantifiable tasks are used to measure an individual's effectiveness on the job. A mission requires no less. And, without evaluation, it will be hard to learn from experience and improve performance (Kleiman et al. 2000).

We suggest eight questions aimed at evaluating a mission of conservation in a collection-based institution. They are not meant to be comprehensive but to stimulate discussion. In the spirit of adaptive management, these questions can help administrators (and the public they serve) to evaluate how successfully a collection-based institution fulfills its mission of conservation and how its commitment can be improved.

The issues raised below may seem like preaching to the converted. After all, such views have appeared in the media outlets of collection-based institutions for several decades. People outside the collection-based professions should care as well. Although many collection-based professionals enthusiastically support conservation, the trend toward running nonprofit institutions with a short-term corporate philosophy does not bode well for a strong commitment to the long-term mission of conservation.

Collection-based organizations must respond to their local constituencies. Public support and praise for those organizations that meet their mission of conservation, or pressure on those organizations that do not, can help shift more resources toward saving nature. Evaluation should be both internal and external (Kleiman et al. 2000). External evaluation and support could come from an organization such as the Society for Conservation Biology

at a sectional level, perhaps through cooperation with the respective national associations. External evaluations could also provide useful graduate projects. The following questions can help evaluate how well a collection-based institution fulfills a mission of conservation and how conservation actions can be improved.

(1) Does conservation define institutional policy decisions?

A mission of conservation means that conservation values are instilled directly into the decision-making process of the organization. With every decision, board members and administrators should ask themselves about the implications of this policy for nature. Collection-based institutions can speed this cultural transition by considering candidates trained in conservation when hiring new directors and administrators and when appointing new trustees. For example, the current president of the Society for Conservation Biology was recently hired to be director of Woodland Park Zoo.

We do not mean to imply that present institutional directors are opposed to conservation. At the 2000 AZA director's retreat, nearly all the directors present agreed that zoos and aquariums should be doing more field conservation. The question we ask is whether that support runs deeply enough to transform sentiment into policy or whether sentiment is overwhelmed by other core values. If conservation is a mission, then it should receive more than vocal approval. It should be a primary consideration in determining policy.

The most direct measure of success is an outcome in the field, but clear results take a long time. So until outcome is clear, we suggest some short-term measures for evaluating a mission. Because generation of revenue in a nonprofit organization is geared toward fulfilling the missions of that institution, level of financial commitment to each mission is one measure of the level of support for stated purposes. Level of effort by salaried employees toward the missions is another method of evaluation. An indirect measure of effectiveness in conservation is the level of open discussion in an organizational structure (Mazur & Clark 2000). Such problem-solving teams can also include experts from outside of the collection-based institutions (P. Raven, keynote address for 2001 National AZA Conference).

(2) Does the institution have significant organizational funding for conservation activities?

Does the institution claiming a mission of conservation actually put its money where its mouth is? Financial commitment includes both operating expenses allocated by the institution to conservation and income raised from outside sources for conservation. Inevitably, financial commitment defines policy.

Zoos in the United States alone spend a total of about \$1 billion a year in operating expenses (Primack 2002).

Only a handful of collection-based institutions commit more than 5% of their operating budget to conservation. Indeed, 10% of an operating budget may be insufficient for a mission. The Wildlife Conservation Society dedicates more than 25% of its total budget to conservation, and that percentage is what we consider a benchmark for collection-based institutions. Of course, outcome is the final measure of success. But, again, outcomes take time, and funding levels can be a short-term measure of commitment. Financial support for a conservation department does not guarantee success, but it can greatly elevate the chances of success. Directing a portion of money that is raised for capital construction can also provide additional avenues of funding. Such a strategy links a capital campaign to the social missions of the institution.

Sound support for conservation will greatly benefit an institution. Conway and Hutchins (2001) cite the incentives a conservation and education program provides for donors. At the regional level, conservation of nature has more than aesthetic or intrinsic value, and healthy ecological systems contribute fundamental support to an economy (Myers 1988; Rasker & Hackman 1996; Costanza et al. 1997; Pimentel et al. 1997, 2000; Balmford et al. 2002). An institution that actively contributes to conservation also contributes to those economic benefits. Finally, collection-based institutions owe their very existence to nature.

(3) Does the institution have a functional conservation department that performs conservation science and/or increases the capacity of others to do conservation?

Having scientists on staff, or access to scientists through agreements with other institutions, is important for conducting or evaluating conservation projects. Collection-based institutions are also a popular source of information about the environment (Mench & Kreger 1996; Conway & Hutchins 2001), so a staff of trained professionals would support that image. The contributions of sound science for the protection of nature, accurate conservation education, and top-flight wildlife management training programs are important components of conservation. Thus, collection-based institutions should place a priority on employing more highly trained conservation scientists (Kaufman & Zaremba 1995; Hutchins 2003). Curators can be particularly effective contributors to conservation at many levels if they have the appropriate background and if the institution is able to provide suitable support. Usually, however, their collection responsibilities come first.

Many collection-based institutions catalog biological diversity, and that is valuable science, but taken alone it is insufficient for a mission of conservation because the problems of nature have become too immediate. The crisis is such that the first priority of conservation science should be to stop the degradation of nature.

Producing capable and prepared leaders is one of the greatest legacies an institution can leave. Conservation biologists from collection-based institutions can, and do, teach at universities and mentor graduate students as adjunct faculty members. The teaching stipend can be dedicated to scholarship funds, research expenses, or other forms of capacity-building (as is done at the Denver Zoo). As an example, in 2002 the Missouri Botanical Garden had cooperative agreements with four area universities, and 32 graduate students had an advisor from the Missouri Botanical Garden. The Smithsonian National Zoological Park has cooperative agreements with three local universities and mentors high school students in advanced science programs.

International training programs have been highly successful for the Conservation and Research Center of the Smithsonian National Zoological Park (Rudran & Wemmer 2001). That program alone has produced over 3000 alumni in the last two decades. Many of these alumni now hold prominent positions in their home countries. The Wildlife Conservation Society has extensive programs around the globe to train the next generation of conservationists (Bennet & Rabinowitz 2001). An international training program by the Chicago Field Museum of Natural History, the Chicago Zoological Society, the John G. Shedd Aquarium, the University of Illinois at Chicago, and the University of Chicago is exemplary for its cooperative nature (Jackson 2001). Raising national capacity to manage protected areas and threatened species is the heart and soul of a conservation mission. Indeed, conservation will not be implemented around the world until there are enough local citizens to advise their governments accurately about the problems and issues involved (P. Raven keynote address for 2001 National AZA Conference).

(4) Does the institution advocate for conservation?

Collection-based institutions have an important obligation to be advocates for and advise decision-makers about specific conservation issues (Conway 2000; Hutchins 2003). According to recent surveys by the Mellman Group and Roper, such institutions are a highly trusted source of information about the environment (Mench & Kreger 1996; Conway & Hutchins 2001), so they can play an influential role by bringing important issues to their local community through press conferences, public speaking, newspaper articles and editorials, magazine articles, and television.

Some collection-based institutions emphasize their need to remain apolitical so as not to be seen as lobbyists. The Merriam-Webster dictionary defines politics as "guiding or influencing governmental policy." If collection-based institutions campaign for bond issues that benefit their facilities, and if they have a mission of conservation, then they should be equally committed to the conservation of nature. It is particularly pertinent that

collection-based institutions be advocates for species that are endangered in nature when the exhibition of those species promotes the growth of the institution (or political agenda of a nongovernmental organization, for that matter).

Society expects the scientists of collection-based institutions to provide expert information, opinion, and testimony, which is quite legal. The law even permits a certain amount of lobbying so long as it is not a significant part of a tax-exempt institution's activity. Claiming neutrality on an issue is a conscious choice. Neutrality often indicates support of existing actions—or inaction—that may be damaging to wildlife. Thus, having a mission of conservation is incompatible with an institutional position of political neutrality. As Peter Raven said, “to not be politically active in a democracy like the United States is basically to dishonor the principles on which our republic was founded” (P. Raven, keynote address for 2001 National AZA Conference).

(5) Do the institution's conservation education programs effectively target children and adults?

Collection-based institutions should explore how they can move people to conserve nature. Each institution must take advantage of its special opportunities and the rapidly evolving techniques that are available. The outcome of education for conservation is the ultimate measure. Education can dispense facts and still have little impact on conservation (Reading 1993; Kellert et al. 1996). To affect conservation, education needs to reinforce values and beliefs that have a positive effect on nature and change values and beliefs that have a negative effect on nature; the latter is extremely difficult (Williams 1979; Tessler & Shaffer 1990; Olson & Zanna 1993; Kellert 1996). Follow-up testing is important to gauge success and refine efforts (Jacobson 1999).

Active outreach programs that train local teachers to present environmental lessons increase the efficiency of education efforts (Kellert 1996). Many collection-based institutions have outreach programs that involve visits to local schools or development of classroom activities. The Missouri Botanical Garden reaches 108,000 children and another 2700 teachers annually. The Wildlife Conservation Society provides schools with curricula on conservation in all 50 states and in 15 countries, and it provides training for teachers. Each month, education staff in the WIN-WIN program of the Denver Zoo visits more than 10,000 Denver students in their schools (preschool to fifth grade). Children undoubtedly take some of those ideas home to their parents.

Unless it is carefully planned, passive education inside an institution—simply hoping people read the signs—will be less successful than the active approach. Visitors often spend too little time at exhibits and leave with misconceptions (Marcellini & Jensson 1988; Kellert 1996). Selective

memory, selective reception, and selective interpretation (along with message clarity, accuracy, context, and frequency of receiving the message) can all work against passive education efforts (Williams 1979; Tessler & Shaffer 1990; Olson & Zanna 1993; Kellert 1996).

Many adults have an economic stake in the policies that affect conservation issues, so adult education requires sensitivity and preparation. Developing education and public relations programs is no easy task when values and attitudes are strongly held by antagonistic groups, and social science research can reveal important information about how to reach people (Kellert 1996). Furthermore, to build an image as serious adult educators, collection-based institutions should pay close attention to the context of their messages (Seidman 1992; Mench & Kreger 1996; Reading & Miller 1997; Hutchins 2003). Those messages must attract people, but they should not demean an institution's educational image or increase the perception of human domination over nature (Kellert 1996; Mench & Kreger 1996; Reading & Miller 1997).

(6) Does the institution contribute directly to habitat protection, both internationally and locally?

Some collection-based institutions provide direct financial assistance to parks, refuges, and reserves, and the adopt-a-park concept is growing. Five examples are (1) the partnership between the Minnesota Zoo and Ujung Kulon National Park on Java, Indonesia (Tilson & Sriyanto 2001); (2) the Wildlife Conservation Society's long-term commitment to help protect at least 28 wild and large landscapes in the Americas, Africa, Asia, and Oceania; (3) Brevard Zoo's assistance in buying land for a national park in the Caribbean island of Dominica; (4) Roger Williams Zoo's help with starting a wildlife protection area in Papua New Guinea; and (5) the Missouri Botanical Garden's pioneering efforts in bioprospecting and promotion of the value of tropical forests.

Scientific planning can help identify important habitats that are at risk and connections to link existing protected areas. A proactive approach integrating nature with human society requires scientific planning over large geographic and evolutionary time scales. For examples of such plans, refer to The Sky Islands Wildlands Network Design (the Wildlands Project), Paseo Pantera (Wildlife Conservation Society), and the Southern Rockies Wildlands Vision (Southern Rockies Ecosystem Project, Denver Zoological Foundation, the Wildlands Project).

It is also important for the institution to act in the local community. The Vancouver Public Aquarium uses student volunteers to restore shorelines of British Columbia (Marliave et al. 1999), the Baltimore Zoo restored a wetland habitat on zoo grounds for the endangered bog turtle (*Clemmys mublenbergii*) (Wisnieski & Poole 1999), and the Tennessee Aquarium restored bog turtles to Tennessee wetlands (Tryon 2001). The Monterey Bay

Aquarium promotes understanding and conservation of local marine and freshwater ecosystems.

(7) Do the institution's exhibits promote conservation efforts?

Conway (2000:12) proposed three central questions for every new exhibit or master plan: "(1) If this exhibit were not built, would wildlife be hurt, helped, or unaffected? (2) Will it provide for the continuity of its inhabitants? (3) Will it contribute to species preservation in nature?" All three questions should be answered positively before an exhibit is installed. For example, will stocking an exhibit affect wild populations? In some cases, a single aquarium may capture thousands of marine organisms from the ocean for its exhibits. Many marine populations do not reproduce in captivity, and they must be replenished constantly from wild stock.

Yet even if capture for an exhibit does not affect the wild population directly, it is still beneficial to consider the cumulative and indirect effects. Is the exhibit ethically justifiable? Does it promote trade in wild animals or plants by stimulating interest in having exotic pets at home? If so, is the trade sustainable? The market for parrots, reptiles, cacti, and aquariums in homes, offices, and restaurants is growing fast and is likely unsustainable.

Exhibit planning and design teams profit from including a conservation biologist and a specialist in conservation education, and institutions increasingly are developing such collaborations. Exhibits can benefit conservation if they promote positive values and attitudes toward nature—attitudes that lead people to nurture instead of exploit or control nature. Exhibit graphics that provide more than isolated facts—that convey messages empowering people to become more active in conservation—are very beneficial. If exhibits cannot promote positive values toward nature, they are extremely difficult to justify as conservation education.

The context of an exhibit is important. In some cases, the act of confining an animal has been shown to reinforce existing attitudes of human superiority and domination over nature, especially if people believe that animals are being exhibited only for the visitor's pleasure (Kellert 1996). If the educational content of an exhibit is hidden in a context of domination, it can create as much harm as good. To that effect, Seidman (1992) of the Phoenix Zoo has posed an interesting question: What if a desire to be entertained by animals is part of the worldview that nature is simply a commodity to be exploited for our benefit?

(8) Do the institution's internal operating policies protect the environment?

Collection-based institutions often form internal committees to review operations and make recommendations for conserving resources. This can indirectly affect habitat be-

cause collection-based institutions can use large amounts of water, electricity, paper, food, energy, and other resources, and they can produce large amounts of waste. By reducing resource use and promoting such use through educational materials, collection-based institutions can be positive role models.

The by-product of environmentally friendly actions is increased efficiency, often with associated monetary savings. So, being good conservationists within an institution can also mean good business. But in other cases conservation measures may be more expensive. For example, using recycled materials for building construction may cost more because the technology is new. It is worth investigating, however, whether the extra cost of recycled materials truly is beneficial. Some recycled products may save wood but use more water and energy in the process.

Conclusions

People working in collection-based institutions increasingly discuss the importance of conservation, but a survey across institutions would demonstrate dramatic differences in commitment. The small size of many conservation departments is a serious obstacle to the success of programs. Where such departments are composed of but one or two people, it is difficult for them to be effective at anything more than very small projects, especially if they are administratively or scientifically isolated. The problems in conservation exist at the regional and continental scale (Soulé & Noss 1998).

Cooperating with other organizations to solve a specific problem is one way collection-based institutions can address large-scale issues effectively. They can form regional consortiums to address landscape-level conservation issues, promote parks and wilderness, or sponsor a permanent conservation team. As an example, zoos, agencies, and nongovernmental organizations are cooperating to explore solutions to the bushmeat crisis (Eves & Hutchins 2001).

The assets that collection-based institutions can provide to conservation are unique and potentially effective. They have living organisms (or dioramas) to convey a message and representations of habitats they wish to save. These collections provide an easy bridge to academic institutions and other organizations wishing to train future leaders. As established institutions in a community, they have an influential voice in conservation debates. That position also gives collection-based institutions advantages in fundraising for conservation activities (Hutchins & Ballentine 2001).

A clear challenge for institutions with a mission of conservation is to find ways to create a new and effective base of political support, financial help, and scientific expertise to save as much of nature as possible in the face of obstacles that are almost unrivaled in complexity.

Although statement of a conservation mission recognizes this need, the question we ask is whether collection-based institutions are living up to that mission. We hope that the questions presented here will stimulate administrators to evaluate how effectively their institution meets a mission of conservation. Time is short. Conservation is about life, and each day that we dally, more is lost. The degree to which collection-based institutions can successfully retool existing facilities, use innovative models when building new facilities, and change their prime function from visitor recreation to the fundamental community service of conservation will have a profound effect on the fate of Earth's marvelous wild creatures.

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