A Welfare State for Elephants?

A Case Study of Compassionate Stewardship

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ABSTRACT

Technological advances over the next few decades will mean that every cubic meter of the planet will be computationally accessible to surveillance, micromanagement and control. Such unprecedented power places an immense burden of responsibility on the planet's cognitively dominant species – Homo sapiens. Status quo bias equates the natural with the morally good; yet the immense burden of suffering in Nature calls this intuition into question. Human and non-human animals typically flourish best when free-living rather than incarcerated or wild. This paper presents a costed case study of compassionate stewardship of an entire species of free-living non-human animals. The successful construction of an elephant welfare state would be a key historical milestone on the road to a compassionately run global ecosystem.

Keywords: elephants, natural harms, compassionate stewardship, intervention in nature, neonatal care, healthcare, nutritional support, speciesism, suffering, wild animals.

1. INTRODUCTION

1.1. *High-tech Jainism?*

Within the next few decades, the exponential growth of computer power will ensure every cubic metre of the planet is computationally accessible to remote monitoring, micro-management and control. Harnessed to biotechnology and nanorobotics, this growth in surveillance and control capabilities presents huge risks and huge opportunities. In a dystopian vein, such technologies lend themselves to advanced war-fighting, or they could be used to sustain an Orwellian dictatorship. Alternatively, such technologies could deliver compassionate stewardship of the entire living world.

High-tech Jainism [1] of the kind needed to safeguard the interests of smaller mammals, let alone the well-being of marine vertebrates and (ultimately) members of other phyla, is still decades away. The CRISPR revolution in genome editing, for example, is only a few years old (Esvelt, Church, and Lunshof 2014). Nanotechnology, and in particular nanorobotics, is still in its infancy. Nevertheless, the obstacles to a cruelty-free world are not merely technical. Even as the technologies of intervention become cheaper and readily available, human *status quo* bias (Bostrom and Ord 2006) may postpone implementation of a compassionate biology indefinitely. The ideology of conservation biology is deeply entrenched. So ambitious germline interventions to "reprogram" traditional predator species (Pearce 2009), orchestrate pan-species fertility regulation, and guarantee the well-being of all sentience in our forward light-cone are probably not on the horizon for a century or more. Yet this sort of timescale does not mean discussions on ethical intervention or stewardship are just idle philosophising. On the contrary, some forms of compassionate stewardship are *technically* feasible right now. Many of the worst and most morally urgent cases of wild animal suffering are the most accessible to intervention, and also the least expensive to remedy.

1.2. *Why elephants?*

Launching our compassionate stewardship of the living world with free-living elephants might seem an arbitrary choice of species. However, there are good reasons to choose elephants for a feasibility study. From a moral point of view, elephants are a prime candidate. With a brain weighing just over five kilograms, the African elephant has the largest brain of any terrestrial vertebrate. On some fairly modest assumptions, elephants are among the most sentient nonhuman animals. Moreover, all the technologies necessary for a comprehensive elephant healthcare program are available, in principle if not yet in practice. Nothing speculative or even especially futuristic in the way of high technology need be invoked to lay out the foundations of an elephant welfare state, although software tools for efficient remote monitoring and tele-diagnostics need further development. Admittedly, free-living elephants offer a comparatively easy example of compassionate

[1] Jains aim never to harm another sentient being by word or deed. They are famous for sweeping the ground before them so that they do not inadvertently tread on insects. The term "high-tech Jainism" is intended to convey an analogous (secular) ethic practised towards all sentient beings through the use of modern technology.

species care. Elephants are large, long-lived, charismatic and herbivorous. No seemingly irreconcilable interests are involved (e.g. lions versus zebras) in safeguarding their interests because mature elephants typically have no natural predators besides *Homo sapiens*. Indeed, the limiting factor on elephant population size in the absence of human predation or artificial fertility regulation is inadequate nutrition. Nevertheless, lions and hyenas will sometimes attack and eat alive juvenile, sick and injured elephants – the kind of horror that compassionate stewardship of Nature could prevent.

2. Are cared-for elephants really free-living?

Some critics of any blueprint for elephant welfare safety-net will contend that elephants who receive healthcare, food aid and emergency relief would no longer be "free-living". This is not the place to explore the metaphysics of freedom, nor to enter human left-right political debate. Elephants are not economic actors – even if the expression "welfare state" gives libertarians cause for alarm. In this context "welfare state" is politically neutral. Moreover, if intelligently run, crisis-interventions in time of drought need not give rise to an elephant "dependency culture" – this is not, after all, feeding time at the zoo.

Other critics will undoubtedly allege that elephants whom humans have assisted or saved from harm are no longer truly "wild" or "natural". Nevertheless, humans who wear clothes or who take medicine are not thereby less human or somehow diminished compared to their "wild" conspecifics. Likewise elephants.

Some animal advocates may claim that the use of immunocontraception in over-populated wildlife parks violates the presumed right of nonhuman animals to procreative freedom. It may also be claimed that intimate or remote monitoring as canvassed here violates the supposed right of nonhuman animals to privacy. Yet worries about privacy breaches, in particular, are an unwarranted anthropomorphic projection on our part. The alternative to fertility control is witnessing one's calf slowly starve to death in a degraded habitat, or the brutal practice of "culling" (i.e. massacring whole elephant families) to prevent ecological devastation (Aarde, Whyte, and Pimm 1999). Nevertheless, even if it were the case that elephants did experience some loss of freedom due to human intervention, the suffering they would otherwise endure is far worse. The loss of a calf or a child, or of a matriarch or a mother, is traumatic for elephants and humans alike (Bradshaw 2004).

3. The costs of intervention

What would be the financial cost at contemporary prices of cradle-to-the-grave healthcare and welfare provision for the entire population of free-living African elephants? The elephant population of the African continent currently stands at around 500,000 (WWF 2015). Elephant taxonomy is currently in flux, but the half-million figure includes what is commonly known as the savannah (or bush) elephant, *Loxodonta africana*, and the forest species of elephant, *Loxodonta cyclotis*. An annual cost of somewhere between two and three billion dollars seems plausible. Similarly, most of the same challenges and opportunities arise for securing the well-being of the Asian elephant, *Elephas maximus* – an estimated of whom 40,000 are left in the wild (WWF 2015). So the type of program sketched out below could also be implemented in South-East Asia, at a fraction of the price.

Most human healthcare expenses are incurred in the last six months, and often the last six weeks, of life (Alemayehu and Warner 2004). In the case of elephants, we simply do not know the upper bounds to life-expectancy, given adequate late-life dentition. Assuming effective orthodontic care, this particular challenge – i.e. managing the age-related infirmities of free-living geriatric elephants – will (presumably) be decades away from the launch of an orthodontic healthcare service. After being GPS chipped, vaccinated and (where necessary) provided with immunocontraception, most free-living elephants could be remotely monitored, but otherwise largely left in peace – apart from during years of severe drought and famine, when costly crisis-interventions will be necessary. To flourish, free-living elephants need a habitat that offers fresh water, some available shade, plentiful vegetation for grazing and browsing. A mature African bush elephant typically ingests over 200 kilograms of vegetable matter daily (Tchamba and Seme 1993). Therefore, the elephant emergency equivalent of humanitarian daily rations will be quite bulky.

When needed, the cost of providing additional vaccinations, vitamin and mineral supplements, painkillers, anti-inflammatories, parasiticides, sedatives and anaesthetics, antibiotics, antifungals and antivirals, disinfectants and cleaning agents will not be negligible; but the relevant agents are almost all off-patent.

Training and labour costs of ancillary support staff in sub-Saharan Africa are comparatively low and likely to remain so for the foreseeable future. Close, politically sensitive collaboration with the local human populations will be vital to the long-term success of the project. Elephant healthcare work could provide valuable employment, though some forms of expertise could be delivered only by specialist veterinarians. Finally, an air-ambulance service would incur significant transport costs.

3.1. *Immunocontraception*

Ivory poaching and habitat destruction have dramatically reduced unprotected elephant populations over the course of the past 200 years (Red List 2014). However, in favourable conditions elephant populations may increase at four to five percent per year (ibid.). Inevitably, such growth is ecologically unsustainable. In the long run, humans will have to choose the overall level and demographic profile of elephant populations in our wildlife parks, or otherwise let Nature (i.e. famine and malnutrition-related deaths) take its course. The victims of "natural" disasters will mainly be the young, the sick and the old. As with tomorrow's humans, advances in behavioural genetics and reproductive technologies will shortly allow use of preimplantation genetic screening to choose everything from pain thresholds – cf. variant pain-modulating alleles of the SCN9A gene (Reimann et al. 2010) – to susceptibility to depression – cf. the role of the COMT gene and serotonin transporter 5-HTTLPR gene (Wichers et al. 2008) – to personality variables. Or alternatively, policy makers may opt to perpetuate the traditional genetic roulette of sexual reproduction. Once again, political and moral choices will be unavoidable.

3.2. *Neonatal care*

Provision of prenatal elephant care is potentially expensive. Elephants typically give birth to one calf, less than one percent of births involving twins. However, one and often both calves usually die within weeks or months of birth (Mumby et al. 2013a). Intervention here will be needed to ensure a favourable outcome.

An elephant calf's first year of life is their most hazardous. Immediately after birth, the young calf is most vulnerable to predation by lions, hunting dogs and hyenas. In the face of potential predators, the calf's mother will vigorously defend her new-born. Unfortunately, the calf may not always be able to keep in the secure position under her mother's abdomen. Moreover, the calf will still be vulnerable to predators for some years to come. After six months or so, the youngster starts to move further from their mother. If potential predators are near, she is at risk of being left behind if the herd is disturbed or stampeded (Loveridge 2006). Causes of juvenile death, though, include not just predation, but also disease, accidents, drought, starvation, nutritional deficiencies, stress, heat stress, drowning, becoming trapped in mud holes, snake bite and congenital malformation. All things considered, mortality rates during the first three years range from below

10% to more than 50%, and is liable to increase when ranges are restricted and habitats change, as opportunities for browsing and midday shade become less available (Lee and Moss 1986).

A calf normally continues suckling at least until two years old. After weaning, annual elephant mortality rates decrease to perhaps 5% or 6% until about the age of 50 years only to rise sharply in the sixth decade (Carey and Gruenfelder 1997). Nevertheless, orphaned elephants will need special protection. Unaided, orphaned young elephants below the age of two or three years rarely survive in the wild. In a few countries, the basic infrastructure of elephant orphanages is already in place (see, for example, The David Sheldrick Wildlife Trust). Such rescue and rehabilitation services just need extension, systematisation and adequate funding.

3.3. *Injuries, disease prevention and treatment*

Elephants are normally robust and peaceable. However, fights do occur, particularly between bull elephants disputing access to a female in oestrus (De Waal and Tyack 2009). Occasionally, one or both parties may be badly injured in such aggressive encounters. Bone fractures will need to be treated by elephant orthopaedic specialists.

Regarding diseases, some ailments are specific to elephants, notably trunk paralysis and elephant pox, but other afflictions are common to humans and elephants alike, ranging from intestinal colic and constipation to pneumonia. Like humans, elephants are susceptible to infection by tuberculosis, mosquito-borne diseases and anthrax, which may be contracted via contaminated water or soil (Wildpro 2015). Additionally, elephants may even catch the common cold, though this condition is self-limiting.

Ill elephants often attempt to self-medicate, treating digestive diseases through fasting or consumption of bark, bitter herbs or alkaline earth (Wildpro 2015). Such limited self-treatment can be complemented by human expertise in scientific medicine.

3.4. *Elephant orthodontics*

Human depredations aside, the greatest source of mature elephant morbidity and mortality is inadequate nutrition. Elephants replace their teeth multiple times. The fifth set of chewing teeth (molars) lasts until the elephant is in his or her early forties. The sixth – and usually final – set must last the elephant the rest of his or her life. As the final set of molars wears away

during the late fifties, the elephant is no longer able adequately to chew food. This will cause them to die from the effects of malnutrition or starvation (The Scotsman 2004).

Free-living elephants do not usually live much past sixty years. Elderly elephant deaths generally occur during the dry season (Dudley et al. 2001). This is because dry food cannot be effectively sheared by the residual smooth grinding surface of the worn-down sixth molar. The weakened and emaciated elephant will eventually collapse. Helpless, she may then be eaten alive by scavengers and predators. Late-life orthodontics to prevent this fate will be more cost-effective than routine GPS tracking or immunocontraception, because the material used for false teeth could last decades without need for replacement.

3.5. *Drought*

During drought, deaths normally occur due to starvation, malnutrition, and heat stress, rather than thirst. This is because elephants are reluctant to leave known water-sources to find food. Constructing and maintaining artificial waterholes during severe drought will be necessary to prevent such deaths. However, the congregation of herds of undernourished and malnourished elephants at remaining water-holes will make provision of crisis nutritional support easier and cheaper.

3.6. *Elephant psychiatric care*

Like people, elephants may suffer low mood, anxiety disorders and depression (Bradshaw et al. 2005). Elephants grieve when they lose a calf or another close family member. Psychosis also occurs, but rarely for elephants in their natural habitat, and primarily as consequence of captivity. Similarly to humans, incidence of endogenous depression is lower when elephants are living in their natural habitat in small family groups, rather than suffering solitary confinement in captivity. Post-traumatic stress disorder in the aftermath of being hunted or natural trauma could potentially be treated with inexpensive anxiolytics, such as beta-blockers. Determining the appropriate drug dosage in different treatment regimens still depends on metabolic scaling formulas. Such crude procedures are used because comparatively few pharmacokinetic studies have been conducted to provide elephant-specific information. If an ethical discipline of compassionate biology replaces a doctrinaire conservation biology, this relative lack of studies can be remedied.

3.7. *Uncertainties*

For now, financial projections of comprehensive free-living elephant care can depend only on rough and imprecise calculations, rather than on a rigorous methodology. But an estimated annual expense of $2.5 billion for full healthcare and welfare provision for the entire population of free-living African elephants may turn out to be pessimistic. In practice, the great majority of Africa's 500,000 elephant population would need far less than the annual $5,000 per head that this figure allows. Neuro-chipping, individual genome sequencing, vaccinations, GPS-tracking and (when appropriate) immunocontraception would cost, at most, a few hundred dollars per head. Moreover, the first three of these would typically be a one-off expense rather than a regular part of the annual budget. Given that chipping is feasible and inexpensive for domesticated dogs in the UK (BBC 2013), it should be no less feasible for free-living elephants. Here, chipping could range from simple tagging to more complex remote-monitoring of health status.

Nevertheless, financial planners will need to bear in mind the potential for cost overruns and unexpected expenses that plague any new enterprise. These may include (unfortunately) the costs of corruption, maladministration and the growth of a welfare bureaucracy – the expense of which are hard to quantify.

Finally, there is the issue of timescale for complete coverage of Africa's elephant population. Perhaps one or two years – but only if an international consensus existed.

4. The speciesist objection

4.1. *The objection from the priority of human interests*

Suppose that one accepts that this system of compassionate stewardship is feasible. Even then, the seemingly compelling objection can be raised that establishing a system to care for free-living elephants is not a moral priority. Millions of humans do not yet enjoy an adequate welfare safety net. Also that the cost of an elephant welfare program could be more fruitfully spent promoting human welfare instead. What Africa needs is a welfare program for its human population, rather than its elephants.

Whatever our response to this objection, our answer should not be clouded by arbitrary anthropocentric bias, i.e. speciesism (Horta 2010). It

is worth stressing that anti-speciesism is *not* the claim that "all animals are equal", or that all species are of equivalent value, or that the well-being of a human – or an elephant – is as important as the well-being of a mosquito. Rather it is the claim that, other things being equal, all animals, human and nonhuman, of equivalent sentience are of equal value and deserve equal consideration. The anti-speciesist argues that morally what matters in resource allocation is not ethnic group or species membership but sentience.

The widely held idea that distinctively human cognitive capacities correlate with a higher degree of sentience lacks scientific support. Microelectrode studies of the human brain using awake subjects confirm that the most intense forms of sentience, notably our core limbic emotions, are also the most phylogenetically primitive, whereas the phenomenology associated with such distinctively human cognitive capacities as higher mathematics or generative syntax is also the most subtle and rarefied. Indeed, the phenomenology of language-generation is barely accessible to introspection.

In addition, abundant evidence suggests that elephants are at least as sentient as human toddlers. Elephants can pass the "mirror test", thereby demonstrating a capacity for reflective self-awareness. The elephant hippocampus is comparatively larger than human hippocampus, presumably a function of an elephant's prodigious memory. Elephants are endowed with an immense, highly convoluted neocortex subserving their complex tactile, visual, acoustic and olfactory communication systems and capacity for empathetic understanding (Byrne et al. 2008). They also display sophisticated social cognition (ibid.). More controversially, their comparatively larger limbic systems suggest that elephants may be at least as sentient as adult humans, albeit lacking the logico-mathematical and linguistic prowess of *Homo sapiens* (Shoshani et al. 2006). Either way, even if, cautiously and conservatively, we judge that elephants are no more sentient than prelinguistic human toddlers, we still have a duty to protect their interests – in the same way that affluent countries have an ethical duty to help vulnerable children in developing nations.

4.2. *The objection from the priority of human-inflicted harm*

A more compelling objection to implementing an elephant care program is that our overriding ethical priority should be ending the suffering for which humans are directly responsible. In this regard, factory-farming is the greatest source of severe and readily avoidable suffering in the world today. Most humans are complicit or financially implicated in the nonhu-

man animal holocaust. Even though a pig, for example, is of comparable sentience to a prelinguistic toddler (Angier 2009) humans routinely do things to factory-farmed pigs that would earn a life-sentence in prison if our victims were human. Certainly, the development and commercialisation of *in vitro* meat holds the promise of global veganism or *invitrotarianism*, perhaps later this century [2]. In the meantime, though, billions of sentient beings will have been abused and slaughtered to satisfy our taste for their flesh.

5. Conclusion

For better or worse, humans and their descendants will be responsible for life on Earth for the indefinite future. Despite the initially daunting technical challenges, the biggest obstacle to compassionate stewardship of the world's free-living nonhuman animal population is not technical or even financial, but rather, ideological. Most people are prone to *status quo* bias. Such innate bias is normally rationalised by some version of the "appeal to Nature": what is natural is good.

The irrationality of the "appeal to Nature" is illustrated by a simple thought-experiment. Imagine, fancifully, if starvation, disease, parasitism, disembowelling, asphyxiation and being eaten alive were *not* endemic to the living world – or that such miseries had already been abolished. Certainty, no one would propose there is an ethical case for (re)introducing them. Even proposing such a thought-experiment can sound faintly ridiculous.

However, our bioconservativism is not wholly consistent. If presented with a specific case of terrible suffering – for example an elephant mother and her calf trapped in a mud hole – *most* people argue we should intervene rather than permit the horror to unfold "naturally". Human benevolence is typically weak, erratic, often negligible, and sentimental rather than rule-bound – but still real. By focusing initially on grisly concrete examples, a broad consensus on the *principle* of compassionate intervention can potentially be established, though not of course whether intervention should be piecemeal or systematic – or how it should be funded. Eliciting support for

[2] See for example, The In Vitro Meat Consortium (http://www.invitromeat.org/); Future Food (http://www.futurefood.org/in-vitro-meat/index_en.php); New Harvest (http://www.new-harvest.org/cultured-meat/faq/).

ad hoc animal "rescues" is the critical wedge that advocates of compassionate stewardship of Nature need to press their case further.

Once we accept that intervention to prevent suffering in free-living nonhuman animals is *sometimes* morally permitted, and *sometimes* even morally required, a straightforward question then arises: Why should free-living animal suffering matter only when humans happen to notice it? We should think seriously, as a species, about what principle(s) should govern our interventions. If we can underwrite the well-being of elephants, we should aim, ultimately, to extend our compassionate stewardship to the rest of the living world.

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