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A Literary Examination of the Efficacy of Zoological Conservation
in the United States versus Foreign Efforts

by

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An Introduction to Conservation:

Conservation is defined as the careful preservation and protection of something. With such an ambiguous definition, conservation methodology can be applied in instrumental and intrinsic manners in countless disciplines and is especially relevant due to the current state of species across the world. This examination of zoological conservation in the United States will compare efficacy to that of global efforts. As humans continue to alter and destroy habitats at the expense of other organisms, the need for conservation of the species we endanger only grows (Aguirre, 2016). The constant assessment of the field of zoologic conservation is necessary to provide aid to species in crisis before it is too late for recovery. The examination of conservation work done in the U.S compared to foreign efforts can provide insight into strengths, reveal weaknesses, and help us better serve threatened species around the world.

Two strategies of conservation are employed today, *in-situ* and *ex-situ* conservation (Keulartz, 2015). *Ex-situ* conservation is what many people think of when considering the work of zoos. It is the active conservation of a species outside of its natural habitat, meaning actively maintaining a species while in human captivity. In contrast, *in-situ* conservation protects a species while it remains in its natural habitat, also orchestrated by zoos and other wildlife organizations, commonly called place-based conservation (Keulartz, 2015). Depending on the species, one method might be selected over the other due to sheer feasibility; this could be due to the species' sensitivity, size, and accessibility. The species we commonly see in zoos are related to the conservation methods employed for said species, as well as public appeal. The variability of species represented in zoos has come into question and currently is an important focus of conservation (Jacken, 2020). Due to the need to generate public revenue, zoos commonly keep large, though not critically threatened, vertebrates that appeal to people through personality and

charisma (Fa et al., 2014). This points to an area for improvement and a reminder of the variable stressors zoos face, a chimeric condition that is not unique to the U.S. (Ward et al., 2020).

As zoologic conservation aims to conserve threatened species, it is also important to examine how these efforts may be causing indirect harm. Harm takes on various forms and could look like the reintroduction of individuals with decreased fitness that negatively impact the wild population, causing greater disruption to an ecosystem in unpredicted ways (Johnsson et al., 2014). The ecological ramifications of conservation are a dynamic and ever-evolving question; the interaction of species, other biotic counterparts, and their environment is often unpredictable or reveals questions previously unanticipated.

The Association of Zoos and Aquariums, or AZA, is an organization comprised of 238 facilities across 13 countries and offers accreditation to zoos and aquariums that have upstanding practices of care and welfare standards. AZA accredited organizations are the leaders in not only animal care but also conservation. For this reason, the research produced from said facilities represents best practices in zoologic conservation work. This examination was conducted through reviewing literature and collecting data from publications produced by U.S AZA accredited zoological organizations on conservation projects to be compared with accredited organizations from countries around the world in efforts to gauge the efficacy of conservation rooted in this country accurately. Patterns for successful species and methods of conservation across countries were noted, with success being defined as a positive net outcome. Failure was identified as conservation efforts that failed to produce any positive contributions, in means of viable organisms or growth of knowledge, or actively detracted from conservation through the harm of organisms or their environment; this examination includes both *in-situ* and *ex-situ* conservation.

Literature Review:

Review of U.S Conservation Efforts:

Established in 1973, the Endangered Species Act set a precedent in the U.S. for legislation surrounding conservation. As defined by the U.S Fish and Wildlife Services, the purpose of the ESA is “to protect and recover imperiled species and the ecosystems upon which they depend” (U.S. Fish and Wildlife Service/Endangered Species Program, 2020). The ESA also offers definitions for endangered and threatened species. Firstly, endangered is described as being in danger of extinction throughout all or the majority of the range of a species, and secondly, threatened is defined as a species likely to become endangered within the “foreseeable future” (U.S. Fish and Wildlife Service/Endangered Species Program, 2020). The 93rd Congress also went so far as to include and define subspecies and varieties, as well as “distinct population segments,” as listable entities, excluding pest insects. The ESA can be regarded as the backbone of legislative conservation in the U.S and offers insight into the status of endangered and threatened species.

The ESA requires each species listed to have a recovery plan, which entails management details and the qualifications necessary to be delisted; as of 2016, 15.1% of all recovery plans included zoos, all accredited by the AZA, as responsible for at least one action involved in recovery (Che-Castalado et al., 2018). These actions included *in-situ* programs that focused on population monitoring, as well as more widely known actions like public education and husbandry programs. Nevertheless, as of 2016, 482 out of 710, or one-third of all U.S listed animals, did not have a recovery plan (Che-Castalado et al., 2018). This reveals a vast opportunity for conservation improvement in the U.S.

Established in 2017, the AZA's SAFE program, or Saving Animals From Extinction, facilitates the collaboration and execution of recovery plans for specific species within accredited zoos. The list of species currently involved in this program totals at 28 and mainly includes larger mammals, such as the Asian Elephant and Black Rhino. However, four species of turtle and even two invertebrates made the list as well. As not including every species identified as endangered, the SAFE program has also appeared to fall victim to the need to cater to the public eye in supporting large personable mammals and not particularly the species most in need. As a product of the AZA, this is not surprising as these organizations' survival depends on public support.

Publishing an annual report of their work, the success of the SAFE program is assessed each year in comparison to the goals they have set for themselves. With the last published report covering 2020, the SAFE program is currently exceeding its goals in three areas: number of species involved, cumulative conservation spending, and percent of AZA members participating in SAFE. The one area falling below their desired goal is the percent of AZA members participating in field conservation work, with the desired being 95% and the current, as of 2020, is 92%. SAFE also identifies the top six threats to endangered species, ranking habitat loss and degradation as the highest threat.

In *Headstarting as a Conservation Strategy for Threatened and Endangered Species* (2019), Patrick Thomas and colleagues discuss success in headstarting with reptile populations, as well as promising efforts with birds, specifically *Macrocephalon maleo*, known as the Maleo. Headstarting refers to the conservation strategy of raising a threatened species in human care from infancy to the point of maturity, where they can be reintroduced to their natural habitat (Thomas et al., 2009). However, the authors recognize the limits of this conservation strategy in

the conclusion of their work, including the potential for animals to lack certain behaviors they normally would have learned in the wild and the potential for nonnative genes or pathogens to be introduced to a wild population and their habitat (Thomas et al., 2009). Recognizing the potential for harm is integral to dealing with living organisms and is connected to how we should be defining success in conservation.

Review of Foreign Conservation:

Adopted in 1992, the European Commission developed The Habitats Directive to “ensure the conservation of a wide range of rare, threatened or endemic animal and plant species,” (*The Habitats Directive - Environment*, n.d.). Over 1,000 plant and animal species are protected, as well as 200 specific habitat types, with various levels of protection in place for each. Reporting is required of each Member State on the status of conservation of species and habitats, as well as any compensation due to projects with deleterious impact (*The Habitats Directive - Environment*, n.d.). With reporting due every six years, stated in Article 17 of the Directive, the short-term trend of a species or habitat can be captured and allows for adjustment in approach. It should be noted that all birds are protected under The Bird Directive and assessed separately from all other protected species. The European Commission combines data collected and reported by the European Environment Agency to gauge species and habitat status across the EU accurately. This data, also representing a six-year period, is then published in a cumulative State of Nature report - it is these reports that this examination utilizes to investigate the conservation status and efficacy of the EU.

Pertaining to the 2013-2018 period of study totaling 2,825 species status assessments,

27% of species assessments resulted in a “good” conservation status. The majority of species showing a "poor" or "bad" status was 63%. Unknown assessments were also reported, being 10%. Although not representing a comprehensive list of all European species, this report objectively offers valuable insight over a short-term period. The report concluded that the species with the highest proportion of assessments resulting in a good status were reptiles and vascular plants. In comparison, fish and mollusk species received the highest proportion of assessments resulting in a bad status, that being 30% (The State of Nature, 2020). This report also identifies the most significant human pressures these vulnerable species face; agriculture followed by forestry were named the top two human imposed threats to species.

Through examining trends in global amphibian species numbers in captivity, conservation biologists determined that as of 2014, only 6.2% of globally threatened amphibian species are represented in zoo collections (Dawson et al., 2016). Five divisions of globally threatened species, or GTS, were considered: American, South America, European, Asian, and Oceanian. It was found that the amphibians with the best representation in zoos globally belonged to American, European, and Oceanian regions. Conversely, South American and Asian amphibians had the lowest proportional representation in zoos. This points to an area requiring further support and an opportunity to expand amphibians represented in captive zoo collections across the world, including the U.S.

Drawing Comparisons:

Because the state of zoologic conservation is an opportunity for growth worldwide, the U.S shares that responsibility to improve conservation. European assessments reveal a poor

status for 63% of species, similar to the 75% of listed U.S. species in need of any semblance of a recovery plan.

Discussion of Harm:

Ruled effective December 8th, 1999, the ESA formally defined “harm” in the context of conservation as the act of “take ... to include any act which actually kills or injures fish or wildlife ... acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife,” (U.S. Fish and Wildlife Service/Endangered Species Program, 2020). This definition may seem explicit and without opportunity for interpretation, yet not all would agree. As stated by J. Baird Callicott, “Conservation biologists often treat the value of biodiversity as a given” (Groom et al., 2006). The morals of conservation as a field of study are still relatively new but can be distilled down to four dichotomous terms: instrumental or utilitarian and intrinsic or inherent. Humans often assign value to things based on a need they can meet; this is assigning instrumental or utilitarian value. The idea that something holds value by simply existing represents inherent and intrinsic value; this can be extended to biodiversity. Regarded as a biocentric view of the world, the idea that biodiversity is valuable just due to existing may be favored by some conservationists but is not always the most compelling argument to all audiences. “Perhaps because the suggestion that nonhuman natural entities and nature as a whole may also have intrinsic value is so new and controversial, some prominent conservationists have preferred to provide a purely utilitarian rationale for conserving biology” (Groom et al., 2006). The intrinsic value of our natural world can be a polarizing debate but is a conversation instrumental in gaining support in conservation, especially for zoological organizations that rely so heavily on public support and revenue. With the top four threats to biodiversity being described as habitat degradation, overexploitation,

anthropogenic climate change, and invasive species, endangered species are being threatened unlike ever before (Groom et al., 2006). Even if conservation reaches its full potential in this country and others, the rate at which human impact affects endangered species will outweigh positive contributions in the long run. The efficacy of conservation is only important in the lens of greater global change.

Another indirect human facilitated disservice involves misreported project failure (Catalano et al., 2019). This affects the ability of conservation biologists to gauge the status of species, determine effective methodology accurately, and advocate for appropriate legislative support; “Project failure reporting is an important, but largely unexploited, source of learning that capitalizes on the learning opportunity of failure provided through the experience of navigating research-implementation ‘spaces,’” (Catalano et al., 2019). Conservationist Allison Catalano’s analysis consisted of 59 reports covering 106 projects originating from 32 different countries. Ninety-two percent of authors used the term ‘fail’ at least once, but only 3% included it in the title or keywords. This suggests that the authors recognized the importance of reporting failure but did not want to associate that with their research in the means of a title. Catalano also found that successful projects are reported almost four times more frequently than failures. This lack of published research failure reveals a gap in the available literature, which in turn affects the perceived status of species and results in a lack of legislative support.

Conclusion:

“Until recently, most threatened and endangered species in the U.S lacked their legally mandated recovery plans, and in many cases, the plans were not based on clear scientific

principles, were not or only partially implemented, or had targets that were too low;” although this text was published over 15 years ago, the sentiment still reigns true, (Groom et al. 2006). The lack of clear objectives and principles, as well as targets that were too low to effectively contribute to the conservation of endangered species, are both major contributors to ineffective recovery plans. The concern of misreporting failure rates is an area of vast improvement in the U.S, as well as global studies. The inclusion of scientists in legislative decisions and implementation of the law can more accurately aid the conservation of endangered species. In the U.S, the basic legislation is in place; the ESA has set a precedent and foundation to build upon. Foreign legislation is in a similar spot, the ESA and the EU’s Habitat Directive both are working towards the same goal; as stated by Groom, “Conservation policy – even that which claims to be science-based policy- invariably reflects compromise among the social, political, and economic issues.”

As the recognition of areas of conservation in need of further attention arises, the responsibility that falls on advocates only increases. In their concluding remarks, Groom states, “Most scientists involved in conservation biology are motivated by a strong sense of responsibility to natural resources and future generations. Lawyers attempt to label such scientists as ‘advocates’ who are inherently biased, and they refuse to recognize that one can support a position in the absence of bias; bias does not necessarily follow from advocacy” (Groom, 2006). The acknowledgment and advocacy for the delicate balance that is zoological conservation can come from a place of objectivity if that is what it takes to gain the acknowledgment that many would argue the natural world deserves.

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