

Materialising reform: how conservation encounters collection practises in zoos

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ABSTRACT

This paper examines how zoos decide which animals to keep, drawing on guidance produced by zoo membership organisations and in-depth interviews with zoo curators. Zoos make curatorial decisions within constraints posed by each zoo's legacy of buildings and animals. Different versions of 'conservation value' inform decision-making alongside other criteria such as education value, visitor value and whether or not animals are available. We find that an international agenda to rationalise zoo collection planning in the name of environmental conservation has only partially reshaped existing practices. As a 'bald object' in the Latourian sense, 'conservation' presents a clean surface, which also means that it invites projections that attach to concrete practices only in loose ways. Given the ambiguity of conservation as a value, conservation presents zoos with a range of options and can be made to fit a broad range of choices, which make sense to actors for other reasons. Reform efforts gain traction where they are inserted as 'hairy objects' and resonate with practical problems zoos are already facing. Reforms in the name of conservation have led to networks of exchange and co-operation, which help zoos to secure new animals in the context of new regulations.

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Introduction

After entering Vienna's famous Schönbrunn Zoo from the main entrance, visitors pass by the burrowing parrot and the coati – a type of raccoon, originally from Central America. Slightly further ahead to the left is the larger enclosure of the giant panda; small crowds of visitors usually indicate where exactly the two resident pandas can be seen at any given moment.

A visitors' map gives us a sense of some of the 700 species Schönbrunn holds as part of its 'living collection.' How did this map come to be this way? Why do we get to see those particular animals, and not others? Beyond the case of Schönbrunn, how do zoos decide which species to include in their collection and, by implication, which animals not to hold? What are the knowledge claims, frameworks and systems, which organise and justify the collection of particular animals in zoos and make ongoing decisions about collections possible?

This paper addresses these empirical research questions in the context of efforts to align zoos' curatorial practices with their conservation mission, a relatively recent focus of their work. It draws on policy documents and guidance material published by national and international zoo membership organisations: the World Association of Zoos and Aquariums (WAZA), the (North

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American) Association of Zoos and Aquariums (AZA), and the European Association of Zoos and Aquaria (EAZA), as well as in-depth interviews with professionals in zoos ($n = 10$), collected as part of a larger project on decision-making in conservation NGOs ($n = 40$).

It will highlight that zoos make curatorial decisions within constraints posed by each zoo's inheritance in terms of specific buildings and animals and within constraints associated with holding live, mortal objects. Different notions of 'conservation value' inform decision-making alongside other criteria such as space constraints, 'visitor value' and whether or not animals are available.

We find that an international agenda to rationalise zoo collection planning in the name of environmental conservation has only partially reshaped longstanding practices. As a 'bald object' (Latour 1998, McFall 2017), 'conservation' presents a clean surface, which also means that it invites projections that can attach to concrete practices only in loose ways. Given the ambiguity of conservation as a value, conservation presents zoos with a range of options and concerns and can be made to fit a broad range of choices, which make sense to actors for other reasons.

Reform efforts gain more traction where they are inserted as 'hairy objects' into existing practices, and resonate with practical problems, which zoos are already facing. Reforms in the name of conservation have, as their most tangible effects, led to networks of exchange and co-operation, which help zoos to secure new animals in ways that negotiate the regulation of the trade in wildlife.

The re-invention of zoos as conservation NGOs

We can recognise elements of contemporary zoo-keeping in a range of historical practices, which have involved the capture, keeping and display of animals for purposes other than agriculture (Kisling 2000, Thorsen *et al.* 2012). Strange and exotic animals were assembled in royal menageries as symbols of power in ancient Egypt, Imperial China and in European courts. Wandering menageries have displayed animals to a broader set of publics (Rieke-Müller and Dittrich 1999).

The oldest existing zoo in Vienna's Schönbrunn Palace started as a private collection of the Austro-Hungarian imperial family and opened its doors to the public in 1752. The ménagerie du Jardin des Plantes in Paris is often cited as the first modern public zoo, founded in 1793 after the royal family's collection of animals in Versailles was raided by protestors during the French Revolution. Unlike earlier collections of animals, modern zoos are publicly accessible and maintain close links to scientific and educational institutions (Macho 2005, pp. 158–159). Modern zoos laid 'claim [to] an independent and civic function,' an understanding '[...] that it was another kind of museum, whose purpose was to further knowledge and public enlightenment' (Berger 2009, p. 31).

In the wake of cultural shifts since the 1960s, zoos have found themselves on the defensive. They were facing strong criticism of the capture of animals for display, and of the conditions in which zoo animals were housed (Baratay and Hardouin-Fugier 2002, Braverman 2012, Friese 2013, Tironi and Hermansen 2018). They were also impacted by new restrictions on the trade in wildlife. In response to these criticisms, zoos have repositioned themselves as conservation organisations while continuing to provide family-oriented entertainment (Friese 2013, Grazian 2015). In 1993, the International Union of the Directors of Zoological Gardens produced its first conservation strategy (WAZA 2005, p. 5). Among the still considerable range of enterprises keeping animals, such as safari parks, animal parks and circuses, zoos distinguish themselves by their active contribution to conservation and their adherence to conservation-related standards, which are a condition for membership to zoo associations.

What does it mean to say a zoo is a conservation organisation? The conservation contribution of zoos is imagined in different ways: there is, on the one hand, the idea that zoos should try to minimise the harm they do to wildlife in the wild, in terms of how animals are captured and sold. Beyond that, zoos are engaged in in-situ conservation programmes in the animals' natural habitats (Zimmermann 2010, Braverman 2015, Krause and Robinson 2017), as well as in ex-situ breeding programmes (Kleiman 2010, EAZA 2012, Friese 2013).

The project of reforming zoos in accordance with an agenda of environmental conservation also had implications for collection planning more specifically. According to Allard *et al.*, the 1993 strategy of the International Union of the Directors of Zoological Gardens ‘appealed to regional zoo associations to intensify coordination of the composition of animal collections, and to individual zoos to shift their use of space toward threatened taxa with a well-defined, conservation-directed role in their mission’ (2010, p. 53). The 1993 strategy envisioned an understanding of animal acquisition, which entailed ‘[...] every animal acquired having some meaning for conservation or education and also an emphasis on the welfare of the animals’ (Walker 2001, p. 1). This was meant to result in a highly purposive collection, entirely grounded in conservation rationales.

Reform in a socio-material world

In this paper, we consider the project of aligning zoos’ practices with the values of environmental conservation as a case of a project of intentional social change, or reform. We examine the range of effects of reform in the context of a focus on everyday practices by those who are the target of reformers’ efforts. We draw on work which has paid attention to ‘material practices, knowledges and orderings’ (McFall 2015, p. 3) and objects and technologies, influenced by science and technology studies but exploring outcomes beyond the construction of knowledge itself (Becker 1984, Law 1990, Latour 1996, Leigh-Star 1999, Molotch and McClain 2008, 2012).

We note that our general approach to the issue of reform is in contrast to some aspects of both ‘sympathetic’ and ‘critical’ scholarship of reform in different substantive areas, which has included reforms in the name of efficiency, humanitarianism, or the environment as cases. Both sympathetic and critical scholarship can tend to focus on the content of explicit ideas. In the terms developed in the tradition of valuation studies, the focus has been on ‘values’ rather than ‘valuation’ as a practice (Muniesa 2012, Dusage *et al.* 2015).

Sympathetic scholarship often follows reformers rather than general practitioners, and asks about success rather than about the range of effects of reform (e.g. Keck and Sikkink 1998). Questions about ‘success,’ even if they are asked in a way that is open to findings about ‘failure,’ seem to have the effect of blackboxing the values under consideration in this literature, highlighting them but preventing further exploration of their status and how they are interpreted in practice.

Critics of reform, on the other hand, often base their critique on a critique of ideology, which is based on an analysis of the possible implication of values and ideas. This also, somewhat ironically tends to overstate the effects of reform efforts, even as it calls into question the labelling of such efforts as ‘success’ (building e.g. on Foucault 1977). This overstatement is reflected in epochalist tendencies in the critical literature (see Savage 2009, McFall 2015, Osrecki 2015); it is not uncommon to characterise whole time-periods based on the claimed and projected negative consequences of specific projects of reform.

Valuing candidates for zoo places

To examine collection practices in the present, the paper draws on in-depth interviews with professionals in zoos ($n = 10$), conducted as part of a larger project on decision-making in conservation NGOs ($n = 40$) (Krause and Robinson 2017), as well as policy documents and guidance material published by zoo membership organisations. Our respondents were curators in charge of their zoo’s collection, or a part of it, and we asked them how they decide which species to include in their collection and, by implication, which animals not to hold.

Our approach to interviewing stands in a specific tradition of expert-interviewing, which has been influenced by the sociology of knowledge (Berger and Luckmann 1966, Bogner *et al.* 2009). In this tradition, respondents are not interviewed to give information about a subject area that he or she is knowledgeable about as an observer; rather his or her practical knowledge of organisational processes, which he or she herself is involved in, is the target of the investigation. The knowledge is targeted not because it is ‘better,’ but because it has effects in practice. Respondents worked

for organisations including Berlin Zoo, Bronx Zoo, Chester Zoo, London Zoo, Schönbrunn Zoo and Singapore Zoo.

The study engages with a specific situation of valuation (Muniesa 2012, Hutter and Stark 2015), which we examine across organisations. We examine the considerations and dilemmas involved in evaluating animals as ‘candidates’ (Zuckermann 1999) for inclusion in a zoo. The situation of valuation under consideration resembles the situations examined by classic and contemporary work in the sociology of culture, where scholars have long examined the practices of ‘curators’ or ‘gate-keepers’ of various kinds (White 1950, Becker 1984, Powell 1985, Clayman and Reisner 1998, Corra and Willer 2002, Petersen and Anand 2004, Franssen and Kuipers 2013, Friedman 2014, Darr and Mears 2017, Haman and Beljean 2021).

In the context of these previous studies, we are able to explore how different objects of curation come to matter differently, asking how specific features of animals as objects become important for curators empirically. In this, we build on efforts to extend the new materialism inspired by science and technology studies in the direction of a project of comparative ontology (Guggenheim 2009, 2016, Domínguez Rubio 2014).

In analysing the descriptive findings about general practitioners, we draw on a distinction between ‘bald’ and ‘hairy’ objects, drawn originally by Bruno Latour (e.g. Latour 1998, p. 288). Bald objects are associated with modern projects, they are seemingly self-contained and free-floating, abstracted from specific contexts. They are transportable and have a clean surface that invites loose connections without frictions. Hairy objects, by contrast, are dishevelled, ‘networky,’ prone to entanglement and able to attach to other objects in a more lasting manner.

Following McFall, we surmise that reform agendas make a difference when they find a way to matter as ‘hairy objects.’ Reforms have to be joined with existing practices and the specific objects under consideration. They have to ‘stick’ to ongoing concerns and problems, and develop close, enduring, entangled relationships with people and institutions (McFall 2017, p. 4, see also McFall 2019).

Inherited animals and spaces

Looking again at the map of Schönbrunn Zoo, we note that it is already full. Zoo curators must work with the consequences of inherited decisions about which animals are included in the collection. Zoos make decisions about the species they would like to have, while also having to manage the legacy of individual animals they already hold, which are not easy to store away or to discard.

Aging animals present particular considerations for zoo curators: Zoo animals often live longer because they are not subject to the same threats as in the wild, and zoos face public criticism if they are put down (Benbow 2004). One respondent discussed with us the issue of having to remove animals from display who, to visitors, might look thin and frail, but from a welfare perspective, are perfectly fine. Another respondent explained:

We had this pair of Syrian brown bears, which we got originally in the 70s; they were old, and we said, ok, we’ll carry on keeping them for as long as they live, but we won’t get any more, and when they die, we’ll put something new in the enclosure.

Managing particular animals over their natural life course sometimes has complex consequences in terms of the designs of the zoo. The specialised nature of some enclosures places particular constraints on curators wishing to change animals. As one respondent explained:

And then phasing out in this sense means that you look, either that you give them away, you also at the same time have to consider, how do I then use the enclosure after for a new purpose, will I have to re-build, what’s going to go in there, how would it work for the animal in there, and for the group, and so on. [...] So it’s also a skill, really, phasing out.

Curators are constrained by the buildings they inherit, which are often designed for specific animals. Architecture has always been an integral part of zoos as spaces of exhibition. As the ornate

buildings of Tierpark Hellabrunn in Munich, or Berlin Zoo demonstrate, zoo buildings and animals were thought of together as part of the design of a specific visual experience (Meuser 2017). Zoo architects have paid attention to changing aesthetic versions of the exotic and the wild, and to changing ideas about what particular animals need (Anderson 1995, Baratay and Hardouin-Fugier 2002, Braverman 2012).

Many European zoos work with buildings that are protected as architectural heritage, which means they face tight restrictions on what they can and cannot change. In an extreme case, an enclosure becomes part of a zoo's material heritage but can no longer be used to house animals at all, as is the case for the (former) penguin exhibit in London Zoo designed in 1934 by Berthold Lubetkin. Its modernist concrete surfaces are considered unsuitable for penguins' feet and behaviour today (Shapland and Van Reybrouck 2008).

Under these conditions, there is considerable inertia in zoo collections. Colonial ties influenced early opportunities for acquisition (Brockway 1979, Miller and Reil 1996) and often echo until today. Antwerp Zoo, for example, has held the okapi, which is endemic to Congo, since 1918 – along with the bonobo, a monkey also found in Congo, making a link to Belgium's colonial past.

Exotic animals given as diplomatic gifts can have long-lasting effects on zoo collections (Nicholls 2010, Collard 2013, Leira and Neumann 2017, p. 353). Modern conservation by now also has its own history. The zoos in Munich and Prague were the only zoos in the world to keep the Przewalski horse after the second World War, once extinct in the wild, and both still hold it today (Boyd and Houpt 1994).

In their considerations of both the current collection and future plans, curators need to be able to think several moves ahead, to be able to plot out the several stages of manoeuvres that may be required in order to be able to accommodate a new animal or species. As one respondent explained:

We will go enclosure by enclosure, we'll go species by species, and we'll determine, what can we do with what? What are our conservation issues? How can we engage the visitors better for that conservation outcome? So there's all these discussions that go into that, and what were we successful with? What do our facilities lend themselves to be successful with [...] obviously we don't want to continue down a path that we can't correct, and conversely we want to continue down a path that we do well.

In these accounts, enclosures undergo transformations, and animals are moved around the zoo's limited spaces like pieces of a puzzle. Large changes, such as the structural re-design of one enclosure, might be preceded by several smaller moves, or by having to wait for animals to die before changes can be made.

The collection plan and its columns

As zoos typically hold around 700 species of animals – Berlin Zoo is exceptionally large with 1500 species – curators are involved in ongoing decisions about which species to keep and which not to keep, and which new animals can be introduced despite these constraints. These decisions are supported by zoos' collection plans, a document written and maintained by the zoo curators and keepers. A collection plan contains information about the biological classification of a zoo's animals, the current individual animals held, the staff members responsible for them and the animals which are desired.

Collection plans thus present an overview of what *is*, and they are also a tool for thinking about the future. As one respondent explained:

There is always a 'should' inventory and an 'is' inventory of animals in a group [...]. Some things are revised every year, others every five years, where you look over it, there are notes there and you can look: "hm, I'd like to phase out this species, I would like to add this species", then everything's on the paper and then you work off that. [...] But, of course, there's not just one column, you have to work with all the columns.

In its guidance on institutional collection planning, EAZA suggests one possible format for a collection plan (Figure 1).

Common name	Scientific name	Current inventory	Planned inventory	Conservation value	Education value	<i>Ex situ</i> research value	EAZA RCP Recommendation	Planned actions	Justification of plans

Figure 1. Template for zoo collection plan. (Reproduced from EAZA 2012, p.68)

Alongside the template, EAZA lists a series of factors that zoos should take into account when considering species for their collections, including: whether the species is documented as at risk; whether the zoo has the relevant expertise to keep species to a high standard; whether there is the intention to directly or indirectly (through fundraising) support the species in-situ, or to carry out research with the ex-situ collection; as well as the species' educational and display value (EAZA 2012, p. 68). The Association of Zoos and Aquariums discusses a similar set of criteria for assessing different species for inclusion in a collection:

1. Husbandry expertise
2. Reproduction factors
3. Availability
4. Demand within AZA
5. Institutional commitment
6. Availability and feasibility of potential founders
7. Scientific and research potential
8. Exhibit value
9. Educational value
10. Taxonomic uniqueness
11. Risk of losing the *Ex situ* population
12. Link to *In situ* conservation
13. Acquisition costs
14. International or national program, studbook. (AZA 2014, pp. 42–43)

This list is based on the notion of species as a unit of valuation (Hinchcliffe 2008, Fredriksen 2017); it does not exhaust the factors that are or could be considered. Curators have to factor in the everyday running costs – as opposed to the acquisition costs – of certain exhibits. Some advocates argue that the degree to which an animal thrives in captivity should also be taken into account (Mason 2010).

Zoo collection planning thus involves quite different categories of value. How are curators supposed to combine these? Part of the official answer is that each species in the zoo is assigned a specific dimension of primary value expressed through its 'role' in the collection, which 'might include conservation value (in relation to captive breeding), ex-situ conservation value, research, and education' (Moss and Esson 2010, p. 717 – referring to guidance from the British and Irish Association of Zoos and Aquariums (BIAZA)).

This process favours animals that are a clear winner in any one category, while also being practical to house and easy to acquire. One such example of a clear winner is the panda. As one respondent explained:

Yes, so, the panda is a good example. It's a lovely example actually, because to me, the panda has no conservation value, realistically. It has a huge marketing value. It brings in a lot of people. It has good education value, because people love pandas. You can tell a nice story and they are umbrella species for other species. But it also

has a huge cost factor. So, when we evaluated that, still, it was doable from a cost factor, but it had enough strengths on the education and marketing front that we could ignore the conservation side of things. [...] I had to fight quite hard to say, “This is not to be counted as a conservation contribution.” This is purely from a commercial, flagship species point of view.

The panda’s exhibition and marketing value outweigh its relatively limited conservation contribution and the respondent is keen to emphasise that these aspects need to be considered separately. By contrast, Archey’s frog, a rare frog native to New Zealand, is the ‘world’s most Evolutionarily Distinct and Globally Endangered amphibian species,’ and would score highly on taxonomic uniqueness, research potential and threat status.¹

The ambiguity of conservation value

Conservation value matters alongside other criteria, such as exhibition value, and it is sometimes opposed to these other criteria. The differentiation among criteria or values should not lead us to overlook the internal complexity of each value, a point, which Heinich and colleagues have made about art (Heinich, Schaeffer and Talon-Hugon 2014, see also Moor and Lury 2011). Collection plans sometimes include the conservation value for each species as one number, but we can see already in the AZA’s list, referenced above, that there are different ways in which the zoo’s contribution to conservation is imagined, with quite different implications for which animals to hold.

Threat status and taxonomic uniqueness are two criteria which apply to species regardless of the perspective of particular zoos, yet they do not necessarily point to the same animals as priorities. The idea that the specific animals housed in zoos should be threatened or taxonomically unique alludes to visions of the zoo as a Noah’s ark (Soulé *et al.* 1986), where species can be kept alive for a possible future rewilding. The criteria of threat or uniqueness themselves, however, do not directly relate to the practical considerations related to rewilding, which is a very complex challenge (Hancocks 1995). Commentators have pointed out that if the focus of zoos’ conservation work was to provide insurance populations, following the ark model, they would engage in processes of ‘cost benefit rationalisation,’ building their collections around ‘small-bodied species’ which are easy to breed (Balmford, Mace and Leader-Williams 1996, Zimmerman 2010, p. 283). This would create a different distribution of animals in zoos than the one we currently see.

Zoos’ in-situ conservation programmes add another dimension to how the ‘conservation value’ of an animal can be considered. The heads of conservation programmes affiliated with zoos often seek to target species in the wild, which are held in a particular zoo (Krause and Robinson 2017). Inversely, conservation activities ‘in the field’ can also introduce new animals to the zoo. This is illustrated in the following account:

It makes a lot of sense for the conservation community to actually appreciate the different stake holders, and that it’s not only in-situ but also ex-situ. [...] A good example is the turtles. One is batagur trivittata, a giant river terrapin found in Myanmar. It is critically endangered, there are maybe less than 20 adult individuals left for reproduction. In collaboration with [...] we have done a huge genetic survey on captive offspring of that species to find out which are genetically viable. Out of those ones, we have selected 25 that we’re bringing here as an insurance colony, to safekeep that genetic material in an environment where there is good animal care and husbandry. The animals can thrive here until they are of reproductive age, which can take 10 years, then they will be sent back to Myanmar to enter in situ programmes.

The desire to link in-situ and ex-situ work introduces the inequalities among animals in international conservation more broadly into the zoo. The bias towards cute or scary furry mammals has been well-established in international conservation (Feldhamer *et al.* 2002, Lorimer 2007, Fredriksen 2017, Krause and Robinson 2017). Curators, like conservation managers in NGOs, refer to ‘flagship species,’ whose appeal is used to narrate key messages about zoo priorities or used as an anchor to generate funding for conservation projects. Referring to the giant panda, one respondent said: ‘This is a species that visitors like very much, and it’s much easier to get money for a giant panda, or for an elephant or a hippo [...], or a great ape, than for a buck or an ant, or a small bird [...].’

Educational value as a means and an end

Contemporary zoos emphasise their relevance and ethics in terms of giving an increasingly urban population a first-hand experience of animals and inculcating a sense of respect for and responsibility towards the natural environment (Zimmermann 2010). Zoos provide information about the habitats in which their animals are naturally found, and about the threats to these habitats. They also try to educate visitors about steps they can take to reduce their consumption of natural resources and to make more environmentally-informed choices when they buy products.

This educative role is used to distinguish zoos from being simply places of entertainment, as one of our respondents emphasised: ‘You’re not a drive-in movie. You’re not an amusement park.’ In an optimistic account from one of our respondents this reads as follows:

[...] human-to-human communication is our goal, and that’s what we know works very well. We have some awesome animals that represent these conservation programmes in the wild. So, if we’re there and can say, “Hey, what’s this elephant doing here? Well, did you know that 96 elephants a day are getting killed for their ivory? Call up your representative and help us get the ban on ivory” and it’s worked.

Another respondent is more skeptical, commenting:

It’s easy to get kids to say, “We’re going to save this monkey” [...]. The trick is whether or not when they grow up they’re going to be worried whether or not their car is fuel efficient because that has an effect on wildlife [...]. It’s not crystal clear whether or not zoos’ and other wildlife organizations’ messages impact on people when they’re adults.

Education value is often discussed with reference to conservation as an ultimate legitimisation, as the examples above show. Yet education is to some extent separate from the operationalisations of conservation value discussed above. Zoos regard visitors’ education as an important aspect of their activity, with its own dedicated departments and staffers. Education activities are maximised in their own right in a way that means that they are at least sometimes in competition with other aspects of conservation, such as conversation conceptualised as programming in-situ, for example. Education value is also competing with more narrowly conservation-related criteria when it comes to the selection of animals.

The pursuit of visitors’ education has generated a considerable body of research which attempts to measure it, understand it and maximise its effect (for overviews see Ballantyne *et al.* 2007, Nygren and Ojalampi 2018). Studies have correlated the time visitors spend in front of exhibits with the size of animals (Moss and Esson 2010), surveyed visitors’ knowledge of conservation and motivation for visiting the zoo (Falk *et al.* 2008, Ballantyne and Packer 2016), analysed the impact of various forms of signage (Fraser *et al.* 2009), and examined how visitors engage with exhibit facilitators (Mony and Heimlich 2008). Research within zoos features prominently in the academic journal, *Visitor Studies*. Conservation education research competes with other conservation research for funding.

A further distinction is between education value and visitor value. Visitor or exhibit value is understood as the interest visitors show in an exhibit, e.g. the time they spend in front of a cage (BIAZA guidelines, cited in Moss and Esson 2010, p. 718). This has been shown to be related, for example, to taxonomic grouping – favouring mammals –, body size and whether animals are active or passive during zoo visiting hours. In planning discussions, exhibit value can also refer to the power to attract paying visitors. Exhibit value in that sense can be pursued while at the same time being framed as contributing towards conservation via education or as a form of fundraising.

Collection planning through international co-operation

Historically, zoos developed partly out of the availability of live animals captured in the wild by traders and collectors. It is not a coincidence that the founder of Hamburg’s pioneering Hagenbeck zoo dynasty was in the fish trade, receiving curiosities alongside commercial catch in Hamburg’s global harbour (Rothfels 2002).

Legislation in the 1970s made trade in endangered wild animals illegal (see Braverman 2015, pp. 159–185), but zoos still occasionally need new animals. They are also interested in disposing of surplus animals in an acceptable manner: Animals may reproduce too little in the zoo, they may also reproduce too much and there is a lot of public opposition to euthanasia of animals.

Nowadays zoos are supplied by animals born in captivity, the supply of which is managed through international co-operation in the form of regional collection planning. Co-operation among zoos regarding the breeding and exchange of animals through regional collection planning, Taxon Advisory Groups and studbooks is a response to the practical problem of the supply of animals. It is also seen as an important contribution to conservation, indeed, it is sometimes understood to be synonymous with conservation by curators.

Regional collection plans are developed through collaboration by groups of animal experts: curators, veterinarians, and scientists work at a supra-institutional and sometimes supranational level, in order to coordinate zoo breeding programmes and populations on a larger scale. Taxon Advisory Groups (TAGs) are specialist groups working at the regional level of zoo collection planning and co-ordination, comprised of experts who work to ‘define priority taxa’ (Allard *et al.* 2010, p. 254). Similarly to the roles accorded to animals within zoos’ individual collection plans, taxa are also assessed at this level in relation to ‘their potential ability to contribute to conservation action, display needs, education and outreach objectives, [and] research priorities’ (Allard *et al.* 2010, p. 254).

In one interview, a curator points to the broader networks and groups in which zoos are enmeshed give further recommendations as to what species to prioritise:

[...] then you look at the regional collection plan, and perhaps there’s a species there that you don’t have currently, but you would like to change to, as its been prioritised or recommended by the TAG (Taxon Advisory Group), so there are a lot of different considerations.

Studbooks contain demographic information on species. In European zoos, co-ordinators update and share studbooks for their species of focus across zoos. There are active studbooks for 1027 species in WAZA’s library (Oberwemmer *et al.* 2011, p. 34). Studbooks provide only very partial coverage of threatened animals, covering ‘8.6% of all assessed vertebrates’ (Oberwemmer *et al.* 2011, p. 34).

Co-operation in the form of regional collection planning, taxon advisory groups and species survival plans have helped zoos to supply new animals in a publicly acceptable way (Chruliew 2011). Co-ordinated planning marks an ethical reform of animal supply, and it helps to improve the genetic quality and diversity of the animals held by zoos (see Friese 2015). This curator links conservation value to practical issues regarding the supply and genetic quality of new animals:

[We] collaborate on things. We sent a bear from somewhere in the States, because our problem is we don’t have enough young animals. Their problem is they don’t have enough genetic diversity. So, we swap bears and that helps a lot.

Exchanges of animals organised between zoo curators are presented as swaps between equal partners. A respondent emphasised that money was not involved and implied the process had an organically maintained equity without conditionality:

When I have a surplus animal here, when we breed successfully, for example, then I, first of all, if there is an EEP (European Endangered Species Programme) or an ISB (International Stud Book) I’ll tell the studbook keeper, “Okay, I have a surplus animal here. Please find a place for it” and if it’s not a rare species, I send every half a year, ‘wanted’ and ‘available’ lists to the other zoos.

Interviewer: So, it’s an exchange. It’s like a Gumtree for zoos.

Yes, that’s right, and we don’t get any money for the animals. So, in some cases, I have a zoo say, “We are interested in this animal but we cannot offer an animal at the moment.” Then we say, “Okay, we need a place for this animal. We are happy to give it to you and perhaps you will have in one year, or two years, or any time, an interesting animal for us. Then please keep in mind that we made an exchange.” That works very well normally.

Here, a suspended form of exchange is enabled through the curator projecting their plans for the collection into the future and trusting that their co-operation in the present will be remembered. Our comment about Gumtree might sound flippant but it does reflect an existing platform that zoos use to make each other aware of gaps and surpluses in collections, and thus support animal exchanges – the ZIM's (Zoological Information Management System) Available and Wanted tool (EAZA 2012, p. 4).

Similar to the movements of the animals around the zoo which are made through a series of incremental and contingent steps, as discussed earlier, collaborations with partner zoos are examples of another kind of 'holding pattern' undertaken by curators. One curator, for example, who filled a new bird house with a pragmatic mix of appealing and easily available birds, is embarking on a series of gradual, long-term shifts with the aim of transforming the collection:

So, at the moment most of the birds we have are colorful, or they sing nicely, but I would like to change this to use our new bird house for the EEP [European Endangered Species Programme], the European Studbook [ESB] and the International Studbook, which means, for rare birds, to keep them there and breed them there. So that our bird house would be a conservation house for birds, but this is a long-term thing.

This move to a more conservation-driven collection, involves a series of steps over time, including waiting for other zoos to be able to breed successfully from their own stock of rare birds to the extent that they have some surplus animals to pass on to this curator. Realising this long-term vision of a new collection with clear conservation value is therefore closely linked to work going on in other zoos and relies on close co-operation and willingness to exchange animals.

Conclusion

We have discussed how zoo curators make decisions about which animals to keep and select in the context of efforts to rationalise collection planning in the name of environmental conservation.

Environmental conservation has allowed zoos to respond to fundamental criticisms of the practice of keeping animals in order to exhibit them and conservation concerns also feature prominently in zoos' reflection on collection practices. But when curators consider the future of their collections, they have to contend with their zoo's inheritance in terms of animals with specific needs, that are not easy to dispose of and in terms of specific enclosures and buildings.

Conservation itself takes on many meanings even in the relatively narrow context of collection planning. It is interpreted as inviting zoos to prioritise threat status and evolutionary uniqueness as well as links to in-situ projects, for example. In the context of rationalisation of collection practices, considerations other than conservation narrowly understood are also named and formalised to some extent. Conservation education is justified with some ultimate reference to conservation value but it also has developed its own arm of research and policy, which at times competes with other versions of conservation for funding and attention.

Given the ambiguity of conservation as a value, conservation presents zoos with a range of options and concerns, and can be made to fit a broad range of choices, which make sense to actors for other reasons. As a bald object, 'conservation' presents a clean surface, which also means that it invites projections that attach in loose ways: References to conservation education or in-situ conservation or both allows zoos to link every animal, which visitors like to see to conservation.

As a result, conservation has only partially reshaped existing collections (Born Free Foundation 2007, see also Lees and Wicken 2009). Reforms in the name of conservation are insertions that only stick in a specific and partial ways. In terms of collection planning, conservation gets particular traction as a 'hairy object' where it resonates with practical problems which zoos already have.

The analysis highlights that these practical problems are specific to the social world under examination and are related to the properties of the particular object involved, which can be examined for other cases in future work. The object zoo curators are working with, live animals, cannot easily be acquired following regulations of the market in wild-trade. They can also not be easily disposed

of. Live animals may reproduce too little or too much. In light of public opposition to euthanasia, zoos face difficulties killing off surplus animals. Due to the relative lack of differentiation among institutions for living non-humans, there is also no easy path for zoos to have their objects ‘graduate’ to other establishments. Networks of exchange and cooperation, organised in the name of conservation, have helped zoos to address the problem of how to secure new animals, and how to get rid of surplus animals.

Notes

1. See <https://www.edgeofexistence.org/species/archeys-frog/> (Accessed 30 October 2020).

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