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# List of abbreviations

**BBC** - British Broadcasting Corporation

**EISA** - European Initiative for Sustainable Development in Agriculture

**FAO** - Food and Agriculture Organisation of the United Nations

**IISD** - International Institute for Sustainable Development

**IUCN** - International Union for Conservation of Nature

**LZS** - London Zoological Society

**NASA** - National Aeronautics and Space Administration

**NNSS** - Non-Native Species Secretariat

**NGOs** - Non-Governmental Organisations

**RSPB** - Royal Society for the Protection of Birds

**RSPCA** - Royal Society for the Prevention of Cruelty to Animals

**UN** - United Nations

**USDA** - United States Department of Agriculture

**WWF** - World Wildlife Fund

# Abstract

There has long been a divide between literature which focuses on the ethical aspects of wildlife conservation and that which deals with its practice. The split is particularly marked when it comes to practices which involve killing, such as hunting and culling. The aim of this thesis is to bridge that divide by creating a new framework, which can be used as a tool for resolving the conflicts of interests which arise when we consider killing one living thing in order to save another. I will argue that killing is only very rarely justified because it undermines the inherent value which exists in all individual living things. Not only is killing usually unethical, it is more often than not ecologically unsound. To demonstrate the veracity of my argument I will combine rigorous analyses of moral philosophy with knowledge gathered from the latest scientific findings on wildlife biology and behaviour.

The first chapter of my thesis utilises these methods to show why the traditional, anthropocentric approaches to wildlife ethics are flawed and how this has led to ineffective policy creation and enforcement. The second and third chapters then set up my alternative framework, which I have termed ‘biospherical individualism’. I outline my philosophical arguments and then use these to construct a series of steps which can be used to answer the question: ‘is it morally permissible to kill X in order to protect Y?’ In the remaining chapters I present case studies to show how my framework can be put into practice. I look at the practice of population control, problems surrounding ‘invasive’ species and the ethics of medical testing to create vaccines for animals. Together, these cases highlight the ways in which our conservation policies have, to date, failed to recognise the inherent value of individual living things and how this has led to our failure to protect them. They also, however, demonstrate ways in which we can reconstruct wildlife policy to serve the interests of the plants and animals themselves and which could lead to more effective protection measures in the future.

**PRINT BUT DO NOT INCLUDE IN BINDING**

# Introduction

## i) Aims of the thesis and definitions of key concepts

The purpose of this thesis is to examine a very specific area in wildlife conservation policy: that which involves the killing of one living thing (or, more commonly, a group of them) in order to save or protect another. The overarching questions that I seek to answer are as follows: is it ever morally permissible to kill another living being in the name of conservation? And if it is, how do we come to the conclusion that killing is right or wrong in a given situation? The reason I have chosen to investigate this particular area is because I believe that the traditional, human-centred systems of thought that we use to try and resolve moral problems do not provide us with a clear, comprehensive method for answering these questions. The primary aim of my thesis then is to construct a new framework which does address these issues and is able to help us resolve the different conflicts of interest that frequently arise in wildlife policy.

Typically, the type of conflicts I address follow the basic pattern; ‘X has an interest in obtaining or doing A, but Y has an interest in that event not happening’. This is then followed by the question: ‘is it acceptable to kill X in order to prevent him from doing A, thus protecting Y?’ For example, in Chapter 5 I look at the problem whereby cats (X) have an interest in eating (A) birds (Y) on a small island. The birds obviously have an interest in that event not taking place, but is it ethically acceptable for us to institute a policy promoting the killing of the cats in order to protect the birds? In order to work out the answers to such dilemmas, I look at what the interests of the individuals in question are and I draw out the different factors that explain why the conflict has arisen. I provide a comprehensive definition of what constitutes an ‘interest’, who can hold interests and the different forms of interest in Chapter 2.

In order to construct and test my framework my research went through three stages and this is reflected in the structure of my thesis: in the first stage (Chapters 1-2) I outline the philosophical arguments which have informed my work as a whole. In the second stage (Chapter 3) I systematise these arguments in order to form a set of principles. The third and final stage (Chapters 4-6) involves applying these principles to current conservation issues in order to show how they can be used to help us construct more ethically sound conservation policies.

I believe that this new framework is necessary because the killing of plants and animals is a ubiquitous practice in much of conservation policy. Yet the idea that killing in the name of conservation is morally acceptable has not yet been rigorously challenged, except in the narrow context of trophy hunting.[[1]](#footnote-1) Every year, millions of animals and countless numbers of plants are killed legally and, ostensibly, as a form of conservation. In 2014 alone the US department of Wildlife Services documented killing 2.7 million animals which had been deemed ‘pests’.[[2]](#footnote-2) These included mountain lions, wolves, otters, blackbirds, swallows, turtles and many others. Since 1996 the USDA is estimated to have shot, poisoned, strangled or ensnared 27 million animals.[[3]](#footnote-3) In the UK, policies have been advocated which promote the regular culling of animals such as deer, badgers and squirrels, resulting in thousands of killings each year.[[4]](#footnote-4) While there have been protests from the public about these events, there has been little in-depth, intellectual scrutiny of both the ethical and ecological arguments which underpin them.

The point of my framework then, is to provide a method for philosophically dissecting these cases and coming to reasoned judgements as to both their permissibility and practical effectiveness. The term ‘effective’ is one which I use frequently when judging a particular policy or idea, and so I shall elucidate on what I mean by this in the context of the thesis. Firstly, it is important to draw a clear distinction between an ethical conservation policy and an effective one. An ethical policy, as I shall show throughout this thesis, is one which protects the basic interests of individual beings and allows, as far as possible, for them to freely pursue their own good in their own way. An effective conservation policy is simply one which meets a certain strategic goal, such as increasing overall biodiversity. Ideally, conservation policies will endeavour to be both ethical and effective but it is important to draw the distinction as in certain situations we may have to make a choice between the two. For example, in Chapter 6 I examine the question of whether or not it is ethically acceptable to test vaccines on captive apes in order to save their wild relatives from the Ebola virus. Despite the fact that this may be an effective measure, in that it would probably achieve the goal of saving both the wild apes and the flora and fauna that depend on them, it would not be ethical because it would involve sacrificing the captive apes for the sake of the wild ones. As I show in the chapter, there is no relevant difference which makes this decision morally acceptable.

My framework therefore utilises a hierarchy, in which ethical concerns will override matters of effectiveness unless a certain critical point is reached. This is reflected in the list of principles I have created for resolving conflicts of interest (these are explained in detail in Chapter 3):

|  |
| --- |
| a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.  b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken.  c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests    d) When interests conflict, we should prioritise basic over nonbasic interests    e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on the wider biotic community. |

These principles are a step-by-step guide, to be used when the interests of one individual clashes with those of another. Questions as to the effectiveness of a policy are not raised unless we reach principle (e), which is essentially a principle of last resort.

Because I structure my framework in this manner, biospherical individualism may be classified as a work of ‘threshold deontology’. It is a deontological theory because it judges the morality of actions by a set of criteria, rather than by the consequences of the action. It treats nonhumans as ends in themselves. It is not however an absolutist theory, because it is acknowledged that deontological principles alone cannot answer every conceivable moral problem. In the case of my own theory, deontological principles do not help us answer the question of what to do when the basic interests of one individual clash with the basic interests of another. It is at this point that is it both acceptable and indeed necessary to consider consequentialist arguments.[[5]](#footnote-5) It has been argued that threshold deontological theories are problematic because the threshold point is arbitrary and often unclear.[[6]](#footnote-6) However, this is not a problem for my own theory because the threshold point does in fact become quite clear if we approach conservation problems on a case-by-case basis. In each case, if we work through each of the above principles but find that we reach a ‘stalemate’ (a clash of basic interests), then this is the point at which the threshold has been reached.

Before concluding this section, I must also set out my definition of ‘inherent value’ as much of the discussions in this thesis centres around the fact that I attribute inherent value to all living things. I use the term ‘inherent value’ in the Kantian sense: if a being has inherent value it has value in-and-of-itself. Inherent value is not contingent on the being in question having any other type of value; it is not reducible to the quality of his experiences or the type of life he leads.[[7]](#footnote-7) For example, the life of a destitute, sickly person is not inherently less valuable than that of a wealthy person in good health. Because inherent value is distinct both from the quality of an individual’s experiences and from his use-value, inherent value is not something that can be calculated. To illustrate this, let us imagine two people: A and B. B is a healthy person, he is married, has a well-paid job in finance and owns his own home. A is overweight, divorced, he has children and a low wage job as a bus driver. It will certainly be the case that A and B have qualitatively different lives which entail very different experiences. They also have different types of use-value to different people; B may have high utility in that he pays a high amount of tax and can share financial burdens with his wife. A, however serves an important social function in his work and contributes greatly to the lives of his children. We can see then that there is no way we could objectively, or indeed justifiably, calculate that one has a greater inherent value than the other. Inherent value is something that living things have categorically, it does not come in degrees and is not dependent on external factors.[[8]](#footnote-8)

At this point I have only described inherent value in humans, but I believe all living things possess inherent value because the value of a nonhuman life is also not reducible to the quality or the type of life it leads. All living things have a kind of value which is distinct from their use-value to both humans and nonhumans alike. Furthermore, all living things possess what Paul Taylor refers to as ‘a good of their own’, by which he means that they have interests which can either be set back or promoted.[[9]](#footnote-9) Because they have interests, all living things can potentially be harmed and this means that all living things are to some degree morally considerable.[[10]](#footnote-10)

It is important to note that inherent value and moral considerability are two separate things, all living things have equal inherent value because inherent value is something that cannot be calculated or possessed in varying degrees. Different living things can have different degrees of moral considerability though: for example, because of the type of being that grass is, we can step on it without causing it harm while the same is not true for a mouse. When we are thinking about how to treat grass and mice then, we can reasonably say that they deserve different kinds and degrees of moral consideration.[[11]](#footnote-11) My definition of inherent value and its distinction from moral consideration will be of particular importance in Chapters 2 and 3, where I expand upon the concepts further and demonstrate their relevance to my own theory.

My theory, biospherical individualism, has of course been inspired by the writings of others working in the fields of animal and environmental ethics. In the next part of this introduction I will provide a brief overview of key authors, their arguments and how my own thesis both fits in with and expands upon the existing literature. I provide more detailed analyses of relevant scholarly work throughout the thesis.

## ii) Original contribution to the literature

My work has been heavily influenced by other authors who have written in this field. In terms of its theoretical background, my own writing owes much to the work of Paul Taylor, James Rachels and Gary Varner. Although each of these authors focus on different aspects of environmental ethics, there is one commonality which was hugely important for the creation of my framework and that is their argument that *individual* living things are the only entities which can hold interests and are therefore of moral concern.[[12]](#footnote-12) Although this idea may not seem particularly radical in the field of human-centred ethics, in environmental philosophy it has long been overshadowed by holistic notions of value.

Holistic arguments can, broadly speaking, be split into two categories: 'the land ethic' and 'deep ecology'. The land ethic was first proposed by Aldo Leopold in his 1949 book *A Sand County Almanac* and has since been reappraised and built upon by scholars such as J.B. Callicott and Holmes Rolston III.[[13]](#footnote-13) The basic idea behind the land ethic is that, within conservation practice, an action is right if it preserves ecosystems and it is wrong if it damages them.[[14]](#footnote-14) Deep ecology, while similar to the land ethic in its focus on 'wholes' differs in several respects. Firstly, it does not revolve around a single source, as the land ethic revolves around Leopold, nor is it a systematic philosophy.[[15]](#footnote-15) Rather, it is the name given to a group of theories and political movements which first arose during the 1960s and embrace a brand of 'spiritual activism'.[[16]](#footnote-16) Unlike the land ethic, deep ecology is often affiliated with Zen Buddhism and other systems of thought which assert that we should not only ‘respect’ the Earth because we are dependent on it, but because we have emotional and spiritual ties to it.

Tom Regan however, branded holistic systems (in particular the land ethic) ‘environmental fascism’.[[17]](#footnote-17) This is because holistic systems dictate that individual beings should be sacrificed if doing so protects such vague concepts as the ‘integrity’ or ‘beauty’ of the land. Peter Singer and other philosophers who take a sentience-based approach to ethics argue that the inherent value environmental holists attribute to ecosystems is misplaced. This is because objects such as trees and rivers can only hold instrumental value, as things which satisfy the needs of sentient beings.[[18]](#footnote-18) Because of disagreements such as these, holistic theories and those which we might broadly term animal-ethics-based approaches have long been assumed to be incompatible. Moral individualism however can provide a common ground between the two approaches because, as I shall discuss in greater depth in Chapter 2, it can allow for both the interests of animals and the wider biotic community to be taken into account.[[19]](#footnote-19)

While authors such as Taylor and Rachels have already advocated the incorporation of moral individualism into environmental/wildlife ethics, my original contribution to the literature will be to use it to create a novel system for resolving conflicts of interest. This new framework is designed specifically to answer questions pertaining to killing in conservation policy. In order to show how I constructed this framework I will now provide a brief methodology.

## iii) Methodology and limitations to the research

This thesis will be looking into the ethical problems surrounding matters of life and death. More specifically, it seeks to address the following questions: is it ever morally permissible to kill plants and animals in the name of conservation? And if it is, how do we come to the conclusion that killing is right or wrong in a given situation? Given that the focus here is on issues of ethics and the role our moral value systems play in the construction of wildlife policy, this thesis naturally falls into the categories of political theory and applied ethics. As such, I will be using philosophical enquiry to achieve two aims: the first is to answer normative questions about political issues with regards to the relationship between humans and other animals. The second aim is to generate ethical and political prescriptions. This method will entail rigorous analyses of the arguments and counterarguments posed and it will follow a clear and logical structure.

I will be concentrating on a very specific kind of relationship; that which exists between the human conservationist and plants or animals which are targeted because they are perceived to be ‘bad’ for an environment, either because of their numbers or their behaviour. Because human perceptions of other living things play such an important part in the formation of conservation policy, describing the ways in which these value judgements are made will be of central importance throughout my work. Practically every decision we make about the welfare of animals, plants and our environment is based on our perceptions of what is ‘valuable’: what is good, bad or useful to us. This emphasis on values means that the thesis fits not only into the categories of political theory and applied ethics but also that of value theory. As Mark Schroeder describes:

“*[value theory] is a worthy distinction in its own right; theoretical questions about value constitute a core domain of interest in moral theory, often crossing the boundaries between the normative and the metaethical, and [these theories] have a distinguished history of investigation*.”[[20]](#footnote-20)

This work will have some practical application in policy formation, while also contributing to a body of philosophical literature. I accept however that any policy impact will be contingent on the prevalence of conflicting ideas on the subject of wildlife conservation. This is an often controversial area, as is any subject which deals with matters of life and death, so my particular view and the ethical framework I propose are likely to face some strong opposition. Despite this inevitability, the work is still justifiable because the job of the political theorist, as Stuart White and Adam Swift describe, is to be a ‘democratic underlabourer’. This entails offering various perspectives on an issue after conducting a thorough evaluation of the arguments involved.[[21]](#footnote-21) White and Smith assert that the political theorist can:

“*offer arguments and justifications of her own, seeking to persuade her readers about which values [...] are the right ones for them to be pursuing in their policy choices, [...] precisely because the arguments she makes are, indeed, offered [...] it is for her fellow citizens to decide whether they want to accept them*.”[[22]](#footnote-22)

It is this *offering* of an alternative to current narratives on conservation that I wish to put forward.

Throughout the process of creating my ethical framework, I consistently utilised the method of reflective equilibrium. This method is appropriate to my research because, as John Rawls describes in his early work on reflective equilibrium:

“*in ethics we are attempting to find reasonable principles which, when we are given a proposed line of conduct and the situation in which it is to be carried out and the relevant interests it affects, will enable us to determine whether or not we ought to carry it out and hold it to be just and right.”*[[23]](#footnote-23)

In order to find these principles, the method of reflective equilibrium requires that we take our beliefs and intuitions, both about particular cases and broad rules alike, and we analyse the theoretical assumptions that underlie these beliefs and judgements. We then work to and fro between these beliefs, revising them if necessary until will reach an acceptable level of coherence between them. An ‘acceptable level of coherence’ means that our ideas are consistent with one another and in some cases one belief (or set of beliefs) will provide support for another.[[24]](#footnote-24) In the process of moving back and forth between our beliefs, we may decide to modify or discard old beliefs and add new ones when necessary, until we reach such a degree of coherence between all our beliefs and judgements that we are satisfied that they no longer require altering.[[25]](#footnote-25) Achieving coherence, or equilibrium, in this way allows us to show why the principles we finally come to hold are valid, as they are now stable and have been sufficiently justified through the processes of questioning and testing them against one another.[[26]](#footnote-26)

I have used this method, not only as a tool for showing why traditional, anthropocentric ethical systems are wrong, but also to question and evaluate my own beliefs. My principles required constant revision, I initially started out with 4 principles but after lengthy reflection I realised that there was much more within these 4 principles that needed unpacking and revising. I eventually ended up having to separate them into two distinct chapters: the foundational principles of biospherical individualism (Chapter 2) and the principles for resolving conflict (Chapter 3). Indeed, it is only now, after approximately three years of engaging in the process, that I am satisfied that I have reached a tentative equilibrium. I refer to this present state of equilibrium as ‘tentative’ because the very nature of reflective equilibrium, as outlined by Rawls, requires that we keep an open mind and are willing to revise our beliefs should new information or evidence come to light.[[27]](#footnote-27)

For example, I argue that all living things have equal inherent value because they all share the common trait of being individuals with their own teleology and ability to pursue their own ends (this is explained in detail in Chapter 2). Whether those ends are as simple as a plant conducting photosynthesis or a human launching a rocket into space is *morally* irrelevant with regards to the inherent value of plants and aerospace engineers. This is because there are no sufficient grounds for arguing that either the ability to photosynthesis or to construct a rocket are the basis for inherent value. If, however we were to discover that in fact plants and animals are, as Descartes believed, mere automata with no ability to pursue their own ends, I may be compelled to revise my beliefs about their inherent value. As I stated earlier in this section, what I offer in this thesis is a framework for guiding our actions and informing the way we think about wildlife, given what we know about them.

There are of course certain limitations to using this kind of methodology. Firstly, critics of Rawls’ system of reflective equilibrium have argued that it gives too much weight to moral intuitions.[[28]](#footnote-28) Richard Brant, for example, argues that simply having coherence among our beliefs does not necessarily suffice because our initial beliefs may lack ‘evidential force’.[[29]](#footnote-29) In other words our intuitions may simply be the result of superstition, our cultural heritage or some other form of bias. If these initial beliefs or intuitions lack evidence to support their veracity, then no matter how well we utilise Rawls’ method, our beliefs will still be unfounded.

It is arguable as to how far this critique really affects Rawls’ own *Theory of Justice*.[[30]](#footnote-30) However, it is certainly a critique that could be relevant to my own theory. It could be argued that my principles rely heavily on the rather emotional intuition that killing nonhuman beings is morally problematic, and this would not be an entirely unreasonable observation. However, it is for precisely this reason that I have not only taken moral considerations into my reflections, but have also researched a great deal of scientific literature. This ensures that although I may have chosen this subject because I had certain moral intuitions about the wrongness of killing wildlife, I have been able to substantiate my claims using both moral theory and empirical evidence. Future scientific evidence could of course provide new information which might call into question the strength of my principles, and this is an unavoidable limitation.

Another limitation concerns the scope of my thesis: throughout my work I refer to the role of humans in causing certain conservation problems, yet I have not used any human-based case studies. In Chapters 4-6, I could conceivably have included sections on human overpopulation, humans as ‘invasive species’ and animal testing for drugs intended for human use. However, I deliberately excluded human case studies, the reason for this is that they would have taken me beyond the scope of the research aims and research questions. The aim of this thesis is to consider whether or not it is ethically permissible to kill plants and animals in the name of wildlife conservation. While humans are certainly a type of animal, there are certain key problems that would arise if I were to discuss the possibility of killing humans in order to save wildlife. Perhaps the most obvious question is, how would we decide who to kill or how could we persuade people to, for example, stop having children in order to curb the human population? This leads us to other issues such as who would have legitimate authority to implement such controversial policies? Would it matter that such policies would severely infringe on our individual autonomy? Questions such as these would need to be answered, yet doing so would be consume so such space in the thesis that it would detract from the fact that this thesis is about wildlife policy. The overall clarity and structure of the thesis would therefore have been very negatively affected.

Before moving on to the main body of my thesis, I will now provide a brief overview of the forthcoming chapters in order to demonstrate the logical progression that my arguments will follow.

## iii) Chapter Overview

My thesis can be divided into two distinct parts: the first half (Chapters 1 to 3) consist of the construction of my theory of biospherical individualism, while the latter half (Chapters 4-6) involve the application of that theory. In this final section of my introductory chapter, I shall provide a brief synopsis of each chapter in order to show how they link together to form a coherent whole.

**Chapter 1.**

I begin the main body of my thesis by looking at the ways in which we can ascribe value to other living things. My focus in this chapter is on traditional philosophies which either place the value of all human interests above all those of non-humans, or which at least have a strong tendency to favour human interests. I concentrate on three key kinds of argument which are used to justify the superiority of human interests: the first stem from religion and the idea that humans are closer to God. The second kind of argument asserts that human interests are of greater value because of our remarkable cognitive abilities. The final branch of ethics that I analyse argues that any being which can suffer deserves moral consideration. Each of these arguments are, to varying degrees, logically flawed in a way which raises serious problems in the context of wildlife conservation. The purpose of this chapter is to highlight these problems and thus clearly demonstrate why our most prominent ethical frameworks are often unsuitable for informing wildlife policy.

**Chapter 2.**

Here I set out what I have termed ‘the foundational principles of biospherical individualism’, which are the moral claims which tell us why other living things have inherent value. There are two principles here: 1) Humans are not special: humans have inherent value, but so too do other living things. Because of this, we have certain moral obligations towards nonhumans. 2) The moral value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way. The first principle is, in part, a response to the anthropocentric theories I discussed in Chapter 1.

Principle (1) argues against human exceptionalism by discussing how scientific knowledge has, over the last century, proved much of what we presumed about our uniqueness to simply be wrong. Although we may revel in the acquisition of this kind of new knowledge, I assert that there has been a strong resistance to the idea that we should change the way we treat nonhumans differently in light of what we now know. In elaborating on principle (2), I then move on to discuss environmental holism, which is a branch of philosophy that is strongly anti-anthropocentric but which still cannot provide us with a satisfactory method for resolving conflicts of interest because it is extremely vague about who can hold interests. This then is where I explain why individuals are the source of inherent value as opposed to ‘wholes’ such as ecosystems. It is at this point that I most closely engage with the literature of academics such as Paul Taylor and Gary Varner. I also use this opportunity to clearly define what I mean by ‘interests’, I set out the different kinds of interests and their relevance to moral philosophy, thus setting the stage for Chapter 3.

**Chapter 3.**

In this chapter I answer the question which, at this point, will have become rather pressing: if *all* living thing have inherent value, what kinds of moral considerations do we owe them? It is here that I set up my principles for resolving conflict, using my foundational principles as a starting point. I have five principles for resolving conflict:

|  |
| --- |
| a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.  b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken.  c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests    d) When interests conflict, we should prioritise basic over nonbasic interests    e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on the wider biotic community. |

In this chapter I go through these principles one at a time, explaining how they were devised, why they are philosophically robust and why they are necessary for my framework. Having outlined and justified my ethical framework, I use the final part of this chapter to show how these principles can be applied. I show how they can answer questions such as ‘is it morally wrong for animals to eat other animals’? and ‘how can we justify using plants?’ As the framework is now set out, I am able to move on and show how it is supposed to work in the following chapters.

**Chapter 4.**

Chapter 4 marks the beginning of my series of case studies. In this first set of examples I look at the issue of population control in conservation and I question if it can ever be permissible to kill individuals as a means of controlling the wider population. The first two examples I examine here involve the use of hunting as a mode of ‘control’. The first case deals with problems of ‘underpopulation’ or endangered species. Specifically, I examine whether or not it is ethically permissible to allow trophy hunters to kill black rhino. The pro-hunting argument states that it is good for conservation because killing just one rhino produces high levels of finance which can be put into protecting other animals from poachers. In the first instance, I cast serious doubt on the validity of this claim, but more importantly I show why it is wrong, in this context, to kill one individual in order to save others.

My second case study looks at the hunting of ‘overpopulated’ species. I examine two case studies: the first is of the lantana plant and the problems it has caused in Australia. The second case looks at white-tailed deer in North America. In the lantana case, I show that there may well be good reasons for removing the plant from certain areas, but that killing need not always be necessary. In the second study, I assert that hunting is both an unethical and impractical method of conservation as it fails to treat animals as individuals with inherent value. Although deer do cause problems, those problems are better solved by reforestation and, if absolutely necessary, by the use of immunocontraceptives to temporarily put deer numbers on hold.

In the final section of this chapter I discuss the concept of rewilding, with particular focus on the question of whether or not it is ethically sound to introduce predators to an area as a means of ‘controlling’ other species. I chose this case study because, not only is it another example of a form of population control, but also because throughout the thesis I stress the importance of habitat restoration. One may therefore assume that I would endorse all forms of reforestation or habitat regeneration, but this is not the case. In the case of rewilding, some practices may create more conflicts of interest than they resolve. By discussing the various forms of rewilding and examining their ethical implications I am able to emphasise the usefulness of my framework for tackling tough conservation issues concerning life and death.

**Chapter 5.**

In this chapter, I turn to the issues surrounding so-called ‘invasive’ species and also to their hybridisation with ‘natives’. In this instance, the main question is ‘is it acceptable to kill invasive plants or animals in order to protect native individuals?’ My overarching argument is that it is not acceptable to kill other living things purely on the basis of their non-native status and I justify this assertion in the first section of the chapter. However, this does not mean that newly arriving species are not sometimes problematic, especially when they threaten the lives of local individuals. There may be some instances in which, although killing may not be justifiable, another form of intervention could be. To illustrate this, I provide two case studies: one in which it is morally wrong for us to intervene with ‘invasive’ wildlife and one in which it would not only be permissible, but required.

The first case concerns the ruddy duck and its current persecution by conservationists for being ‘the biggest threat’ to the white-headed duck. I dispute their argument and show that the problems facing the white-headed duck are much more extensive, and that in fact the causes of its initial decline were human destruction of its habitat and hunting. To blame the ruddy duck for this conservation problem is thus highly misleading and killing them is morally wrong. By contrast the second case study looks at problems caused by cats on Ascension Island. In this instance, I believe that there were grounds to remove the cats from the island to protect the local birds, but that killing the cats was wrong because there were alternative means available. By using my principles for resolving conflict I am able to highlight the fact that there is no one-size-fits-all measure which can be used when discussing ‘invasive’ species. Instead we must take each case as it comes and examine it according to its own unique context.

**Chapter 6.**

My final chapter concerns the unusual case of African great apes and the Ebola virus. I chose this particular case because it is both a pressing concern in conservation policy today and because there are two types of conflict of interest at play which allow me to test my framework against some very difficult problems. The first conflict is between the individual apes and the Ebola virus. While it may at first simply seem intuitive to say that it is ethically acceptable to kill viruses or bacteria there has rarely been any discussion of why it is acceptable if a virus is a living thing. The first part of this case study delves into this question and I argue that although viruses do, under my theory, have inherent value, we can kill them on the grounds of self-defence or defence of another.

The second problem I explore is whether or not we should vaccinate African apes against Ebola. This time the conflict is between the apes that would be used to test the vaccine and those who receive it once it has been confirmed safe. I argue that the testing of vaccines on apes is not ethically acceptable even when it is done for the sake of others of their kind. This is because it goes against the captive individual’s basic interests and there is no relevant difference between captive apes and wild apes that can justify treating them differently in the context of medical experimentation. This case shows that my framework is able to cope with highly complex and controversial ethical dilemmas.

# Chapter 1. Assigning moral value to nonhumans

Understanding the myriad ways in which we value plants and animals in our daily lives is of the utmost importance if we are to also understand the laws and policies that governments make to protect them. Although the animal rights and environmental ethics movements as we know them are relatively recent phenomena, the idea that other living things deserve at least some degree of moral consideration is not a new one. The purpose of this chapter is to analyse those discourses which have influenced and shaped the way we value, and subsequently treat, wildlife today. As stated in my introduction, I will be taking a novel approach to my analyses throughout this thesis, as I will not be utilising a firmly animal rightist or environmentalist strategy. Instead, my arguments will be based on the idea that *all* individual things have value in-and-of themselves, which I refer to as ‘inherent’ value. By extension, communities or groups of living things have value because they are a collective of valuable individuals. I shall provide further justifications for assigning inherent value to all living things in Chapter 2.

Given that the aim of my thesis, as a whole, is to introduce a new kind of framework for resolving the conflicts of interests that arise in wildlife policy, this chapter is crucial as it tells us why this new framework is needed. It evaluates traditional ethical systems and shows why their anthropocentrism is deeply problematic for conservation policy and practice. I will look at three ethical systems which have traditionally been used to assign moral value: religion (specifically the Abrahamic and ‘Eastern’ religions), arguments based on reason and intelligence, and arguments grounded in the capacity to suffer. I have chosen these examples because of the high degree of influence they have had in the history of moral thought. A report published in 2012 by the Pew Research Centre estimated that 8 in 10 people across the globe identify with a religious group.[[31]](#footnote-31) Around 55% of those people consider themselves followers of an Abrahamic religion (Jewish, Christian or Muslim) and around 23% follow Hinduism, Buddhism or a branch of these religions such as Jainism. Although the relationship between religion and the formation of human moral codes is hugely complicated, it is not unreasonable to assume that, historically, religions have informed many people’s attitudes towards nonhumans.[[32]](#footnote-32) Non-religious arguments concerning animal behaviour and sentience have also been of great importance, as they have resulted in the creation of organisations such as the Royal Society for the Prevention of Cruelty to Animals (RSPCA) and other bodies which have lobbied successfully to increase the legal protections afforded to animals.[[33]](#footnote-33)

My intention in this chapter is to show that, although certain aspects of these traditional approaches can have positive consequences for wildlife, by and large such systems are inadequate for providing us with a coherent and consistent system of ethics. This is because there is a great deal of opacity and variability in religious texts regarding the moral standing of nonhumans. Furthermore, and as I discuss in greater depth in Chapter 2, evolutionary theory presents serious challenges to the idea that humans are biologically and morally special.

Each of the traditional systems I discuss will have different answers to the question of who or what can have moral value. Some assign purely instrumental value to all nonhumans, while others argue that there are elements to animal lives which are inherently valuable. However, there is one overarching issue which is especially problematic for all traditional theories. All of these approaches are united in the way they force us to create hierarchies of value, with humans invariably the most important species. As a consequence, such approaches frequently allow for the killing of living things if doing so serves human interests. In terms of wildlife conservation, I will demonstrate throughout this thesis that this drive to serve our own interests has fuelled the decline of wildlife across the globe.

In the following sections I will primarily be referring to conflicts that arise between humans and animals. This is due to the fact that the literature in question only refers to these kinds of conflicts. However, I believe that plants also possess inherent value and I shall discuss why they possess such value and what this means for the way we should treat them in Chapter 2. To begin my analysis of anthropocentric ethical systems, I will discuss issues which arise in six of the world’s most popular religions: Hinduism, Buddhism, Jainism, Islam, Christianity and Judaism. The purpose of this overview of religious approaches is twofold: firstly, it will show how our modern thoughts on animal welfare have been shaped by the teachings of religion. Secondly it will show that these teachings do not provide us with a clear framework for protecting wildlife.

## i) Restrictiveness and inconsistency in world religions

In this section I begin by examining the Abrahamic religions and their views on the moral considerability of animals. I show that these religions cannot be used as a basis on which to form ethical conservation policy for three reasons. The first problem is that, even as individual religions, they are highly subjective. There is no consensus within Islam, Christianity or Judaism as to how we should treat nonhumans. As the religious doctrines themselves are so open to interpretation, it would be impossible to form any coherent policies around them. The second problem concerns the ethical implications of using religious frameworks to form policy. The issue here is that the Abrahamic religions all attribute special moral standing to humans which, as I shall discuss in depth in Chapter 2, is unjustified. I then move on to discuss Hinduism and Buddhism which take a different approach to the Abrahamic religions in that they do not see as great a spiritual divide between humans and other animals. However, they are still unsuitable as foundations for conservation policy because they too are subjective and create hierarchies of moral value which have troubling results.

In addition, a much broader problem with using religion as a basis for policy formation is that doing so would be too restrictive, particularly in countries with a diversity of ethnic communities. Even within a single country, it is often the case that people will follow a variety of religions, yet policies which govern an entire country need to be understandable and accessible to all. Further to this, in places where atheism or agnosticism are prevalent, policies founded on any kind of religious doctrine would be extremely alienating.

I shall begin with an examination of the three Abrahamic religions, which do take slightly differing approaches with respect to how we should treat nonhuman animals. For example, the consumption of certain animals is forbidden in Islam and Judaism, in contrast to Christianity. However, for the purpose of this thesis I have grouped Islam, Christianity and Judaism into the same category, not only because they are monotheistic religions with a common origin, but because all three hold that humans were granted dominion over other animals by God. This can be seen both in the Old Testament and in the Qua’ran.[[34]](#footnote-34) The writings of the Abrahamic religions therefore tend to suggest that wildlife are primarily of instrumental value. The Bible, for example, repeatedly describes animals in terms of their function as tools for Man and God: from God granting power over animals to Adam and Eve, through stories of sacrificial lambs, to Jesus unnecessarily casting two thousand pigs into the sea.[[35]](#footnote-35) This portrayal of animals as instruments for human use has serious ramifications for animal welfare to this day. As an example, in May 2010 the Malaysian chief minister in Malacca justified his plans to build an animal testing laboratory by saying that God had created rats and monkeys for humans to use in whatever way they needed.[[36]](#footnote-36)

Of course this is not to suggest that the whole of the Abrahamic world encourages or permits cruelty to animals. Many followers of Abrahamic religions adopt vegetarianism and consider the human trait of compassion and caring as something we should practice with regards to all living creatures. Take for example saints such as St. Francis or St. Benedict, whose actions implied that mankind’s role is to be a ‘brother’ or kindly steward of nature rather than a vicious dictator.[[37]](#footnote-37) But it is exactly this vagueness, this scope for interpretation within the religions themselves, which means that they cannot provide us with a convincing account of how we should treat nonhumans. Even St. Francis, perhaps the saint most often affiliated with animals, has been in turn vilified and idolised by successive thinkers, either because he went too far in stressing the importance of animals or because he did not go far enough.[[38]](#footnote-38)

Upon reading the numerous works which try to extract an ethic for wildlife from religious texts, it quickly becomes apparent that no consistent answers will be forthcoming. Certain aspects of religious practice are purported to be created with animal welfare in mind. Katherine Wills Perlo describes the Islamic practice of halal slaughter, for example, as being designed to be the quickest and least painful mode of killing the animal. The animal would not be permitted to witness the sharpening of the blade, nor would other animals be allowed to witness the slaughter because these actions would cause undue stress.[[39]](#footnote-39) Such sympathetic views can then be starkly countered by essays such as John Passmore’s *The Treatment of Animals*, in which he describes his view of the Christian attitude to animals as follows:

*“‘The Puritan’ Macaulay once wrote with condemnatory intent [that he] “hated bear-baiting not because it gave pain to the bear but because it gave pleasure to the spectators” [...] to the mere fact that the bear suffered as a consequence of human action they were indifferent. That, on the whole, is the Christian tradition.”*[[40]](#footnote-40)

Passmore can perhaps be criticised here for making a rather sweeping generalisation about Christian values. But whether interpretations of religious practices are as scathing as Passmore’s or more forgiving, the subjectivity of each of the Abrahamic texts makes them quite unsuitable as a basis for any form of practical ethical policy. This is because the conclusions people can draw are far too fractured. If followers of a faith cannot agree on what their religious texts mean with regards to the moral status of animals, then it would be impossible to ever form a coherent political policy from these disparate interpretations.

As an illustration of this confusion caused by the subjective nature of religious texts, let us consider the story of Noah and the great flood; one could interpret this story as meaning several things for the relationship between God, humans and animals. To begin with, while the flood was raging Noah’s duty was to safeguard the animals on board the ark, caring for and protecting them. The idea of a ‘good’ man as being one who shows compassion towards animals is echoed in the image of God as ‘the good shepherd’. On this reading, kindliness and consideration for the lives of animals is seen as a virtue.[[41]](#footnote-41) The problem with this reading of the story of the Ark is that it overlooks the point that God would have already destroyed millions of animal lives in the flood.[[42]](#footnote-42) Furthermore, many who wish to advocate for the right of man to eat meat cite the line in Genesis which states that after the flood God said to Noah *‘everything that lives and moves will be food for you. Just as I gave you the green plants, I now give you everything.’[[43]](#footnote-43)* Anyone who believes in a literal translation of this passage will find it difficult to argue in favour of vegetarianism or abstention from using animals, as turning down God’s offer of meat could be considered an insult to God.[[44]](#footnote-44)

The story of Noah also shows us how the Abrahamic religions create a hierarchy of moral value: even if, at times, Noah is compelled to show kindness towards animals, ultimately he is justified in killing or using them if he sees fit to do so. This stems from the idea that only humans are created in the image of God and thus humans have a special relationship to ‘the Divine’ and a special moral standing.[[45]](#footnote-45) This elevated status creates an ethical problem because it implies that human interests always have precedence over those of animals. Consequently, an ethic or policy formulated on the assumption that humans are morally special would carry an implicit bias. This bias could have ethically problematic consequences as it may be used to justify practices such as logging which cause great harm to wildlife but are very useful for humans.

Of course not all persons of faith see the hierarchical nature of the Abrahamic religions as a problem. Many religious writers who are vegetarians have explained their decision to abstain from the eating of meat by contextualising the writings of their religion. For example, Richard Young asserts that simply because, in Luke, it is briefly mentioned that Jesus ate a fish, we do not therefore have carte-blanche to consume every fish in the sea.[[46]](#footnote-46) Interpretations like this consider the fact that meat consumption is mentioned in the Bible to be a historical fact, but they feel that we in the modern world need to consider how the world has changed and adjust our behaviour accordingly. Vegetarians can also argue that they are living in accordance with the utopian idea of Eden, in which both man and animals are all vegetarian.[[47]](#footnote-47) It does not matter that this is a state which does not yet exist, because to live according to one’s ideal principles can be a good characteristic.

Once more however, although individual followers of a religion may see their faith as being one which advocates the protection of animals, this belief is not unanimous among different sects within each of the Abrahamic religions. Therefore, it cannot be the basis for forming coherent, ethical wildlife policies. In the last part of this section, I explore why this inconsistency is also a problem in ‘Eastern’ religions. Although, as with ‘Western’ religion, there are many different faiths in South and East Asia, I have chosen to focus on Buddhism and Hinduism as they are the two of the oldest, most popular, and thus most influential religions in the East.

The reason I have differentiated between the Western and Eastern systems of faith in this chapter is due to the fact that they espouse markedly different attitudes towards nonhumans. In the Eastern religions, this different attitude is epitomised by the concepts of karma and reincarnation, which create a cyclical view of the processes of life and death which does not exist in the Western faiths. This cyclical element means there is a much narrower gap between humans and wildlife from an Eastern, religious viewpoint. However, this does not mean that they are unproblematic.

One must be careful when testifying as to exact beliefs of any individual Buddhist or Hindu. However, for the purposes of this thesis it is reasonable to identify certain common themes which have appealed to those looking for an alternative approach to wildlife ethics.[[48]](#footnote-48) These themes include compassion (*karunā,*)‘loving-kindness’ (*metta*) and non-violence (*ahimsa*) towards human and nonhuman beings. These are important because of two key beliefs which are common to all three religions: karma and reincarnation. Reincarnation is the process by which living things continually die and are reborn as other living things up until the point at which they achieve enlightenment. Karma is used to describe the process of cause and effect which ultimately decides which form we are reborn in. Put simply, one’s actions in one life dictate their situation in the next.[[49]](#footnote-49)

It is a common assumption that, under the ethics of the Eastern religions, animals are given a much higher moral status than in the Abrahamic religions. There are several reasons for this assumption: the first is that because of the process of reincarnation animals, as well as humans, are considered to have souls. Therefore, given that they too embody the existence of ‘the Divine’ they should be treated with *karunā,* *metta* and *ahimsa*.[[50]](#footnote-50) The process of reincarnation encourages vegetarianism, care and consideration because by eating or mistreating an animal one could unwittingly be eating or mistreating a member of one’s own family.

However, there are some problems with adopting these philosophies. To begin with, under the rules of reincarnation and karma, humans are actually considered the apogee of all living things, they are the best thing that ‘life’ has to offer. Only humans can achieve enlightenment and make the transition to Nirvana, which means that to be an animal is to be inferior to a human. This milder form of anthropocentrism prevents the Eastern religions from being able to treat humans and nonhumans as beings with equal inherent value. Furthermore, the idea of karma has historically been used to justify the caste system, under which certain groups of people have been consistently oppressed and socially ostracised.[[51]](#footnote-51)

Certain branches of Buddhism override these problems by insisting that all living things are in fact equal. However, ethicists informed by these Buddhist principles face criticism from conservationists who point out that Buddhism cannot justify special treatment to endangered species.[[52]](#footnote-52) Under the most egalitarian readings of Buddhism “the suffering of a tiger is no more significant than the suffering of a rat.”[[53]](#footnote-53) This inability to attribute a special conservation status to endangered species is a problem that could also be levelled at my own theory. However, as I shall show when I discuss rhinos in Chapter 3, although my own theory does not assign any extra *inherent* value to endangered species, this does not mean we should not take extraordinary measures to protect them if we are responsible for their plight. For the strictly egalitarian Buddhist however, the problem still remains as the Buddhist system cannot provide us with a clear method for deciding how to act when, for example, the basic interests of a tiger and a rat conflict. These are the kinds of questions that we must be able to address in wildlife policy, but Hindu and Buddhist systems do not provide us with a single coherent method for making such complex decisions.

Without wishing to discount the noble intentions of those who are of religious faith, from the point of view of *political* theory and practice, effective policy cannot be built on religious belief. This is because policies should be built on rationales which can be accepted by everyone within a society, and which do not rely on views which are as highly contested as religious belief. Religious ideas are also open to multiple interpretations, they are therefore often inconsistent and can be created with a mind to protect only a select few. The aim of this thesis is to propose a system that is not only idealistic in tone, but is also workable in our day-to-day lives. In the next section I will be discussing why animals have been denied moral value by philosophers such as Aristotle, Descartes and Kant. I have chosen to look at these philosophers because of the ways their works have influenced certain social attitudes towards animals. For example, in Descartes’ *Discourse on Methods* he argued that animals could not feel pain.[[54]](#footnote-54) Subsequently, scientists used Descartes theory to justify the use of live-animal vivisections. Though the methods have since changed, the use of animals in medical and cosmetic testing is still widespread throughout the globe, with the charity Cruelty Free International estimating that around 115 million animals are used in laboratories each year.[[55]](#footnote-55) Although many of the ideas that these philosophers put forward have now been scientifically discredited, I will show that they are still hugely influential in the forming of political policies.

## ii) Reason and intelligence

Until relatively recently, our understanding of animal behaviour or the animal mind has been limited. Only in the 1800s, with the publication of works such as Charles Darwin’s *On the* *Origin of Species* and George Romanes’ *Animal Intelligence*, did the study of animal behaviour become a topic of deep controversy among the wider population.[[56]](#footnote-56) This shift in mood is likely to be due to the implications that evolutionary theory would have for religious societies. However, in this chapter we will be moving away from issues specifically related to theology and on to matters concerning the ability (or inability) of animals to ‘reason’. Arguments in this area are concerned with what the behaviour and habits of animals can tell us about their mental lives.

I will show that arguments which assign moral value based on the perceived intelligence of animals are highly problematic for several reasons. The first problem is that the science of understanding animal’s mental states is in its infancy; there is far more that we do not know about the animal mind and animal behaviour than there is that we know. Any ethic founded on our understanding of animal cognition therefore is founded on little to no evidence. The second problem is that even if we do accept that some animals are intelligent we are then in danger of creating a hierarchy of intelligence from which we form our ethical values. This is troublesome because it raises the question: should we value humans according to how intelligent they are? In certain circumstances we certainly do value the trait of intelligence very highly, but I will show that it would be morally wrong to rank people and their inherent value according to their intelligence.

Similarly, if we take reason as the source of moral value then we are faced with difficult questions over how to value very young children, people with severe mental disabilities or those suffering from psychotic episodes, whose abilities to ‘reason’ are severely impaired. We often take certain ethical principles as common sense when we apply them to members of our own species, which is why most of us do not think that new-born children or the mentally ill are of inferior moral value. However, for many, that same ‘common sense’ approach does not apply when discussing the lives of members of other species. I will now look at arguments which state that animals cannot possess moral value because they lack certain mental capacities and then move on to refute these claims.

The notion that animals are “dumb beasts” is described by Aristotle when he asserts that:

*“[It is not] the lowing of an ox that a lion enjoys, but the feeding on it. The reason why he seems to enjoy the lowing is that it was through it he became aware that the ox was near.”[[57]](#footnote-57)*

In the section of *The Nicomachean Ethics* which contains this quote, Aristotle draws a very clear distinction between the moral value of animals and humans. He is discussing the notion of licentiousness, the lack of moral discipline, and draws the conclusion that animals only enjoy sensations which fulfil their immediate desires. Thus their only interests are in acquiring food, drink and sex and for this they are described as ‘low and brutish’.[[58]](#footnote-58) For Aristotle, when humans overindulge these desires they are licentious, ‘odious’ and guilty of behaving in an animalistic fashion which is morally wrong. By equating animal behaviour with that which is morally wrong in humans, Aristotle set a precedent which allowed us to deny animals any moral worth for hundreds of years.

The notion that animals are devoid of reason or are not conscious in the way humans are is repeated by much later philosophers such as Rene Descartes, who describes animals as ‘automata’.[[59]](#footnote-59) Descartes’ justification for his view was based on his principles of dualism, the separation of mind from matter. For Descartes, all animal action could be explained as a response to a physical stimulus but not all human action could, therefore humans must be in possession of an immaterial ‘mind’ which governs their behaviour.[[60]](#footnote-60) Further to this, Descartes noted that animals fail two ‘tests’ which would prove the existence of a mind. The first test is the use of language and the second is the ability to respond rationally when one is faced with a new situation.[[61]](#footnote-61) In addition to arguing that these ‘tests’ are not a particularly good way of proving the existence of a mind, later in this section I shall also show why Descartes’ assumptions about the inability of animals to use language or adapt intelligently are highly questionable. As was noted with regards to religion, we should not suppose that thinkers such as Aristotle and Descartes advocated cruel treatment to animals (indeed many reports suggest that Descartes was highly affectionate towards his dog, Monsieur Grat). Rather, these scholars were arguing that the relatively ‘primitive’ state of animal minds means that they do not possess inherent value.[[62]](#footnote-62)

Immanuel Kant, who also held that animals do not hold inherent value because of their lack of reason, argues that cruelty to animals is a negative action because cruelty in general is a trait which lessens one’s humanity: “*If he is not to stifle his human feelings, he must practice kindness towards animals, for he who is cruel to animals becomes hard also in his dealings with men.*”[[63]](#footnote-63) Kant’s particular philosophy on the moral status of animals centres around his idea of ‘personhood’. For Kant, only humans can hold moral value because only we are self-aware, only we understand the concept of “I”.[[64]](#footnote-64) This special ability sets the human species apart from the rest of nature and allows us to make use of animals and the natural world insofar as our needs require them. Under this rule hunting, experimentation and other consumptive uses are all permissible.

Having outlined the traditional bases for linking reason and intelligence with moral value, we need to question the assumption that animals do in fact lack reason and intelligence. Scientific studies of animal minds and behaviour have greatly undermined previous assumptions regarding animal intelligence. I will now provide examples which challenge the views of philosophers who deny that animals can reason, feel emotions or communicate using complex language. While many ancient thinkers did not consider humans and animals to be directly related, modern science and evolutionary theory presented cases which radically blurred the lines between ‘us’ and ‘them’ that had been drawn by history.

Studies of the behaviour and genetic features of various animals has raised questions over the uniqueness of humans and our cognitive abilities. Experiments with New Caledonian crows, conducted by Auguste M.P. von Bayern and his colleagues and published in 2009, yielded results which showed that the crows did remarkably well when faced with problem solving tasks which they would not have been exposed to in the wild.[[65]](#footnote-65) The experiments demonstrated the ability of the crows to use stones to raise the water level in a long tube, which caused food to rise up the tube until it was within their grasp. The crows had not been trained or faced with similar tests beforehand. The same test was repeated at Cambridge University in 2012 but with two variations on the kinds of tubes involved.[[66]](#footnote-66) The experiment was also conducted with crows (this time Eurasian Jays) and children under the age of ten. In two out of the three tests the crows performed as well as the children. Such abilities reveal crows to be far more intelligent than may have previously been thought.

While such experiments may have surprised many who had previously questioned the intelligence of animals, it is perhaps studies of primates that have had the greatest impact on our perceptions of nonhuman rationality, consciousness and indeed self-consciousness. Gordon G. Gallup’s studies with chimpanzees and mirrors concluded that chimpanzees were aware of the fact that the image in a mirror was in fact them.[[67]](#footnote-67) Chimpanzees then almost certainly understand the concept of “I”. Charles Darwin himself believed that animals have emotional lives, and that humans are not unique in this but rather that our emotions and behaviours are of a different degree rather than a different type.[[68]](#footnote-68)

As to the problem of the two tests posed by Descartes, research has identified several examples of animals using language and also of individual members of a species adapting in manners which can be described as intelligent. Before discussing this point we must first clarify what we mean by language, because it can be defined in several ways.

The intuitive answer to the question of what language is, is that it is a communicative system, but the issue gets complicated when we then ask ourselves the question, ‘what does language communicate’? All mammals, fish, birds, amphibians and reptiles show the ability to communicate concepts such as danger or the impulse to reproduce, but the screech of a meerkat warning his clan of an approaching predator or the display of a male peacock’s tail feathers are not described as linguistic forms of communication. We tend to think of language as something far more complex, the ability to not only project an immediate need but to both comprehend and convey thoughts to others. The ability of humans to create and communicate abstract thought in this way is generally perceived to be uniquely human, as is our use of voluntary speech (this is speech which conveys an emotion we may not actually be experiencing at the time, such as when we lie about how we are feeling) and syntax (the construction of complex sentences).[[69]](#footnote-69)

Trying to establish whether or not animals have *thoughts* in the way that humans do is both tricky and contentious. It is difficult enough for a human to work out the thoughts of his fellow humans, so the idea that we can know the minds of other animals seems absurd. We tend to deduce the thoughts of other humans through both vocal language and body-language. While it seems likely that the audible languages of animals are less complex than our own (we have also made things twice as complex by creating the art of writing) the body languages of animals can be richly descriptive and creative.

For example, consider the behaviour exhibited by Western and Clark’s Grebes: these Grebes pair for life and studies have shown that their body language changes as time progresses.[[70]](#footnote-70) When a pair is first courting, they use an elaborate dance-like ritual known as ‘the rushing ceremony’, which begins with the pair facing one another and going through a complex series of head bobs, dips and shakes before the pair suddenly ‘rush’; running along the water side-by-side and diving in sync with one another. Over the years the pair’s interactions change, with variations on the first dance taking place and the addition of the sharing of food or the presenting of plants to one another. If long-established pairs become separated, upon regrouping they perform an abridged version of the rushing ceremony. Research shows a strong link between the length of time that a pair have been together and the amount of time they spend performing these dances.[[71]](#footnote-71) The longer the couple have been together; the less time they spend dancing in order to reconnect.

It would not be anthropomorphising to assert that the use of such complex body language clearly serves a communicative, evolutionary purpose. Although we cannot know with absolute certainty what is being communicated, given the strong correlation between the type and length of dance and the nature of the pair’s relationship, we can reasonably infer that the dances are used, firstly, to communicate sexual suitability and then in later stages to confirm recognition between two individuals. Studies have also shown that body language is also hugely important in human communication, as it helps us to assess the validity of what someone is saying to us.[[72]](#footnote-72) For example, if someone says “this dinner is delicious” with a smile and relaxed posture, we are more likely to believe them than if they are physically tense and wearing a taut facial expression. The point of this example is not to argue that Grebes exhibit a human-like behaviour and are therefore worthy of moral consideration, the point is that nonhumans can still communicate with one another without the use of vocal language. The fact that many animals use body language more than they do vocal expression is no indicator of their intelligence, nor should it be considered as a basis for inherent value. If we regard this kind of body-language as being indicative of intellectual and moral inferiority, this would undermine the intelligence and moral status of the deaf, or people with other disabilities, who have to rely on sign language to communicate.

It could be argued that voluntary speech sets us apart from the rest of the animal world and thus gives us some form of special status. This is an interesting idea as this kind of speech does appear to be a specifically human trait. However voluntary speech is only a part of language, it does not define it, for example if I say to someone “I have a headache” and I am telling the truth then I am not using voluntary speech but that does not mean I am not using language. Although syntax and grammar do at first appear to be features of human speech alone, we must remember that those capacities which allowed us to evolve complex language are ones which we share with other animals. For example, the types of neurons and neurotransmitters in our brains, the basic structures that we need to hear and produce vocal sounds and the ability to form and retrieve memories.[[73]](#footnote-73) Each of these are traits we share with all animals, the fact that we are evolving and taking them in new directions is certainly interesting, but there is no reason it should form the basis of our unique, inherent value.

To provide further evidence for my assertion that humans and animals share certain intellectual capacities, we will now go through several examples which undermine Descartes’ notion that animals can neither use language nor behave rationally in novel situations. Bottlenose dolphins (hereafter referred to simply as ‘dolphins’) can illustrate these points well. In Louise M. Herman’s experiments, two dolphins were trained separately in different languages. One language was audible and the other visual, each consisted of only a few ‘words’ and was limited to the following: a set of objects (such as window, ball, hoop) a set of imperatives (such as “go under”, “go over” and “fetch”) agents (the two dolphins named Akeakamai and Phoenix) modifiers (“up”, “down”, “left”, “right”) and function words (“yes”, “no” and “erase” for when an instruction is to be ignored.)[[74]](#footnote-74) Herman’s experiments showed that not only were the dolphins able to follow a set of frequently repeated instructions such as “ball, fetch, person” (bring the ball to the person), but once a sentence had been learned a previously unused variation on the instruction such as “person, fetch, ball” could be used and the dolphin would respond accordingly. This use of what Herman terms ‘lexically novel sentences’ is an example not only of object recognition but of a more complex comprehension of the instructions being given.[[75]](#footnote-75) Dolphins are not the only animal to have been successfully trained to use a human-created language. A number of primate species including gorillas, chimpanzees and macaques have been studied in an attempt to answer questions over how language evolved in humans and also to determine the extent to which these animals can understand human language.[[76]](#footnote-76)

Herman’s experiments also tested other aspects of the dolphins’ cognitive abilities, including short-term memory and the ability to understand structurally altered ‘sentences’. Of course none of the above tests revealed a 100% success rate and interpretations of what the results mean are varied. However, for the purposes of this discussion we do not need to debate the intricacies of the data. What we need to take away from this example, together with physiological studies of the dolphin brain, is the fact that dolphins have the potential for complex and intelligent action and such action cannot be dismissed as merely mechanical.[[77]](#footnote-77) This is further demonstrated by the fact that in different parts of the globe different clans of dolphins have developed unique ways of hunting, which range from following trawler ships to pick up their cast off fish, to beating mud up in circles around shoals of fish, essentially trapping them in a temporary net.[[78]](#footnote-78) This again implies that the dolphin has the cognitive ability to problem solve and behave in a manner which we would term rational.

Although this discussion of language has been somewhat brief, its purpose in this chapter is to establish that some animals do indeed have the capacity for language. That language may not be English, Arabic or any form of human language but they do have the ability to communicate feelings and establish social bonds just as humans do. Anatomical features of the human body such as our vocal chords and neurological ones such as the activities of our prefrontal cortex can explain why human language is so different to that of other animals.[[79]](#footnote-79) However, it is difficult to see why these differences should be used to make judgements as to the inherent value of animals when most of us do not consider linguistic or physical differences between humans as a reason to deny them inherent value.

These examples all show that to assign inherent value to wildlife because of their intelligence or power to reason is a poor method, firstly because arguments based on intelligence are founded more on assumptions than they are on scientific observation. The most recent evidence, as I have demonstrated in this section, shows that the functional differences between humans and nonhumans are really not very significant. Secondly, assigning beings inherent value based on their intelligence and rationality would also leave some humans with little or no moral value. To avoid these problems, it is clear that we need to find a more generally applicable trait that is of moral significance. The next part of this chapter will explore the idea that the notion of consciousness provides us with a more inclusive way of valuing animals.

## iii) Consciousness, Suffering and the ‘Quality’ of Life

As we have seen, theories of value based on intelligence are problematic because they inevitably create hierarchies which exclude many animals and indeed many humans. Because of this, many moral theorists now prefer to assign moral value on the basis of consciousness. Any animals that can suffer harms or enjoy the pleasures of living are regarded as having some independent worth. This theory is markedly different from those we have previously examined as it allows us to include *all* humans and sentient nonhuman animals too. In this section I will examine arguments which state that the moral value of animals is derived from the fact that they can suffer, both physically and emotionally, and are thus conscious beings deserving of some moral consideration. The notion of animal consciousness may have been a great leap forward in terms of moving towards a more inclusive theory of the value of wildlife, but we shall see that it is also problematic. This is because, once again, unjustifiable hierarchies are inevitably formed when we base our theory of value on cognitive capacities. Before we delve into such problems though, let us look at the more positive aspects of theories from consciousness.

Many of us would agree that mammals, birds, reptiles, amphibians and fish all have a degree of consciousness. By ‘consciousness’ I mean awareness, awareness of sensations in their own bodies such as pleasure and pain and an awareness of the basic state of the world around them (temperature, light etc.) Of course this does not necessarily mean that animals have as extensive an awareness of the world as humans, for instance I do not think the fish in my fish tank have any knowledge of the world outside of my living-room, but they have the ability to feel physical sensations. Because they are aware in this manner this I would argue that many animals feel things on an emotional, as well as physical, level. Again, such emotions need not be as extensive or complex in their repertoire as human emotions.

It is not particularly controversial to say that such feelings as distress, fear and joy are evidently part of the mental lives of most animals. As with humans, emotions are often sparked by social, as well as physical, situations. For scientists, in both behavioural psychology and other types of cognitive studies, human and animal responses to social stimuli are very similar and understanding one often helps us to understand the other.[[80]](#footnote-80)

By accepting that animals have feelings in this way, many people now believe that animal lives matter in their own right. This is in contrast to the earlier quote we saw on the ‘puritan Macaulay’ or indeed the thoughts of John Locke, whose focus was not on the harm that that suffering caused to animals but rather the problem that people who find pleasure in hurting animals may also find pleasure in hurting humans.[[81]](#footnote-81)

Scholars such as Richard D. Ryder and Peter Singer liken this shift in our attitudes towards animals to other social movements, which have focused on ending types of discrimination such as racism and sexism.[[82]](#footnote-82) Discrimination on the basis of skin-colour, gender or sexuality is derived from the idea that certain biological factors, such as race or sex, are morally relevant. Discrimination on the basis of species is very similar because it too stems from the idea that a biological trait can make an individual less worthy of moral consideration. But just as many of us now accept that race and gender are morally irrelevant biological traits, many scholars also argue that ‘speciesism’ is morally wrong. This is because if we accept that animals can suffer, just as we accept that humans can suffer, it follows that we should give animal suffering the same kind of considerations as human suffering. As Ryder points out:

*“[...] whatever is morally wrong in the human case is probably wrong in the nonhuman case as well. When faced with a particular type of exploitation one can apply one such ‘human test’. Veal Calves: would it be right to separate babies from their mothers while still suckling? [...] Foxes: would it be right to chase vagrants across the countryside and to encourage hounds to tear them apart?”*[[83]](#footnote-83)

This emphasis on comparing the way we treat animals with the way we treat humans is of the utmost importance if we are to take the problem of speciesism seriously. We must ask ourselves questions such as ‘is it morally acceptable to experiment on people who are less intelligent than ourselves?’ or ‘is it acceptable to chase and shoot a man who steals a chicken from a farm (even if he has no real concept of what it is to ‘steal’)?’ Only after asking such questions do we realise that prejudices formed on the premise that someone is ‘different’ do not provide satisfactory grounds for mistreatment.

For those who argue that consciousness should give animals equal moral consideration, the interest in avoiding pain and suffering is one which both humans and other animals share.[[84]](#footnote-84) Speciesism is therefore morally wrong because it denies this equality between human and animal suffering. While I agree with this point, there are still several practical problems with assigning inherent value to living beings based on their ability to suffer.

The first problem is posed by the rare genetic disorder congenital analgesia.[[85]](#footnote-85) This disorder has the effect of preventing the sufferer from feeling pain. As a result, people with this condition tend to sustain numerous severe injuries because the lack of pain stimulus means they do not have the incentive to avoid danger that the rest of us have. But it cannot be the case that the people who have this biological trait lack moral value. We must acknowledge that to cause them injury would still be morally wrong even though they do not feel physical pain. The account from suffering would still work insofar as people with this condition tend to suffer from psychological traumas that result from their injuries, but it fails to recognise that if one were to cause a minor injury to the person which then went unnoticed, the person causing the injury had still done something morally wrong. Although it is a rare disease this case raises an important point; it shows that if pain were the only morally relevant consideration that we needed to take into account, then practices such as medical experiments on anaesthetised patients would not be morally wrong.

A second problem with the consciousness and suffering model is that, just as theories based on reason and intelligence create an unjustified hierarchy of value, this theory creates an unjustified hierarchy of suffering. The most intelligent animals will again be at the top because of the perception that they feel both physical and emotional pain more acutely than the ‘lesser’ species. But as with intelligence, the truth is that we do not actually know how much other species feel pain. Sadly, in the case of animals such as laboratory mice, the issue is often side-lined when the experiments being conducted are perceived to be in our human interests.[[86]](#footnote-86)

The third problem concerns the types of consciousness that we are willing to contribute to our fellow humans, but not to other animals. The argument at hand states that although we may concede that other animals have varying degrees of consciousness; we humans are in some way *more* conscious. This is exemplified by Jeff McMahan in his book *The Ethics of Killing*, here McMahan attempts to explain why it is that we tend to think that the killing of animals is usually less wrong than the killing of humans. Among McMahan’s conclusions is the idea that

‘*Human well-being, by contrast [to animals’] is more continuous, dense and varied, so that the ecstatic moments [...] are less salient. And what fills the intervals between these moments is normally altogether better than the dull vacancy of a dog at rest. [...] the goods an animal loses in dying are not only of a lower quality; they are lesser in quantity as well*.’[[87]](#footnote-87)

The main focus of this thesis is of course to look at the ethical problems associated with killing other living things, not only causing them pain, and so an evaluation of McMahan’s argument here will also be useful for contextualising my own position.

The above quote describes a commonly held assumption, that animal life is less valuable than human life because of the complexities that a human life entails in comparison to our nonhuman counterparts.[[88]](#footnote-88) The depth and variety of our emotions, our ability to plan, hope, aspire and to shape the world around us gives humans an elevated moral platform. The premature death of a human is more tragic than that of an animal because of all the potential ‘goods’ that death deprives us of. Furthermore, our actions and the accompanying sense of responsibility for those actions give us a sense of entitlement which add to the ‘quality’ of human life; we deserve the good aspects of life because we have earned those goods by being responsible moral agents. McMahan also considers the idea that the goods in a human life are more valuable because the patterns of our lives suggest that they have a narrative (childhood, adolescence, jobs, marriage etc.) which animals lack, therefore the tragedy of a premature human death lies in the disruption of this narrative.

McMahan’s views on this topic, although they may at first appear to be ‘common sense’, have several problems. To begin with, as we have already seen, our knowledge of the complexities of animal behaviour, their emotions, their sense of community, their intelligence, is by no means complete. The studies we have discussed point to the fact that we are still in the process of learning about the extent of animal capabilities, therefore any theory which points to cognitive complexity as being a reason to lower the value of animal life is perhaps making too hasty a judgement. Further to this, McMahan does not explain why the ‘good’ experienced by a dog playing with a ball is somehow a lesser good than that experienced by a baby playing with a toy or an adult reading a book. It seems likely that McMahan makes this assertion because he believes that the types of cognitive processes that are taking place, the kinds of thoughts that are going through the human mind, are more complicated than those which the dog is using to play. This is problematic again though, because there is no good reason for us to assign inherent value based on the *type* of thoughts that we have.

This leads us to the question of whether or not the complexity of human life, as McMahan describes it, is really such a good measure of the value of human life. Undoubtedly most of the valuable complexity which McMahan and others are referring to when they talk of the richness of human life is the *potential* for human life to be rich and varied (this is why they are able to counter arguments which say that infants lack the necessary levels of consciousness to be considered as moral agents). But the richness and variety within our lives is more often than not a consequence of our circumstances. Severe disability, illness, extreme poverty, war or other circumstances may render human life short and unpleasant, but such lives are not inherently any less valuable than others. In circumstances where the potential for human life to be rich and varied can never be met then it is unclear why it should be considered the primary marker of the value of human life.

The final argument from McMahan, regarding the ‘quantity’ of goods in an animal’s life, asserts that the general length of an animal’s life is also somehow of value significance. McMahan’s justification for this is that ‘most animals are condemned by their biology to live lives which are considerably shorter than the maximum [...] human lifespan.’[[89]](#footnote-89) This lesser quantity means once again that a human’s death is a greater loss than an animal’s.

McMahan’s mention of the length of a human life is an odd thing to include in terms of the relative worth of human and animal life though. To begin with, there are numerous species with lifespans similar to, if not longer than, that of the average human. Our closest relative the chimpanzee for instance lives to around 45 years in the wild.[[90]](#footnote-90) Other species with long natural life spans include African Grey Parrots (anywhere between 30-60 years) and Galapagos tortoises (100 years or more).[[91]](#footnote-91) Even these long lived animals are vastly overshadowed by the lifespans of certain plants. The oldest known living Giant Sequoia tree, for example, is around 3,300 years old.[[92]](#footnote-92) Granted, these species may be exceptional when considered against the whole of the animal and plant kingdom but their existence shows that the human lifespan is not a good reason to consider human life more valuable than nonhuman life.

Furthermore, just as the lives of animals may be cut short by biological or violent incidents, there are disparities between human life expectancy rates due to factors such as financial wealth, access to food and clean water, the prevalence of violence in society and so forth. In Africa, average life expectancy in 2011 ranged between 48 (in Sierra Leone) and 64 (in Ghana).[[93]](#footnote-93) In contrast, across Latin America life expectancy ranged between 72 (in Paraguay) and 79 (Chile). Obviously this does not make the life of the average Latin American person more valuable than that of the average African person, so lifespans cannot be used to make value judgements against other species when they do not apply within our own. One could return to the potentiality argument and say that both Latin Americans and Africans have the potential for a long lifespan, but as I have demonstrated, if their environment is stable and they are not killed by predators or disease, then many species of animal can live significantly longer lives than humans. So the argument that lifespan is of value significance when comparing humans and nonhumans still does not work.

We can see then that although the arguments from consciousness give us a method for valuing animals which is far more inclusive than its predecessors, there are still problems with these arguments because they too create unjustified hierarchies of moral value. I have shown that the ability to feel pain, both emotional and physical, while morally important are not good grounds for attributing inherent value to living things. Similarly, the length and ‘quality’ of human and nonhuman lives do not provide a satisfactory answer to the question of who has inherent moral value. This is a question which will be explored further in Chapter 2.

Chapter conclusions

The purpose of this chapter was to demonstrate that traditional ethical frameworks are unsuitable as bases upon which we can create ethical conservation policies. By drawing out the problems with these traditional frameworks I have shown why my own framework is necessary as a tool for solving the problems we face in conservation policy today.

In the first section, I argued that religious frameworks are unsuitable bases for policies which concern wildlife. There are three reasons for this: the first is that political policies should be understandable and accessible to people regardless of their religion. The second issue is that even within individual religions, there are conflicting arguments as to the moral standing of animals. While some argue that animals exist purely for human use, others argue that we have a moral duty to be kind to animals. Because there is this persistent, internal conflict within religions, they are impractical as a method for deducing coherent political policies. The third problem is that religions give special moral standing to humans, either because we are said to be made in God’s image, or because only humans can achieve enlightenment and thus receive eternal peace. By giving humans this special relationship to the Divine, religions give special priority to human interests.

My assessment of the arguments from reason and intelligence also demonstrated the problems with assigning value to wildlife on the basis of their cognitive complexity. There are two kinds of problem with this line of argumentation. The first is that not only are the mental lives of animals vastly more complex than many historical ethicists had presumed, but we have in fact only reached the tip of the iceberg in terms of our own understanding about how the minds of other animals work. Therefore, the argument that our intelligence makes us worthy of greater moral consideration is based on limited evidence, and as such is highly flawed. Perhaps more importantly though, this kind of argument also creates unjustified moral hierarchies which lead to morally objectionable consequences. In this instance, if we accepted the view that intelligence has a bearing on a being’s inherent moral value, then we would also have to accept that humans with cognitive impairments have less inherent value and this is simply not the case.

The final section of this chapter looked at arguments which centre around the idea that all sentient beings are worth some degree of moral consideration. Historically speaking, the acceptance of these ideas by the wider populace has heralded a great leap forward in terms of the implications it has had for animal welfare policy. For example, the Protection of Animals Act of 1911 prohibited torture, beating and other forms of brutality against animals.[[94]](#footnote-94) However, even this system creates hierarchies which have ethically problematic outcomes. In this case, a hierarchy of pain is created and this is problematic for conservation policy because it is based on the false assumption that we can actually know the extent to which other animals feel pain.

One similarity between each of the theories, which I have not yet discussed, is the fact that they all exclude plants. In the next chapter I argue that this is wrong and that we have good reasons to include them as morally considerable beings, although this does not mean that they should always receive the same treatment. Having now established what is wrong with traditional ethical frameworks, the next chapter will move on to provide the foundational claims which support my own ethical framework: biospherical individualism.

# Chapter 2. The foundational principles of biospherical individualism

In the previous chapter I identified the key problems with our most familiar ethical frameworks. In the case of religious frameworks, inconsistencies make it practically very difficult to create coherent ethical policies. More importantly however, religions are problematic because they create a hierarchy of inherent value which emphasises the idea that humans are morally special. In this chapter I will show why that while humans do have inherent value, so too do other living things. The creation of a hierarchical system of inherent value is also a problem for ethical systems which assign value either by looking at the intelligence of an animal or its ability to feel pain. In these cases, I highlighted the fact that if we are to take these arguments to their logical conclusions then we are left with some troubling results. For example, we would have to argue that people with learning difficulties and anaesthetised patients somehow have a lesser degree of inherent value.

At this stage then, I will move on to discuss my own alternative framework: biospherical individualism. This chapter and Chapter 3 will work together to provide an original contribution to the literature by creating a unique framework, which is not grounded solely in arguments from animal or environmental ethics, but which instead seeks to bridge the gap between the two. Of course this attempt to revise or replace traditional forms of ethics is not, by itself, novel. My own approach has been greatly inspired by the works of authors such as Paul Taylor, James Rachels and Gary Varner. These scholars take the position, as I do, that the inherent value of living things is derived from the fact that they are individuals. Where my own approach is unique is in the way I have taken the ideas behind what Rachels terms ‘moral individualism’ and used them to create a practical system, a series of steps, for resolving conflicts. I shall outline exactly what those steps are in the next chapter, the purpose of this chapter is to elucidate upon the philosophies which underpin my theory and to discuss the two key principles upon which biospherical individualism rests.

There are two other branches of philosophy which I must also discuss in this chapter: environmental holism and deep ecology. These theories are important because their emergence in the ethics literature signalled a radical shift away from anthropocentrism towards a more inclusive understanding of the value of nonhumans. As such, my own theory has of course been influenced by these alternative ideas, however my own approach differs in two crucial respects. The first difference is that I reject the holistic notion that inherent value exists in ecosystems or ‘wholes’. The second difference is one of practical application; while holistic theories have been hugely influential in challenging the way we think about the world around us, they are too vague to provide a satisfactory account of how we should act in cases where conflicts of interests arise. My own theory however, seeks to tackle the problem head on by providing a clear method for resolving conflicts.

In order to outline the basis of my own theory, while also discussing the issues surrounding environmental holism, this chapter is structured as follows: I begin by outlining ‘the foundational principles of biospherical individualism’. These are the two moral claims which illustrate why other living things have inherent value. Part (i) of the chapter will be devoted to explaining the first principle and part (ii) will discuss the second principle. Part (ii) will also consider the positive and negative aspects of environmental holism and show why, ultimately, it does not provide a satisfactory basis for sound conservation policy. Parts (iii) and (iv) of this chapter will then move on to explore the concept of ‘interests’. Interests will be discussed a great deal in the rest of this thesis, yet the term can be understood in a number of ways. Therefore, a thorough exploration and concise definitions of the different types of interest are crucial for the clarity of my work.

To begin then, below are the foundational principles of my theory:

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| --- |
| 1) Humans are not innately special. If humans have inherent moral value it must be because of certain characteristics they possess, rather than the simple fact they are ‘human’.  2) The inherent value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way. |

The first key proposition in my theory is that humans are not innately special. Although we may be very different from most other animals this does not automatically confer inherent value on us and us alone. My assumption that humans are not innately special is not simply based on moral reasoning, it is also backed by some of the most important scientific discoveries of the last 150 years. I shall primarily be using the work of Charles Darwin to illustrate this point as his work has such clear links to the issues at hand.

If humans are not special, we are then confronted with that most fundamental question: what does have value? For followers of the deep ecology movement and environmental holists the answer would be ‘wholes’ or, perhaps more specifically, ‘ecosystems’. However, my second proposition is that inherent value lies in individual beings, not ‘wholes’. The notion that ecosystems are a source of inherent value has been of great significance in the conservation world because it challenges the assumption that humans are of primary and independent value, it repositions humans as being *part of* the world rather than *apart from* the world. As a result, conservationists are able to argue in certain situations that the interests of a few human beings are not as significant as the interests of another group of living organisms, for example in regards to practices such as logging or aggressive agricultural practices in rainforests. However, we shall see in section (ii) of this chapter that they cannot offer us a satisfactory ethical theory, either because of the vague nature of ‘wholes’ or because extreme holism denies the value of individuals to the extent that their lives become only of instrumental value.

Covering all of the above issues will provide the basis for my discussions in Chapter 3, in which I will move on to describe how these ethical claims can be used to form principles for guiding action. This chapter and the following chapter will therefore work together to demonstrate how biospherical individualism can successfully bridge the gap between abstract moral philosophy and practical solutions which can be applied to modern conservation policy. I will begin then with a discussion of my first foundational principle, that humans are not innately special.

## i) Humans are not innately special. If humans have inherent moral worth it must be because of certain characteristics they possess, rather than the simple fact they are ‘human’.

Around 300 BC, Aristarchus of Samos calculated that the sun did not move around the Earth, but his ideas were rejected in favour of the Ptolemaic model in which the sun and other planets all orbit the Earth. 1,800 years later, Nicolaus Copernicus put forward his own detailed analysis of why the Ptolemaic model was incorrect and yet was still met with much condemnation for claiming such a ‘heretical’ notion. Since then, scientists have persevered and succeeded in their efforts to prove the heliocentric model and reposition the Earth away from the centre of the known universe. But as we can see, such discoveries were not embraced with open arms, it has been understandably difficult to persuade people that we are not at the centre of everything. Just as the heliocentrists fought to prove that we are not at the physical centre of the universe, anti-anthropocentrists now work to prove that we are not at the moral centre either.

The work of Charles Darwin, and the subsequent gains in knowledge made by evolutionary theory, are perhaps the best source of scientific evidence which uphold the idea that humans are not special. Of course, using Darwin’s work to make assertions on the nature of morality can, in itself, be problematic as Darwin’s theory was about biology and Darwin himself generally steered clear of using it to make moral or political statements.[[95]](#footnote-95) I will not be trying to argue for any form of ‘social Darwinism’. The aim of my thesis is not to argue that Darwin proves any political system, such as socialism or liberalism, as ‘scientific’ or correct.[[96]](#footnote-96) Nor do I wish to argue that certain ethical practices would be selectively advantageous for us a species. My argument here is only that evolutionary theory and other scientific works undermine our traditional ideas of mankind’s moral significance. As Gillian Beer puts it in her introduction to the 1996 edition of *On the Origin of Species*:

*“Above all, the Origin made its impact because it raised questions fundamental to the life of humankind without making humankind the centre of its enquiry. [...] All these pressures, desires and fears [that are part of life] are alerted in this work without any particular attention being granted to the human person. This is a history of a world in which the human has a place but has not always been present and where other kinds have each their own lost and fitfully recorded histories.”*[[97]](#footnote-97)

It is this aspect of Darwinism, the idea that nature does not revolve around humans, that is important for us to consider when we are evaluating the place of animals in our political and ethical world. Various scientific advancements have hinted at this notion, from heliocentrism through to the discovery that everything in the universe, mankind included, is built from a fairly small number elements formed in stars.[[98]](#footnote-98) The evidence that we are part of the universe, not apart from it, has been building for hundreds, if not thousands, of years yet there is a general reluctance to accept that this knowledge can have any bearing on our ethics and politics.

This reluctance is not always unjustified. Given that the horrors perpetrated in Nazi Germany and elsewhere were often argued for on the grounds that certain actions were ‘natural’ and simply demonstrated Darwin’s ‘survival of the fittest’ idea, the disinclination to use science to justify social actions is perhaps understandable.[[99]](#footnote-99) As a result, many would argue for the separation of science from moral philosophy, indeed some have even gone as far as to argue that *“to take the idea of a non-anthropocentric ethic of nature seriously is to abandon morality itself.”*[[100]](#footnote-100)

However, many of our most positive social advances, such as the end of transatlantic slavery and suffrage for women, have been made after people accepted that certain biological differences, such as race or gender, do not detract from our common moral worth. Over time, many of us have learned to accept that such differences are irrelevant in the moral sphere and so discrimination based on these differences is wrong. Further to this, as Peter Singer points out in his essay ‘All Animals are Equal’, if we also accept that we are “*no more than a small sub-group of all the beings that inhabit our planet*” it becomes difficult to justify discriminating against other animals too.[[101]](#footnote-101) As we saw in Chapter 1, referring to capacities such as intelligence is inadequate for defining moral worth because it forces us to create a moral hierarchy for humans, which is exactly what those wishing to avoid social Darwinism fear the most.

In an attempt to allay fears that using evolutionary theory in ethics might lead to negative consequences it is useful to turn to the work of James Rachels, specifically the book *Created from Animals*. Rachels argues that one of the most important aspects of Darwin’s theory is that it undermines our previous beliefs about our ‘special’ place in the world, either as God’s favoured creation or as the only creature endowed with the ability to behave morally. For Rachels, “*the basic idea is that a belief is undermined by new information when the new information takes away the support of the belief.*”[[102]](#footnote-102) Evolution takes away the support for beliefs in human superiority for several reasons. Firstly, there is the matter of teleology. As Bryson Brown describes:

*“Darwin certainly applied teleological language to the adaptations evolution gives rise to, but Darwin’s mechanism of natural selection rejects a fundamental role for teleology in how evolution occurs.”*[[103]](#footnote-103)

What Brown is referring to here is the fact that Darwin may have left himself open to misinterpretation with his choice of terms such as ‘striving’, which seem to imply that the process of evolution has some kind of specific goal or end. But to come to this conclusion is to misread Darwin; natural selection *does not* strive towards a specific end, rather, it is a mechanism which allows living things to adapt to changes in their environments, usually over a very long period of time. Terms such as ‘highly evolved’ are therefore rather unpopular with evolutionary biologists, because they imply that there can be some kind of pinnacle to evolution, that some perfect being can exist.

Because of our high levels of intelligence, many have argued that this ‘perfect being’ is in fact the human being.[[104]](#footnote-104) In evolutionary science however there is no such thing as perfection in nature, only suitability to one’s environment. When our historical circumstances changed in the past, we changed and there is no reason to think that this trend will not continue. This then undermines both the idea of God creating man in his image and the idea that evolution could create perfection in the human form. Although humans may have the *appearance* of superiority because of our abilities with technology, language and so forth, in evolutionary terms that is of relative unimportance. We have adapted and harnessed those abilities over the last 500,000 years or so because they enabled us to fit more comfortably into multiple environments. We never had the teeth or claws of the lion, nor the size and strength of elephants. We needed to adapt to survive. Crocodiles, in contrast, have remained roughly the same for 200 million years and the most likely explanation for this is that they are so well adapted to their habitats that change has been unnecessary.[[105]](#footnote-105)

Another reason that Darwin’s work undermines the idea of human ‘specialness’ is in his work on the social lives of animals or, more importantly, his belief that they can behave with certain degrees of morality and rationality.[[106]](#footnote-106) For Darwin, our own complicated moral structures are likely to have developed from much simpler social instincts, akin to those observable in other social animals when grooming, playing or raising young for example. As I discussed in Chapter 1, since Darwin’s passing, numerous scientists have studied animal behaviour with the view to either prove or disprove this particular notion.[[107]](#footnote-107) The evidence gathered thus far overwhelmingly suggests that animals lead far more complicated social lives than we had previously given them credit for. Once again, support for the idea that humans are innately special is undermined by new information.

This steady stream of new information has caused many to call for a re-evaluation of our treatment of living things, on the grounds that so many of the attributes that we once thought were uniquely human are in fact shared by other living beings. If we consider Darwin’s model of the tree of life, humans represent only a single small branch, there is no privileged position at the top of the tree because the tree is always growing and diversifying in different directions. If we are not biologically special, we also have good reasons to doubt that we are morally special. If we are inextricably linked to all other living things, both through our genetic traits and our social habits, it is unclear why we should be considered morally special.

One may wish to argue that it is our complexity which separates us from other living things, but if we then ask ourselves what we mean by ‘complexity’ the argument falls into the same traps as the theories we examined in Chapter 1. On a molecular level, if we measured complexity in terms of the number of DNA we have per cell, humans are in fact less complex than onions.[[108]](#footnote-108) Genetically speaking, we are *very* similar, in terms of complexity, to other invertebrates.[[109]](#footnote-109) Perhaps then it is our social complexity which sets us apart. Again however, scientific evidence refutes this idea. There is now a wealth of evidence showing that various species form complicated social structures, with individuals being capable of forming close social bonds with one another. This is not only true of familial relationships, but also with what we might call ‘friendships’ in which animals who do not live together still maintain social relationships.[[110]](#footnote-110)

Yet despite our knowledge of these facts, living things are still treated as commodities either for our aesthetic pleasure, our consumption or as living petri dishes for our experiments. Despite the fact that evolution has had an enormous impact in science and on our society as a whole, politics, I would argue, currently chooses to ignore the idea that our knowledge of evolution has ethical consequences. Instead we revert to the traditional anthropocentric ethics of our pre-Darwinian societies, because only then are we able to justify practices such as the destruction of rainforests and the mass production of animals for meat. We may teach children the theory of evolution in our schools but we do not then ask them what this means for the way we should treat nonhumans.

The exact nature of our moral obligations towards other living things is a subject that will be explored throughout this thesis. Having established the reasons as to why humans are not innately special I have suggested that we have significant reasons to doubt our moral superiority. However, as my first principle states, if we are not special simply by virtue of being human then we are left with the question: what does make a being inherently valuable? The second foundational principle of my theory addresses this question and in the next section I discuss how inherent value stems from the individuality of beings.

## ii) The inherent value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way.

The aim of this section is to discuss the characteristics that make living things inherently valuable. I begin by critiquing the ethical theories which have asserted that what is valuable, at least when we are discussing environmental issues, is ecosystems or ‘wholes’. These theories have been central in inspiring current environmental movements and NGOs. From radical groups like Earth First! to the Aldo Leopold foundation, the influence of holistic theories has spread steadily throughout the world.[[111]](#footnote-111) Although there is potential for such movements to do a great deal of good, if we look closely at the issue of protecting wildlife it soon becomes evident that there are some significant problems with their theoretical frameworks. In this section we shall first look at the work of Arne Næss and the deep ecology movement. Although his work is important for its non-anthropocentric outlook, it is hampered by a lack of detail which ultimately renders it impractical. Following on from this we will then turn to Aldo Leopold, whose work is problematic because it denies that individuals have moral worth, and instead puts the lives of both humans and nonhumans at the mercy of the ‘land’ and its needs.

The field of environmental holism has been heavily influenced by the work of Norwegian philosopher Arne Næss. Like James Rachels, Næss wished to use Darwinian knowledge to create an inclusive, rather than divisive, system of ethics:

*“The so-called struggle of life, and survival of the fittest, should be interpreted in the sense of ability to coexist and cooperate in complex relationships, rather than the ability to kill, exploit and suppress. ‘Live and let live’ is a far more powerful ecological principle than ‘Either you or me’.*[[112]](#footnote-112)

Næss also concurs with Rachels that the simple fact of being a human does not entitle one to special consideration. From Næss’ point of view, nonhuman lives have an intrinsic value of their own, independent of their utility to humans.[[113]](#footnote-113) Næss refers to this principle as “biospheric egalitarianism”, a person who lives by this principle is considerate towards all living things, even taking care not to unnecessarily damage plant-life when walking outside.[[114]](#footnote-114)

This radical egalitarianism stems from Næss firm belief that ‘every living being should have an equal right to live and flourish’.[[115]](#footnote-115) Næss rejects the idea of “atomic individualism” (the idea that humans are distinct and separate, both from each other and from nature) in favour of a kind of relational view of the world. He argues that by constructing ourselves as individuals and distinct entities we end up behaving selfishly, both towards other humans, to animals and to the rest of nature. If we considered ourselves as *of* the world rather than *in* the world (Næss uses the phrase “knots in the biospherical net”) we would behave more peaceably with other people and with our environment.[[116]](#footnote-116)

One of the principal objections to arguments such this comes from Lynch and Wells who, as I mentioned earlier, argue that “*to take the idea of a non-anthropocentric ethic of nature seriously is to abandon morality itself.*” This criticism was directed specifically against Næss and is based on the following thought experiment: you are walking through a jungle when you come across a human being attacked by a large animal. You are an excellent shot and so, knowing that you will hit the animal and not the human, you shoot.[[117]](#footnote-117) The purpose behind this thought experiment is to demonstrate that, under Næss’ philosophy, we would have no reason to shoot the animal because the human’s life and the animal’s are equally valuable. Lynch and Wells argue that this reduction of the value of human life “*has the effect of ushering in moral nihilism.”*[[118]](#footnote-118) In other words, if we say that everything has equal value we may as well be saying that nothing has any value at all, because we no longer have that crucial point of reference which tells us that it is acceptable to kill an animal to save the life of a human.

To say that Næss’ philosophy verges on the nihilistic is not really a convincing argument. Simply stating that two beings have equal inherent value is not so absurd that it need render their individual value non-existent. For example, using Lynch and Wells’ own scenario, if instead of imagining an animal and a human in conflict we imagine two humans fighting, to say that both people have equal inherent value would not mean that there was no right or wrong way to resolve the conflict. If you, as the observer carrying a gun, thought that one person’s life was in imminent danger then you may be justified in shooting the aggressor. If this was not the case you may choose an alternative, you may shoot into the air to surprise the two people and stop the fight or you may in fact be justified in doing nothing at all. The point is that you could make a judgement on the correct course of action without having to deny that both people still possess inherent value as individuals.

When answering the question: ‘what would be the right thing to do?’ we would have to judge the situation in context and take several different factors into account. This is a point that I stress throughout this thesis. In each of the case studies that I use in Chapters 4-6, I show that the most ethically sound course of action will involve acknowledging the inherent value of the individuals in question, but then using additional considerations (my principles for resolving conflict) in order to come to a decision on how to act. Thinking back to the animal and the human in Lynch and Wells’ thought experiment, it may be the case that shooting the animal will be the right thing to do, or there may be an alternative way of ending the conflict. The right course of action would depend on the circumstances, the fact that both individuals have inherent value does not mean that there is no right or wrong action.

Although their claims about nihilism in Næss’ work are not very convincing, Lynch and Wells’ example does raise one valid criticism. It highlights the fact that deep ecology does not provide a clear system for resolving conflicts of interest. Although Næss, in collaboration with George Sessions, drew up an 8 point set of ‘principles for deep ecology’, these principles are extremely vague.[[119]](#footnote-119) For example, points 5 and 6 run as follows:

*“****5.*** *Present human interference with the non-human world is excessive, and the situation is rapidly worsening.*

***6.*** *Policies must therefore be changed. These policies affect basic economic, technological and ideological structures. The resulting state of affairs will be deeply different from the present.”*[[120]](#footnote-120)

We can see here that deep ecology attempts to address the question of *why* policies should consider that inherent value of nonhuman life, but it does not tell us *how* such changes can be made. The stated aim of many deep ecologists is to ‘raise ecological consciousness’, which means to change society by making people aware of the intrinsic value of nature.[[121]](#footnote-121) The idea is that once people gain ecological consciousness they will automatically behave in a manner which does not harm the environment or other living things. This is problematic however because it assumes that once ecological consciousness has been achieved that everyone will have exactly the same understanding about what is good for non-humans, when in fact this may be a very contentious point. Zoos are a perfect example; while some conservationists assert that zoos are an acceptable tool for conservation and that indeed they are necessary for the survival of certain animals, others would argue that intervening in animal lives in this matter is never ethically permissible.[[122]](#footnote-122) Both sides may reasonably assert that they are behaving in accordance with their personal ecological consciousness, but without a coherent system for analysing these arguments, deep ecology cannot provide us with a satisfactory resolution to the question of zoos.

This problem with the vagueness of deep ecology is somewhat solved by another holistic system: Aldo Leopold’s ‘land ethic’. Like deep ecology, the land ethic asserts that inherent value stems from wholes, not individuals. Leopold derives this ethical stance from his observations of communities. He argues that a human community is comprised of individual members who are interdependent. Our ethical treatment of other human individuals is based on our perception of them as being part of our community. The land ethic seeks to expand the concept of the community so as to include nonhumans: the ‘biotic community’ includes humans, animals, plants, soil and waters (i.e. ‘the land’). Acknowledging that we are part of this community means we should extend our ethical principles to include the other member of our biotic community.

*“In short, a land ethic changes the role of Homo Sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members and also respect for the community as such.”*[[123]](#footnote-123)

This sentiment echoes Darwinism and deep ecology in its attempt to emphasise that we are a part of nature, not above it.[[124]](#footnote-124) He also encourages us to develop an ‘ecological consciousness’, to move away from thinking of conservation only as an instrument for fulfilling our economic self-interest, and instead to consider the land as having independent value.[[125]](#footnote-125) Such a move would, for Leopold, result in more sustainable land use and enable us to see the value in plants and animals which are not generally considered to be economically valuable.

It is clear when reading *A Sand County Almanac* that Leopold’s love of animals and natural landscapes is profound and genuine. Furthermore, his overall assertion, that a radical change in our ethical outlook is required if we are to avoid ecological disaster, is certainly valid. However, the methods for conservation that Leopold proposes are troublesome in that they leave room for rather totalitarian forms of conservation to be justified.[[126]](#footnote-126) The following statement constitutes what is perhaps his most contentious assertion:

“*A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.*”[[127]](#footnote-127)

Taken to its most extreme conclusion, this idea could lead to dangerous political and ethical consequences. For example, under this rule it seems to be ethically acceptable to kill off both animals and humans if that would be in the interest of the biotic community. A further concern is that, given that the greatest harms to our global environment are generally caused by humans, under Leopold’s argument, millions of people should probably be killed. As J.B. Callicott describes, “*the land ethic, thus, not only has a holistic aspect; it is holistic with a vengeance*.”[[128]](#footnote-128) While it seems unlikely that Leopold himself would advocate such actions, his line of argumentation is unsuitable for creating ethically sound conservation policy because it does not rule out such drastic and unethical practices.

Aside from Aldo Leopold, others have adopted similarly holistic positions which elevate the value of species or ecosystems above that of individuals. Holmes Rolston III for example, just as Leopold and Næss do, rejects the idea that ethics should be about protecting the interests of individuals. For Rolston, “*the individual represents (re-presents) a species in each new generation. It is a token of a type, and the type is more important than the token*”.[[129]](#footnote-129) Put very simply, he justifies this assertion on the grounds that it is species which have the capability to last for millennia and individuals merely play a small part in carrying the genes of that species on. If an individual dies it is of no great consequence to the biosphere, but if a whole species dies out then the ecosystem of which that species is a part is altered irrevocably. Echoing Leopold, Rolston states that “*[the] more radical view sees that the stability, integrity, and beauty of the biotic communities are what are most fundamentally to be conserved.*”[[130]](#footnote-130) Although Rolston brings a new element to the holism debate by introducing genetics and the importance of future generations for the stability of the environment, he is still faced with the problem of killing in order to balance the interests of humans with non-human animals.

Although Rolston and Leopold usually only refer to animals and plants, these holistic theories force us to ask how we should value our fellow humans too, after all the biotic community includes humans. If we are only each of instrumental value, mere genetic ‘tokens’, then we are left questioning whether or not we should treat our fellow humans as ends in themselves. Under holistic theories of value, it seems that we should only treat other people well if doing so benefits the ecosystem. For this reason, it seems clear to me that the holistic conception of the community is incorrect; holism regards the individuals within a community as entirely interdependent but also entirely replaceable cogs in Earth’s machinery. While on a purely genetic level this may be true, if we take this idea as being the baseline for morality then the consequences for human society seem dire.

The final problem with holistic theories is the fact that the concept of ‘wholes’ is extremely vague. Although we may describe ecosystems as being ‘wholes’, their boundaries can never be clear.[[131]](#footnote-131) A river for example might be described as an ecosystem, but if that river floods it is unclear whether the flooded fields are now part of the ‘river ecosystem’, vice versa or if in fact an entirely new ecosystem has been born. If ecosystems can constantly shift, interact and take on new forms then it is impossible to say where one ecosystem begins and another ends. This is not only problematic for practical conservation, but also for ethical matters. If we cannot say with any certainty who or what has value, then we cannot provide any justification for seeking to conserve it.

Because holism cannot give us a satisfactory account of the value of nonhuman life or tell us how to treat other living things, I will now move on to explore the argument that it is individual living things that possess inherent value rather than wholes. This is not to say that communities and ecosystems do not have value of any kind, just that they do not possess inherent value. Paul Taylor’s work in *Respect for Nature* illustrates how it is possible to have an individualist approach to valuing life without succumbing to atomic individualism. Taylor, having been influenced by the deep ecology movement, agrees that all living things exist in a complex system of interdependence, and that our existence as humans is entirely contingent on the conditions of our environment.[[132]](#footnote-132) However, Taylor rejects the idea that this means that individuals cannot have inherent value. He argues that we can only make sense of what it means to behave morally towards something when we can conceive of the harm or goods we can do to it as an individual.[[133]](#footnote-133)

In his conception of living things as ‘teleological centres of life’, he describes how both scientific advances and simple observation have taught us that other living beings have individual and unique “personalities”.[[134]](#footnote-134) Although initially this may sound like anthropomorphism, this is not the case. All that is meant here is that individual beings pursue their own existence in their own way, their behaviour does not require intelligence or even consciousness, all that is required is evidence that a being can behave in a manner which promotes its own chances of survival and/or of producing offspring.

Following Taylor’s argument, I shall argue throughout this thesis that all individual living things have inherent value. This is because they all have interests which can be set back in some way. I will define precisely what I mean by ‘interests’ in the next section, at this point the crucial point to note is this: all living things have inherent value because they have the ability to pursue their own interests in their own way and as such they can be harmed (by having those interests set back). This is the dividing line which separates things with no inherent value from things with inherent value. Utterly inanimate objects do not have inherent value because they cannot pursue their own interests, they do not have interests of their own, therefore they cannot be harmed. For example, consider a car and a plant, both locked up in a garage with very little light and no water coming in. The plant will direct its leaves towards the few beams of light coming into the garage and will extend its roots to try and search for water. The plant will actively pursue its interests in its own way, even if it ultimately cannot fulfil them. The car on the other hand will not; parts of it may rust and it may cease to function properly but the car cannot be harmed or killed as the plant can. The fact that the all living things can be harmed matters on both a practical and a moral level. From a practical conservation perspective, the fact that all living things can be harmed matters because the aim of conservation is to protect living things. From an ethical perspective, the fact that we can cause harm, even to plants, is important because if something can be harmed then we must question if our actions which affect plants are morally right or wrong.

The ‘teleological centres of life’ idea is also applicable to models of human society and morality. All around us other people are pursuing their own existence in their own way, from their career choices to the food they choose to eat. The fact that some people are pursuing the same goals does not detract from the idea that they are still individuals. How intelligent a person is does not detract from this either, nor does the fact that many of our actions are subconscious or reactive. By and large, we accept that treating someone as a being with inherent value will involve allowing them to pursue their own good in their own way. Exceptions only occur when the goals of two or more individuals come into conflict. Morally, we do not think it is right to harm other people simply in order to achieve our individual goals. To borrow Arne Næss’s phrase ‘live and let live’ is a far more powerful *moral* principle than ‘either you or me’.

In the next chapter I will be proposing a series of principles for guiding action, which will provide us with a framework for solving the conflicts which arise when the goals of two or more individuals clash. Before moving on to these principles however, it will be necessary for me to define certain key terms related to the concept of ‘interests’. This is an extremely important subject, as the principles for guiding action will rely on our being able to assess different individuals’ interests.

## iii) Defining interests

On a superficial level, defining the term ‘interests’ may not seem too problematic, if I were to state that I have an interest in seeing a film at the cinema tonight there could be little confusion as to what I mean: I would like to go to the cinema tonight because going to the cinema is (usually) a very pleasant experience. Defining an interest as being an object or event which promotes positive sensations is perhaps the simplest and more intuitive way of understanding the term. However, when we speak of something as ‘being in a person’s interests’ we are often implicitly talking about something more complex than mere positive sensations. Paul Taylor, for example, provides the following definition:

*“[...] we speak of those events and conditions in the lives of organisms that are conducive to the realisation of their good as furthering, promoting, or advancing their interests. [...] ‘Interests’ [also] refer to whatever objects or events serve to preserve or protect to some degree or other the good of a living thing”[[135]](#footnote-135)*

For Taylor and many others (myself included) then, interests are connected in some sense to our welfare. However, there are different ways of interpreting the term ‘welfare’ and thus different ways of conceptualising interests. Some philosophers, such as Brian Barry, have considered interests as being synonymous with the satisfaction of ‘wants’. For Barry, “*a policy, law or institution is in someone’s interests if it increases his opportunities to get what he wants.*”[[136]](#footnote-136) There is a problem with such a definition however, in that often the things that we want are not necessarily good for us, therefore it would be contentious to say they are in our interests. For example, many children love fizzy drinks and may well *want* to drink cola with every meal of the day. However, most of us would argue that it is not in a child’s best interests to have cola with every meal because they will undoubtedly end up with rotten teeth and other health problems. It thus seems that although wants may be a kind of interest (and we will be discussing kinds of interest later in part (iv)), they cannot form the basis of our definition of interests.

Joel Feinberg provides us with an alternative, much more robust, conception of interests whereby something is in our interest if it promotes our well-being and it is against our interests if it causes us harm.[[137]](#footnote-137) As Varner describes *“to say that a being has interests is to say that it has a welfare, or a good of its own, that matters from the moral point of view.”*[[138]](#footnote-138) This particular version of the welfarist account of interests is also similar to Paul Taylor’s, insofar as each of these authors seem to agree that anything which causes physical, emotional, or some other form of harm goes against our interests and anything which sustains or improves our lives can be described as in our interest. In other words, interests are not subjective goods in the manner that wants are, they are goods that can be objectively evaluated. This definition of interests, as objectively identifiable goods which promote our well-being, is the definition I shall be using hereafter.

However, the task of defining interest does not end here, for now I must assess who or what can have interests. There is a key difference between Feinberg and Taylor on this point: while Taylor argues that all living organisms, including plants, can have interests Feinberg argues that only beings with certain cognitive capacities can have interests.[[139]](#footnote-139) Indeed, there are a number of competing views as to what interests are and who can have them. Broadly speaking, we can divide these into four categories: the ‘human’, ‘sentience’, ‘living organism’ and the ‘all encompassing’ accounts of interests. I will elaborate on each of these views in turn, while defending my own view that both animals and plants have interests. I will then move on to explore different types of interest in part (iv) of this chapter.

The human account of interests was put forward by H.J. McCloskey in his article ‘Rights’,in which he draws a distinction between interests and the things which promote our welfare.[[140]](#footnote-140) For McCloskey, interests have an “evaluative-prescriptive overtone”, which means that a being can only have an interest in something if they are *actively interested in it.* In other words, a being must have the capacity for concern or active desire in order to have interests. Echoing Aristotle and Descartes, in ‘Rights’McCloskey ruled out animals or plants as having interests on the grounds that they do not possess the cognitive capacity to form active desires, that they can only follow brute instincts.[[141]](#footnote-141) The main problem with McCloskey’s argument here is that it leads us to some rather odd conclusions. Consider the following example: babies may be ‘aware’ in some sense of their immediate surroundings and their bodily urges, but they certainly do not have the same kind of active awareness of their interests that human adults do. But it is clear that babies have interests because they are beings that can be harmed. If an individual baby did not have interests, then there would be no moral wrong in causing that individual harm (although we could of course be harming other individuals, such as the baby’s parents.)

Furthermore, even as grown adults, certain things may be in our interest without our being *actively* aware of them. For instance, 100 years ago people did not know (at least they did not have scientific proof) that smoking was detrimental to a person’s health. However, this cannot mean that smoking was good for people 100 years ago, therefore we could not say that it was in their interests. McCloskey’s definition of interests as having an evaluative-prescriptive overtone is thus unconvincing because it fails to take account of actions or events which may cause us harm, but of which we may not be aware.

We will turn now to the sentience approach, which assumes that interests are tied to welfare and that all sentient beings have a welfare of their own because they are conscious and thus have the capacity to suffer harms or benefit from goods.[[142]](#footnote-142) In other words they have lives which can be said to go well or badly, which is not something we could say of rocks, for example. Although this account also relies on a being possessing some form of cognitive capacity, it does not have the ‘active awareness’ clause, and so through this approach we can assert that babies and animals can also possess some types of interests. The sentience approach does exclude plants; it dictates that they cannot possess interests because they are not conscious. As such, although good or bad things can be done to them and their condition can thus be affected, this is of no consequence *to the plant itself*.[[143]](#footnote-143)

However, it is certainly not clear that the possession of interests requires a being to have consciousness. If I receive a blow to the head and become comatose for several weeks, it does not seem right to say that during that time I cease to have any interests. Undoubtedly the nature of my interests will change but I will still have interests. Because I am a living creature my body will still respond to certain stimuli, even though I am unconscious, and the actions of others could still benefit or harm me. The same is true for each of us, every night when we are asleep. Although we are not conscious, it would still be possible for us to be harmed and have our interests set back, say for example if someone came and took blood from me every night. Although I would not be conscious of the event or the harm being done to me, the person taking my blood is still impeding on my ability to pursue my own interests in my own way. The same is true of plants and indeed all living organisms. They may not be conscious but, like the sleeping and comatose, as living beings they possess interests which can be set back and thus they can be harmed.

This brings us to the ‘living organism’ account of interests which, I believe, best describes who and what can have interests. On this account, the necessary and sufficient conditions for interests is the possession of a life, and so it is inclusive of plants. Although plants are not aware in a psychological sense as animals are, they are aware in a physiological sense: they respond to stimuli in ways which protect them from harm and which promote their well-being.[[144]](#footnote-144) For example, many plants communicate with one another by releasing specific chemicals into the air when they are being attacked by herbivores, pathogens and even by drought conditions.[[145]](#footnote-145) Plants, like animals, have the ability to pursue their own good in their own way and for this reasons it is clear that they possess interests of a certain kind.

This does however raise a contentious question: if all that is required for a thing to have interests is for it to respond to stimuli, then can robots and other machines also have interests? In response to this question I would argue that the ability of a being to respond to stimuli is a necessary but not sufficient condition for the possession of interests. This is because, if we refer back to Varner’s definition of interests, to say that a being has interests is to say that it has a welfare, or a good *of its own*. Animals and plants have a good of their own because they can pursue their own interests. Machines however, do not have goods of their own because everything that a machine does is either dictated by, or is a direct result of, human action. Machines are created by humans to perform specific tasks and they do not pursue any actions beyond those set tasks. It does not make sense to speak of something being ‘in the interests’ of a machine; we may maintain machines so that they perform certain functions, but those functions do not do anything objectively good for the machine itself.

Having defined what an interest is and justified my assertion that all living things can possess interests, I will now move on to describe two main types of interest: basic and nonbasic. Within these categories we will also discuss specific interests, which are the interests held by individual beings. These can fall into both the basic and nonbasic categories and because of this I will begin with a brief elucidation on the nature of specific interests.

## iv) Types of interest - specific, basic and nonbasic

Differentiating between these types of interest is necessary in order to rebut any claims that biospherical individualism is an unworkable theory. By setting out a clear distinction between the various types of interests, we will be able to work out which are to be of the most importance when we are resolving conflicts. I will begin with what is, hopefully, an uncontroversial statement: the most important kind of interests are those which keep us alive. At the most basic level, all living things are the same in that they require water, food and suitable climatic conditions in order to survive. However, there are substantial differences in the types of food different beings need and the types of environment in which different animals and plants can survive. As Taylor points out, by observing other living things we can both deduce what they require for survival and also work out what actions might harm or benefit them.[[146]](#footnote-146) These observations will thus tell us what the *specific interests* of an organism are.

Specific interests can then be further divided into two categories: basic and nonbasic. Basic interests can be defined as the minimum requirements which a being needs in order to lead a healthy life, one which might be described as being ‘normal’ or ‘decent’ for its kind. The terms ‘normal’ and ‘decent’ might seem vague given the variety of circumstances that living things all live under, but while we may debate what the *best* way of living is, there are certain ingredients which we can deduce will be required in order for a living thing to survive and be healthy. These ingredients are the basic interests.

For scholars such as Paul Taylor, the basic interests for humans include “*subsistence and security (the right to life), autonomy and liberty*”.[[147]](#footnote-147) These are the factors we generally consider to be ‘human rights’, indeed Taylor’s phrase is almost a reiteration of Article Three of the Universal Declaration of Human Rights which states that *‘Everyone has the right to life, liberty and security of person’*.[[148]](#footnote-148) These ‘rights’ are basic interests because we consider them to be the minimal requirements for a person to have a decent life. While most of us would not dispute the attribution of these particular rights to humans, there is much room for debate as to what the basic interests of other animals are.

Many basic interests are quite clearly shared by humans and other animals (particularly our fellow mammals), these include access to water, food and breathable air and freedom from psychological or physical abuse.[[149]](#footnote-149) An abuse is defined here as a harm which is forced upon a being and can include such things as assault, sensory deprivation, and physical or emotional neglect. While all animals have an interest in not suffering from physical abuse, the nature of what will psychologically harm an animal will depend on the animal in question. For example, social animals (including humans) suffer psychological damage when deprived for long periods of the company of fellow animals.[[150]](#footnote-150) Social animals therefore have a basic interest in regular companionship, while some other animals do not. Some basic interests will however be entirely unique to a species; for example, only humans can conceivably be said to have a basic interest in freedom of religion.

It may seem at this juncture that basic interests and specific interests are essentially the same thing, however there is an important difference between the two. While the vast majority of members of a species will share their basic interests, individual members can have distinct specific interests, this distinction will be important for us to remember when we are looking at particular conflicts. If, for example, the conflict we are facing involves a pregnant animal, that animal has a specific interest which will not be shared by all other animals of her kind, this will mean our treatment of her may be different. Other examples can include the age of an animal, whether or not it is healthy or injured, or any such factor which will mean that it has needs which differ from the others in its species. While humans and other animals have a complex array of basic and specific interests, the basic interests of plants are reasonably simple to discern. If a plant is provided with adequate soil, water, sunlight, space to spread its roots and the right temperature then it will thrive.

Given our understanding of what constitutes a basic interest, we can define nonbasic interests as those interests which are not essential for a minimally decent life but which may nonetheless enhance our lives further. These are interests which we may consider worth having or pursuing because they either make our lives easier, or they fulfil our more abstract personal desires. Examples of nonbasic interests could include access to a car, art galleries or the ability to buy one’s favourite kind of biscuit. Although these are all examples of nonbasic interests, it will often be the case that some nonbasic interests will deserve greater consideration than others.

Humans have a far greater range of nonbasic interests than other animals. This is likely to be because of our position as the world’s top predator: having either exterminated or learned how to keep other large predators out of our way and by developing agriculture, our species has been given the luxury of free time. This, in turn, is likely to have allowed our species to develop in ways which are unique among the animal kingdom.[[151]](#footnote-151) Our current fascination with things like entertainment-technology are things which many of us value and which we would not *want* to live without. However, no matter how much we may enjoy such things they cannot be considered basic interests because it is possible to imagine a minimally decent life which does not have these things in it. Because they not essential for our welfare, these are examples of specific (because only humans benefit from them) but nonbasic interests.

For wild animals, given that the majority of their waking lives are spent either searching for food, avoiding predators or rearing young they will have very few, if any, nonbasic interests. Even activities such as playing or grooming are counted as basic interests because these activities enable group cohesion and also play a part in their psychological well-being. The situation may be different however for pet animals. For example, dogs do not have a basic interest in attending obedience classes but their lives (and the lives of their owners) may be enhanced by taking them if this leads to a more harmonious relationship between human and dog. Even for pets however, given the differences between the desires which govern their lives and those which govern ours, it is clear that the number of nonbasic interests that animals can have is limited.

Plants cannot be said to have any nonbasic interests because, unlike animals, nothing can substantially enhance their lives beyond those things which I previously described as basic interests. While the life of a dog may be enhanced by the presence of a new, more comfortable basket to sleep in, repotting a plant into a pot which is of the same size but made of softer material would not make any difference to the life of the plant. As Taylor described, basic interests are common to all beings of a particular kind, while nonbasic interests will vary. While it makes sense to say that individual people have different nonbasic interests and that individual animals can have different nonbasic interests, it makes no sense to say that individual plants will have interests which differ from those of other plants of its kind.

Chapter conclusions

In this chapter I have described the two foundational principles of my theory: 1) Humans are not innately special. If humans have inherent moral value it must be because of certain characteristics they possess, rather than the simple fact they are ‘human’. 2) The inherent value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way.

The idea that humans are not special is an idea that is shared by both moral individualists, such as Taylor, and by environmental holists such as J.B. Callicott. However, the key difference between the two philosophies is that holism ascribes inherent value to ecosystems and species, while theories of moral individualism argue that we can only ascribe inherent value to individuals. I have defended the latter position for two reasons: the first is that the holistic notion has the potential to result in conservation practices which would in fact be morally reprehensible, such as mass killings. The second reason is that ‘wholes’ are very difficult, if not impossible, to clearly define in practice. Therefore, it would be extremely difficult to formulate effective conservation policies if we do not know exactly what it is we are trying to conserve. Moral individualism is coherent as a moral argument and it can provide us with a clear platform on which we can build policy ideas.

In summary, I formulated my foundational principles by discussing the scientific knowledge that we have on animal and plant behaviours. I was then able to argue, following James Rachels, that this new knowledge undermines our old anthropocentric view of the world and that therefore the way we regard and treat other living things should change. The question that I must now address is this: what shape should these changes take? After all, these foundational principles are only the moral claims which tell us why things have value. They do not, by themselves, tell us how to act in any given situation. This then, will be the aim of the next chapter. By setting out my foundational principles and also by clearly defining the concept of ‘interests’ I am now able take this discussion a step further and develop these ideas into a set of principles for guiding action.

# Chapter 3. Resolving Conflicts and Guiding Action

Ascribing inherent value to all living things inevitably leads us down unfamiliar and tortuous moral paths. In the previous chapter I laid out the fundamental principles of biospherical individualism, these principles are the claims which tell us why all living organisms have inherent value. Although acceptance of these claims may instil within us a certain ‘attitude’ towards other living things they do not, by themselves, explicitly tell us how to act in circumstances where the interests of humans, animals and plants conflict. If we accept the principles of biospherical individualism, the most pressing question then becomes: if *all* living thing have inherent value, how should they be treated?

In this chapter I will consider this question and explain how my theory can in fact be translated into practice and policy. I will do this, firstly, by setting out five guidelines for dealing with conflicts (see overleaf). I will illustrate how these guidelines are derived from our original principles yet they will allow us to use biospherical individualism, not just as a philosophical argument but also as a practical tool. To begin this process, part (i) of this chapter will discuss the concepts of positive and negative duties, as these are key to understanding the first two principles for guiding action. Part (ii) will then elaborate on the principle of relevant difference, which explains how and why we can treat different living things in different ways. The final three parts of the chapter will begin to show how my guidelines can be used both in the formation of policies and in the practice of conservation. Part (iii) will demonstrate how biospherical individualism can be applied to conflicts involving plant life, part (iv) will deal with the problem of animals eating other animals and the final part will show how, under certain exceptional circumstances, it can be ethically permissible for humans to eat animals. These 3 examples concern the consumption of other living things and as such are not strictly examples of conservation policy. However, I have chosen to use them as consumption is such an important part of the relationships between all living things. These cases show that, as well as answering questions pertaining to specific conservation policies, my framework can also address broader ethical dilemmas.

Before exploring the fine details of this part of my theory, I will quickly lay out the principles for guiding action, this chapter will then systematically work through these principles one by one.

|  |
| --- |
| a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.  b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken.  c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests    d) When interests conflict, we should prioritise basic over nonbasic interests    e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on the wider biotic community. |

## i) Negative and positive duties

The distinction between positive and negative duties has, for a very long time, been well established in human-centred ethics. A positive duty is a duty to take a particular action while a negative duty is a duty to refrain from such action.[[152]](#footnote-152) For many philosophers, negative duties have typically been seen as less demanding than positive duties.[[153]](#footnote-153) For example, the principle that we should refrain from pushing people into lakes is a much less demanding one than that which states we should always pull people out of them. The general principle ‘do no harm to others’ generally does not place any great burdens upon us and for this reason is usually taken to be extremely powerful and stringent. Positive duties, conversely, can place considerable burdens upon us. Not only do they require more effort on our part, but the list of positive duties that we may have are seemingly endless. This has led many critics to either claim that positive duties are less powerful and stringent, or to dismiss them entirely as being too demanding.[[154]](#footnote-154)

In recent years however, there has been increased debate over the clarity of the distinction between positive and negative duties and the degree of demandingness they actually impose. For example, an ever growing body of literature on globalisation and the effects that our activities can have on people thousands of miles away has forced us to consider whether or not the ‘do no harm’ principle is still a valid and practicable principle. In a global economy, the simple act of buying staple goods such as food and clothing can become an ethical minefield: the problems of sweatshops, pesticides, air freighting and numerous other factors are now all becoming prevalent in political and public discourse.[[155]](#footnote-155) It seems that even our simplest, daily activities can produce significant harms to people elsewhere. The key question has thus become: if we have a duty to do no harm, does this not now place unreasonable burdens upon us?

This is also a criticism which is aimed at theories of animal and environmental ethics, such as my own, which argue that the ‘do no harm’ principle should be extended to nonhumans too. After all, many of our most mundane activities, from picking flowers, to writing on paper to buying a box of eggs, cause varying degrees of harm to other living things. It is not inconceivable to think that some of these harms can be alleviated. However, the ‘do no harm’ principle also seems to imply that we should be taking more drastic measures, such as ceasing to cut down trees to make musical instruments, ending the pulling of weeds from our gardens and so forth.

This is certainly a powerful objection, but it is also a problem which can be dealt with. I will concede that the ‘do no harm’ principle places (some) serious burdens upon us and that following the principle will require us to make significant changes to the way we live. However, these burdens and restrictions are still constrained by demandingness, so although my theory does require us to make quite radical changes to the way we live, it does not place such great burdens upon us that our lives become unduly harsh or miserable. If a duty places too great a burden on a person, it can be said that that person is not bound by that duty. A burden can be considered “too great” or “too demanding” if it forces a person to suffer hardships which impact on his/her ability to lead a decent human life. As I described in the previous chapter, a ‘decent’ life is defined here as one in which all of our basic interests are met.

While we may be able to agree that food, water, shelter and freedom from certain harms count as basic interests, aesthetic or creative pursuits present us with a much more complex problem. Consider the practice of recreational gardening: for most people, a necessary part of gardening involves killing the unwanted plants which we term ‘weeds’. However, doing this means violating our duty to do no harm. Furthermore, it is wrong under principle (d) because in killing weeds we are putting our own nonbasic interest, in having our gardens look a certain way, ahead of the plant’s basic interest in continued life. Because of these factors, killing weeds is morally wrong. At first glance this may seem a bizarre assertion and I concede that following this line of argumentation will mean that the way many of us garden will have to change. However, it is not so demanding as to be unworkable or make our lives miserable.

For instance, removing weeds in order to grow vegetables would not be unethical because we need vegetables to survive and lead a decent life. To deny that we can remove weeds in this instance would of course be too demanding. There is no duty, within my theory, which requires that we sacrifice our lives or health for those of others. It would also be acceptable to remove weeds if they are threatening the lives of other plants or animals. For example, if there is ivy growing on the tree in your garden, you may wish to remove the ivy in order to save the tree. In this instance, both the tree and the ivy have basic interest in continued life, but using principle (e) we could justify saving the tree. This is because principle (e) states that when basic interests clash, we should consider what would be best for the biotic community. The tree may support bird life, small mammals and a wide variety of insects and so saving the tree will be best for the community. You may not have a positive duty to save the tree (as we shall see in the next part of this section) but killing the ivy in this instance would be ethically permissible. In addition to this there are many common practices which are not ruled out by my theory, such as pruning trees, cutting grass, removing dead or dying plants, sowing seeds or growing plants in pots.

The do no harm principle gives us an extensive account of why certain actions are morally wrong and indeed it has been argued that negative duties give us an accurate account of all our duties to others.[[156]](#footnote-156) Other scholars however have argued that a robust theory of morality requires a combination of both positive and negative duties.[[157]](#footnote-157) Simon Caney, for example, argues that we have positive duties to assist people living in poverty even if we have fulfilled our negative duty to do no harm.[[158]](#footnote-158) I argue, in principle (b) that positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken.

Before elaborating on this principle I must first clarify a certain point: the principle clearly states that it should be applied to individuals, in keeping with my belief that it is individuals, not ecosystems, who hold inherent value. However, one may notice in Chapters 3-6 that I often refer to ‘species’, ‘communities’, or to plants and animals in the plural form, which may seem to imply that I have adopted a holistic outlook. This however is not the case. The reason I sometimes use terms such as ‘species’ or a ‘group’ is simply because it will often be impossible for me to refer to specific individuals, either because of the obvious fact that they do not have names, or because the exact number of individuals within a group is unknown. Therefore, for the sake of simplicity I refer to all the individuals involved in the case study as a group, community or, in some instances, species. This does not detract from the fact that my principles should be applied to the individuals within that group who are affected by human action.

The idea that we have positive duties to assist others who are being harmed, or who are at risk of being harmed, is a contentious issue even with regards to human-centred ethics. I will argue that positive duties are only generated in two instances: the first, is if an individual is in a situation of imminent threat and rescuing or assisting them would not involve any risk (real or perceived) to ourselves or to others. Few would disagree that we have a moral duty to rescue in such circumstances but, as I shall show, the more interesting philosophical problems are raised by more complicated cases, where the risks and costs are unclear.[[159]](#footnote-159) In cases such as these, I will argue that we do not have a positive duty to rescue, even though it would be a morally good thing for us to do. The second instance in which positive duties may be generated is more contentious: positive duties of assistance are generated if our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken. I discuss this in further detail from page 78, but first I will explore the first kind of positive duty in more depth.

In his influential article ‘Famine, Affluence and Morality’, Peter Singer argues that if we can prevent something bad from happening, without sacrificing anything of comparable moral cost, then we ought to do it.[[160]](#footnote-160) He uses the following example: if a child falls into a shallow pond and there are no real risks to my own life, then I ought to jump in and rescue the child, regardless of whether or not I have any relationship with the child.[[161]](#footnote-161) This can be termed an interpersonal duty to rescue.[[162]](#footnote-162) I agree with Singer that in cases such as this, where there is virtually no risk to the rescuer, where the costs are low (in this case your clothes may be ruined but that is all) and where the consequences of your failure to act are very clear (i.e. if *you* do not rescue this person they *will* die) then we have a positive duty to rescue. This is because in this specific kind of case, the morally good act of rescuing someone is not clouded by any other factors; nothing could justify leaving the child to drown.[[163]](#footnote-163)

However, the example Singer uses to illustrate the interpersonal duty to rescue is not a very useful one for exploring more complicated cases of rescue. Singer has used a very clear cut case, whereas in reality most instances in which people require rescuing will be less straightforward. While nothing could possibly justify leaving the child to drown in Singer’s example, there may be other times where the risks and costs of rescue are low but in which the same kind of positive duty will not be generated. If we have a positive duty to do something, then should we fail to do that action it follows that we can, to some degree, be held culpable or responsible for the bad thing happening.[[164]](#footnote-164) However, in situations which are more complicated than Singer’s child in the pond, it becomes more problematic to hold people morally responsible in this way.[[165]](#footnote-165)

To illustrate the complexity of this issue let us consider the following, non-fictional case: in 1964 Catherine Genovese was stabbed in 3 separate attacks by a man over a period of 35 minutes. During that time 37 neighbours witnessed the attacks, some inadvertently frightened him off by briefly opening their windows, but no one went out to help her when the killer initially fled and only one person phoned the police, after Miss Genovese was dead.[[166]](#footnote-166) There is no doubt that if the witnesses had phoned the police earlier this would have been a morally good act. Indeed, we may feel quite strongly that they should have done so because there would have been no risk to them in the safety of their locked apartments. Furthermore, although it is reasonable to assert that going out and helping her may have been very risky, if the neighbours had gone out as a group it is likely that the man would not have continued the attack, as he had already been frightened off when the windows were opened. Again, this would have been a morally good thing to do, but even so the question remains as to whether or not the witnesses can be held to be morally culpable for Catherine Genovese’s death.

I will argue that the neighbours had a positive duty to call the police but did not have a positive duty to go outside and rescue Catherine Genovese in the same way that they would have a positive duty to rescue the child in the pond. Calling the police would have been an easy form of rescue and there is nothing which can justify their failure to act in this instance. However, they did not have a positive duty to go outside to rescue her because this could have put their own lives at risk. In the dark they may not have been able to see clearly what was happening or if there were other attackers. Therefore, they could not have known with any certainty what the consequences would have been had they gone outside. It would have been reasonable to argue that going outside could even have escalated the problem if indeed there had been more attackers. There is no positive duty to rescue under such circumstances and therefore the neighbour’s culpability for what happened to Catherine Genovese is limited to their failure to call the police.

This brings us to the second part of principle (d): positive duties are generated if our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken. In the Catherine Genovese case, the witnesses did not play any causal role in her death. Although they should have called the police and it is reasonable to argue that going out to help her would have been morally good, the wrong they committed by failing to do so is not the same, or as severe, as causing the harm itself.[[167]](#footnote-167)

The argument that positive duties are generated by harms caused is one frequently made in works on global and environmental justice. If people are living in poverty because we have deprived them of the goods they need to survive, or if we have polluted their drinking water, then as Richard Shapcott argues, we have violated our negative duty to do no harm.[[168]](#footnote-168) If we have harmed someone (thus violating our negative duty to do no harm) then we ought to make amends. This is similar to Dale Jamieson’s concept of ‘global environmental justice’ and Clare Palmer’s argument that human obligations towards animals are generated when we inculcate them into ‘oppressive institutions, entrenched depravations and relations of dominance.’[[169]](#footnote-169) Palmer argues that when a wild animal’s interests have been unfairly set back (she uses the example of building houses in coyote territory) this creates an obligation for us to somehow “make good” on our harmful action. She compares this to the notion of ‘reparation’ in human society and states although animals have much weaker claims to reparation, in that they cannot appreciate it on a conceptual level, they should still be compensated in some way. Palmer believes that to compensate wild animals means to *‘[confer upon them] practical benefits that will make living easier and less dangerous for them so that [their] lives are now [...] closer to their lives before the development.’*[[170]](#footnote-170) There are of course differences in Shapcott, Jamieson and Palmer’s arguments as they do not agree on the kinds of being we can owe duties to. But the common thread that runs between them is the assertion that if a being has inherent value then we will have positive duties towards it if we should cause it harm.

At this point we must ask ourselves two questions: how can present harms, which may have been caused by actions in the past, be assessed and how should we ‘make right’ on these harms? Once again, these are questions which have been frequently discussed in the context of human social justice. For example, many have argued that we owe something to individuals whose ancestors were harmed by the slave trade.[[171]](#footnote-171) In terms of future harms, the issue of climate change has prompted many scholars to consider the question of what we owe to future generations.[[172]](#footnote-172) In both cases, those who believe that intergenerational harms can create intergenerational duties, broadly speaking, do so because of evident causal links between those perpetrating the harm and the victims. For example, David Lyons argues that the descendants of slaves are owed reparations not because of the harms done to the deceased, but because the institutionalised racism (of which slavery was only a part) has not yet been fully dismantled. Current descendants of slaves are still being harmed, and their interests set back, by society because they are still discriminated against in educational, legal and financial contexts.[[173]](#footnote-173)

Translating this method of viewing intergenerational harms in wildlife conservation policy is fairly straightforward. If we accept that plants and animals have interests that can be set back and that past human actions can affect the interests of currently living individuals, then we can see why we owe those individuals something. Just as Lyons points to the continuation of institutionalised racism as a harm to descendants of slavery, practices such as deforestation are harming individual plants and animals today.

I shall now turn to the question of how we can make amends for such harms. I will argue that we can owe both reparations and compensation to wildlife. Although the two terms are very similar in their meaning, there is an important distinction to be drawn. Reparations are given in cases where a moral wrong was committed, while compensation can be given when an act was accidental or perhaps when something bad happened despite it having been done with the best of intentions.[[174]](#footnote-174) Both compensation and reparation can take different forms, as I shall demonstrate throughout the remainder of this thesis. In many instances, for example, it will be the case that in order to improve the lives of affected individuals and to prevent future harms, habitat restoration will be the most appropriate form for making amends. In rarer cases we may be obliged to intervene with medical care or with physical protection. Each form of reparation/compensation will be case-dependent.

Having clarified the nature of positive and negative duties and asserted how they are applied under my theory I will now move on explain the next principle for guiding action, the principle of relevant difference.

## ii) Different treatment of different living things is justified only on the grounds of relevant difference.

Thus far in the chapter I have argued that we do have certain moral obligations towards both animals and plants, and that those obligations may include a duty to give reparations or compensation. Sections (iv)-(vi) will consider some broad examples of the kinds of conflicts that frequently arise in conservation politics and will begin to illustrate how these obligations would manifest themselves in practice. Before I can do this however there is still a question mark over the issue of how we should treat, or what we owe to, different types of being. Even though all living things have equal inherent value I will not be arguing, for example, that we should treat our houseplants the same ways that we treat our pets. This section will explain why different treatment of nonhumans is often ethically permissible despite their having equal inherent value. Taking this step will also enable us to work out the various forms that our obligations to nonhumans will take.

The nature of these obligations can be found by following the idea that there is “*no moral difference without some relevant difference.*”[[175]](#footnote-175) The relevant difference principle is simply the idea that individuals can only be treated differently if there is some difference between them which warrants that different treatment. For example, Rachels argues that there is no relevant difference between humans and other animals which can justify the torture of animals but not the torture of humans. This is because human and nonhuman animals suffer the physical and emotional pains of torture in much the same way.[[176]](#footnote-176) This principle has a long history in moral philosophy and, as Mark Rowlands describes,

“*[...] no one is going to mess with the principle of no moral difference without some relevant difference. The principle is so central to our moral thinking that we simply cannot imagine what morality would look like without it.”[[177]](#footnote-177)*

In Chapter 1 I discussed, at length, why factors such as species membership, intelligence and the degree to which one can feel pain do not count as relevant differences with regards to how they relate to inherent value. This does not mean however that they can never be used as relevant differences when we are considering how we should behave in certain situations. The principle of relevant difference may place greater constraints upon us than we are perhaps used to, but it need not make our lives immensely difficult. I will now consider some examples of how the principle of relevant difference can work to protect animal and plant life without placing unbearable burdens on humans.

Throughout my work, I have argued that humans and other animals are not radically different, that they have some features which are similar and others which are dissimilar but such differences are matters of degree, not kind.[[178]](#footnote-178) Having considered the extensive similarities between humans and other animals, many feel that we should extend many of our moral obligations to animals too, given the evidence that they have emotional lives and physical attributes which are different to ours only by matters of degree. In cases where the interests of a human and the interests of another animal conflict, the fact that one is a human animal does not automatically entitle him to special consideration. Instead each case must first be judged on whether or not there is a relevant difference between the human and other animal. There is therefore a burden placed on humans not to torture animals because animals will suffer from these pains in the same way that humans do. However, there would be no wrong in denying animals the vote because there is a relevant difference in that animals cannot in any way be harmed by having the vote denied to them.

There are a much greater number of relevant differences to consider between plants and animals. Plants can permissibly be treated in ways which would cause great harm, even death to any animal. For example, if I cut the grass in my garden, it will grow back and be perfectly healthy. If I cut the heads off my fish however, this would most certainly not be the case. Many plants benefit from pruning while there is no animal which benefits from having its limbs removed. These relevant differences allow us to use plants in ways which would not be morally permissible towards humans and other animals. This explains why, for example, it is morally permissible to take parts of plants to produce medicines but it is not morally acceptable to use tiger parts (this would be true regardless of whether or not they were an endangered species.) At this stage, the mere suggestion that we *can* have moral obligations towards plants is likely to sound either insane or simply a regression to the principles of deep ecology and land ethics. In fact, I do believe that environmental ethicists are correct in asserting that plants make vitally important contributions to the wider ecosystem. My objection to these theories however was not that they were wrong about our connections to other living things, but rather that they had no coherent or desirable method for informing us about how to proceed with our treatment of them. By combining moral individualism with my principles for resolving conflict, we will have a much more workable theory.

In the final three parts of this chapter I will illustrate how this process will work. I will use simple, hypothetical examples to demonstrate that it is perfectly reasonable for us to use plants and, in some very specific cases, animals in order to live healthy, decent lives but that it is also imperative that we take much greater care in the way we treat other living things. Once I have shown how biospherical individualism works as a theory, I will then be able to move on to the second half of this thesis, in which I shall apply my principles to much more specific, ‘real-life’ conservation cases.

## iii) Consuming plants

My ethical framework, biospherical individualism, holds that we have *some* moral obligations towards plants because they are teleological centres of life. The notion that plants have the ability to pursue their own individual, particular ends has a strong scientific basis. Just as the studies that were examined in Chapter 1 have begun to shed light on the complex nature of animal behaviour, so plant scientists are slowly uncovering a world previously invisible to human eyes. In this chemical world plants send signals, not only to one another but also to certain insects in order to save themselves from predation and to attract pollinators.[[179]](#footnote-179) They can also direct their roots towards the most nutritious areas of soil and can modify their behaviour according to the kinds of plants that are near to them.[[180]](#footnote-180)

Despite this, very few plant scientists are willing to describe this kind of behaviour as ‘intelligent’.[[181]](#footnote-181) As I have already stated though, intelligence is not the basis of inherent value. What the increasing body of evidence does support is my assumption that plants are individuals capable of pursuing their own good in their own way which, under my theory, means that we have certain obligations towards plants. However, that is not the same as saying we have the same obligations to plants as we have to humans and other animals. Principle (c) tells us to treat living things according to their specific interests and we know that the *only* interests a plant can have are in nutrients, water, sunlight, space to spread its roots and a climate appropriate to its species. As such, our obligations towards plants are likely to be very different to those we have towards humans and other animals.

For instance, as was described in the previous chapter, we can use plants for food without killing them. The fruits of trees and other plants are designed precisely to be eaten by animals so that the plant’s seeds are both moved away from the parent plant and are fertilised by the animal’s waste. Because of this, there is no moral wrong in eating fruit or vegetables as the consumption of these parts is actually in the plant’s interest. Without wishing to anthropomorphise, this is what the plant ‘wants’ as consumption of this kind is what allows plant species to survive. If fruit or the flesh of a vegetable is left uneaten it quickly dies and rots and seeds which fall next to the parent plant are unlikely to germinate. Philosophically at least then there is no problem with eating fruit and vegetables, as plants and animals have evolved a symbiotic relationship of production and consumption so as to be mutually beneficial.

A more difficult problem emerges in instances where we kill plants outright, either for agricultural purposes or other uses such as timber or making room for human habitation. These situations can be problematic because, in the first instance, they will undoubtedly go against the specific interests of the plant. Secondly, it may be the case that we are prioritising our own nonbasic interests over the basic interests of the plants. To elucidate, let us consider the following examples: imagine a single square kilometre of woodland, approximately 100 years old. In scenario A a logger wishes to chop down the trees to make cheap furniture. After logging has ceased he plans to sell the land to a local developer to build luxury holiday homes. In scenario B the land will be cleared to make way for a community hospital. In scenario C a farmer wishes to cut down the trees to make way for an arable, organic farm to supply goods to his local community.

I will put aside for the moment the fact that the trees will also house a great number of animals. In the interests of keeping things clear I will focus only on the issue of killing plants. Let us look first at scenario A: in this case the trees are not only going to be used but killed, and their interests in continued life are to be overridden. The basic interests of the trees are thus being violated in favour of the nonbasic interests of humans who would like cheap furniture and/or a holiday home. Scenario A is thus a situation which is not morally acceptable because it is putting the nonbasic needs of humans above the basic needs of plants. Just as we would consider it ethically problematic to evict poor people from a tract of land to make way for a shopping centre or luxury homes, so it is wrong to needlessly destroy the lives of plants for goods which we do not need. If, however, logging was taking place in order to build homes that were *needed* by humans the issue would be different as this would be a case of basic human interests being balanced against basic plant interests. This kind of situation is much trickier, but if we turn now to scenario B we can see how even these kinds of problem can be resolved.

In scenario B, the land will be cleared to make way for a community hospital. Let us assume that this patch of woodland is the only suitable site in the area (perhaps the soil is too weak elsewhere). It is clear that the plants cannot gain anything by the construction of the hospital. However, the potential benefits that the hospital would bring for human life are significant and are certainly not of less importance than the plant’s life. It may be the case that we can solve this problem with principle (c): strictly speaking, plants have no basic interest in being in a particular place, as long as the soil is suitable there is nothing ethically problematic about transplanting the trees. When humans are forcibly displaced however, whether because of wars or because of personal tragedy, the events can trigger numerous psychological problems.[[182]](#footnote-182) Similarly, animals taken from the wild can be stressed to the point where it kills them, even if they are taken in an attempt to keep them from predators.[[183]](#footnote-183) Plants however face no such issues and so because of this we could justify forcibly moving them. Therefore, in the case of scenario B where a basic human interest is in conflict with a basic plant interest, in using principle (c) we may decide to transplant the trees.

If transplanting is impossible however we must turn to principle (e): in the case of a stalemate, a decision must be made in reference to the consequences of an action on the wider biotic community. It may seem inconsistent for me, as a biospherical individualist to be concerned with ‘communities’ having spent so much time espousing the value of the individual but, as I have already discussed, there is in fact no such inconsistency. Despite holding the opinion that inherent value stems from our individuality, to be a biospherical individualist does not mean that we should disconnect ourselves from those around us. A community, after all, is comprised of individuals. When we talk about what is good for the community we talk about what is good for the individuals who make up that community. In addition to this, although we each individually hold inherent value, within a group we also hold an instrumental value because of the way in which we interact with, use and depend on one another. Although a being’s instrumental value does not make it morally considerable in the way that inherent value does, instrumental value can still be a useful concept in examples such as this where there is a stalemate, because both sides have equal value and competing basic interests.

In trying to decide what would be best for the wider biotic community in this instance, we must consider all the pros and cons of building the hospital in this particular place. Would it increase pollution because of increased traffic or would it reduce pollution because local people could now walk or use public transport in order to receive treatment? Would new roads need to be built? What materials/chemicals would be used in construction? These are the kinds of questions that we already ask ourselves when undertaking construction. For example, UK councils often have to carry out ‘environmental impact assessments’ (EIAs) before any kind of construction can take place which may damage the local environment.[[184]](#footnote-184) These kinds of assessments however are generally carried out in order to protect the local human community or, in some cases, endangered species. However, my claim is that we should move beyond current, usually anthropocentric, EIAs and towards ones which would take into consideration the interests of all living things. The main difference is that in this case we would not be asking such questions purely for logistical reasons but in order to see how the building would cost or benefit the biotic community. The solution would therefore not depend on what was cheapest or most convenient but on what would minimise the harm done to the local plants, animals and humans alike. There is no single solution to the problem of killing plants in cases where our basic needs collide with theirs; decisions on these matters need to be made on a case by case basis. The important point to remember is that those factors *must* include the potential harm to the plants and animals as well as the usual human considerations which are factored in in planning.

Finally let us move on to scenario C: a farmer wishes to cut down the trees to make way for an arable, organic farm to supply goods to the local community. Again, the first question to consider is whether or not the farm could be built elsewhere; no farm at all would certainly be better for the trees and for the existing biotic community. However, the situation will be different if the alternative is that a large, industrial scale farm will be built a little further away, in this case we have a wider range of issues to consider. Having a small, local farm would mean that vegetables and crops will not need to be transported in from elsewhere. Local production may result in less pollution for the area which would be beneficial for both the local animal and plant populations. In general terms there is an increasing body of evidence which suggests that small-scale farming is the healthiest and most sustainable form of food production for people and the environment.[[185]](#footnote-185) Intensive production (of both crops and livestock) has numerous negative environmental impacts such as soil, river and air pollution. This in turn negatively affects the animals, plants and humans which live nearby.[[186]](#footnote-186) Small scale, organic farms however have a much smaller overall impact because they tend to avoid using harmful agro-chemicals for pesticides and use mixed systems (crop-rotation and/or a combination of animal and plant agriculture) which negates the need for chemical fertilisers.

In light of these points, when utilising my framework, one could decide that the best course of action would be to cut down the trees and build the farm. After all, being a biospherical individualist does not make me an absolutist, what it does mean is that we should take every possible harm and benefit that may occur to *all the living things* into consideration and then make a decision. This process may sound laborious but it is, in many ways, similar to the way we make decisions in our daily lives with other humans. Many cases of conflict can be solved quickly through simple conversations between the affected parties. Sometimes though, when basic interests conflict we may need to have long, public debates or even court cases. Even after conflicts have been officially resolved, there is no guarantee that everyone will be satisfied by the outcome. There is no avoiding such situations in human society and, for the biospherical individualist, we should not shy away from such debates when the interests of other living things are being violated either.

Many of the steps that we have looked at here can also be applied to the problems we will be tackling in the rest of this chapter. In section (iv) we will now look at how the biospherical individual can account for the fact that animals can kill other animals without committing an immoral act.

## iv) Animals eating animals

One critical issue which arises in my, and other individualist theories, is that many animals have a basic interest in eating meat, but the animals who ‘supply’ that meat also have a basic interest in staying alive. The subject of this section will be how we can deal with this conflict of basic interests. I will assert that, in most cases, it is ethically acceptable for us to let animals eat other animals. My reason for this is ultimately to be found in principle (e): as we are faced with a stalemate we have to consider what is best for the wider community of individuals. However, we also need to consider principle (c) and work out what the basic, specific interests of the animals involved are.

As an example, I will consider the case of a lion eating a gazelle. Lions have a specific and basic interest in eating meat because they are obligate carnivores, which means that their digestive systems cannot process vegetable matter effectively. As a result, proteins from meat are a necessary part of their diet.[[187]](#footnote-187) To deny the lion access to meat would thus have serious implications for their health, which of course constitutes part of a decent life and is a basic interest. This of course clashes with the gazelle’s basic interest in continued life.

There is also the issue which arises from my second foundational principle, which states that living things should be allowed to pursue their own interests in their own way. Preventing predation by wild animals would presumably entail confining either the predator or the prey animals in some way. This infringement on their autonomy would thus violate my second foundational principle and the animals’ basic interests. These assertions that a) animals are autonomous and b) that this autonomy is a basic interest for them may be contentious, so I will briefly clarify how I have come to this conclusion. As humans, part of feeling that we are free to pursue our own good is feeling that we have a high degree of control over our bodies and minds. We can value this in two ways: instrumentally, because it allows us to attain things which give us pleasure and promote our well-being; and intrinsically because we feel that “*the* ***process*** *of satisfying our* ***own*** *interests is valuable in itself.”*[[188]](#footnote-188) In other words, we value autonomy because we value having choices and the ability to make decisions without interference from others. We value this regardless of its consequences, we prefer being allowed to make mistakes to always being told what to do.

While there is no doubt that animals value such processes instrumentally, there is debate over whether or not most animals can value them intrinsically. This is because there are disagreements over whether or not we can describe animals as truly autonomous agents. If we consider autonomy to be *“the ability to frame, revise and pursue their own conceptions of the good”* then it may be the case that most animals are not autonomous agents because they do not have a complex, philosophical understanding of ‘the good’.[[189]](#footnote-189) However, if we understand autonomy as “*a capacity to rule oneself, to be self-legislating”* then it appears most animals do have autonomy.[[190]](#footnote-190) As Lori Gruen points out, many animals make plans by building nests and storing food for winter. Social animals also create complex social structures and engage in behaviours which establish control over territories, food and mating partners. This shows that although they may not hold ideas which resemble anything like the Aristotelian concept of the good life, they are certainly capable of controlling and directing their own lives. Preventing predation would thus be detrimental as it would both undermine the autonomy and inherent value of predatory individuals and also because it would impinge on their basic interest in living a healthy, decent life.

Having said this, we still have to deal with the fact that there is clash of basic interests at hand between the lion and the gazelle. This brings us to principle (e) and the need to assess which course of action will be best for the wider biotic community. Predation, as ugly as it may be, serves a very important function in the flourishing of life on earth. Studies in both aquatic and terrestrial ecosystems have shown that predators play a key role in keeping ecosystems stable, in controlling diseases and can even have an impact on climate change. This is because predators play a key role in food chains by keeping herbivore populations at levels which allow plant life to flourish. As numerous animals depend on plants as a primary source of nutrition, these animals also flourish and biodiversity levels increase. The increase in plant life also combats the effects of carbon emissions thus helping prevent drastic climate change.[[191]](#footnote-191)

This effect is known as the ‘trophic cascade’ and there is an ever growing body of evidence indicating the importance of predatory behaviour in maintaining a diverse and stable ecosystem. This is important from an ethical point of view because the healthier the environment, the better life is likely to be for the individuals who live within that environment. To stop predation outright thus seems to be both impractical and undesirable, firstly on the grounds that it interferes with certain animals, on an individual level, by denying them their specific interest in eating meat. Secondly, because predation invokes a conflict between the basic interests of both predator and prey. This means that using guideline (e) we have to decide on the best course of action by judging what will be best for the biotic community. In many cases it seems that because of the importance of predation in ecology, it is best to let animals eat other animals.

## vi) Humans eating animals

In the final section of this chapter I consider the moral problems posed by human eating other animals. I conclude that the only situation in which it would be permissible for humans to kill another animal for food is if it is absolutely necessary for survival. In order to show why this is the case, I shall use my principles for guiding action to show why the killing of animals for meat is morally wrong in all other circumstances.

With regards to the first principle, it is clear that killing violates our negative duty to do no harm. One may wish to argue that that in saying humans should not eat meat, my theory is too demanding and that eating meat is either necessary for our health or that the pleasure gained from eating meat is an important part of leading a decent life.[[192]](#footnote-192) However, both of these arguments are unconvincing. The first argument rests on the idea that eating meat is ‘necessary and normal’ because as humans we need the proteins and minerals found in meat in order to live healthy lives.[[193]](#footnote-193) However, while many scientists and public health bodies assert that some meat can contribute to a healthy diet, very few now endorse the idea that it is necessary. In recent years studies have in fact shown that a vegetarian diet is better for human health as long as the proteins and minerals which can be sourced from meat are obtained from other foods such as nuts and pulses.[[194]](#footnote-194) This is because while meat is rich in proteins and some vitamins and minerals, it is also high in saturated fats which raise blood cholesterol.[[195]](#footnote-195) Overconsumption of meat has also been linked to diabetes and certain cancers.[[196]](#footnote-196) If eating meat is not a necessary part of a healthy human diet, then the argument that my theory is too demanding because it says that eating meat is morally wrong, simply doesn’t work. Humans can live long, healthy lives without eating meat and while many people may not want to give up meat, this does not affect the veracity of the argument that it is a morally good thing to do.

To answer the second argument, that eating meat is a kind of pleasure that is necessary for a decent human life, we can turn to principles (c) and (d). I have already established that eating meat is not necessary for our physical well-being, but a person may still wish to argue that removing meat from their diet would deprive them of a pleasure which they consider an important part of living a decent life. Addressing this argument, Alastair Norcross uses the following thought experiment to highlight its flaws: Fred tortures puppies in his basement, he does so because by doing this he can, after killing them, extract a chemical from them which enhances the pleasure he receives from eating other foods.[[197]](#footnote-197) When caught, Fred acknowledges that the puppies suffered and that he could survive on bland food, but that he was still right to torture them because otherwise his life would be miserable as he would be deprived of a wonderful sensory experience. Norcross points out that if Fred’s case was real, millions of people would be outraged and his argument that his gastronomic experiences were more important than the lives of the puppies, simply would not be persuasive. Yet billions of animals suffer torturous conditions and are killed by the meat industry every year, according to USDA data around 9.1 billion animals (excluding seafood and rabbits) were killed for food in 2014 alone.[[198]](#footnote-198)

As Norcross points out, there is no relevant difference between puppies and farm animals which makes the torture of one permissible but not the other.[[199]](#footnote-199) Under my own theory, principle (c) asserts that if there is no relevant difference between puppies and farm animals, then we cannot treat them differently. Even if one agrees with this however, it could logically be argued that we should simply agree to eat puppies too. To show why this is wrong, we move on to principle (d): when interests conflict we should prioritise basic over nonbasic interests. Receiving pleasure in eating food is not a basic interest. Having access to adequate nutrition is a basic interest because without it we would die, but access to certain flavours is not necessary for our survival. Besides which, it is perfectly possible to enjoy foods which are not meat. The puppy, or indeed any animal, however does have a basic interest in continued life. Because the animal’s interests in continued life is a basic interest, while our interest in tasting certain flavours is nonbasic, priority should be given to animals and we should not eat meat.

The only exception is if we are in a situation in which we would die unless we killed. If, for example, a person is in an accident and becomes stranded in a forest. Nobody knows he is there and there is no one coming to rescue him, he does not know which plants are edible and which are poisonous. After days of wandering around searching, unsuccessfully, for food he sees a rabbit. In this case it will be ethically permissible for him to kill and eat the rabbit because otherwise he may die of starvation. My theory does not require that we must sacrifice our own lives in order to save others. This subject is covered in greater detail in Chapter 6, where I explore the moral problems surrounding killing viruses and bacteria. As I have shown throughout this chapter, although my theory does make some controversial demands, it is never so demanding that it would make our lives miserable or extremely difficult.

Chapter conclusions

In this chapter I have set out and provided justification for my principles for resolving conflict:

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| a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.  b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.  c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests    d) When interests conflict we should prioritise basic over nonbasic interests    e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on the wider biotic community. |

These combine with my foundational principles to form my own ethical framework for resolving conflicts of interest: biospherical individualism. I began this discussion by exploring the concept of positive and negative duties. Here I argued that although we have a great number of duties towards nonhumans, and as such we should radically change the way we behave towards them as a society, this does not require the placing of unbearable burdens upon us. We do not necessarily have to satisfy the basic interests of animals at the expense of our own. This would, after all, undermine our own inherent value.

With regards to positive duties, I first discussed why we have positive duties in cases of easy rescue. The discussion then moved on to look at instances in which our actions (past or present) have caused serious harms. I argue that we may owe reparations and/or compensation to the affected individuals in such cases. It was not possible, within this chapter, to give a full account of what such reparations may look like in reality because the cases I discussed were very broad. In the following chapters however I will be able to rectify this and give definitive examples related to the specific case studies at hand.

Having looked at the nature of our duties towards nonhumans, I moved on to discuss the principle of relevant difference and its relationship to my section in Chapter 2 on different types of interest. Although the principle of relevant difference is relatively simple to understand, it will be of the utmost importance throughout this thesis. This is because when we are considering killing one individual (or a group of them) in order to save another, we will have to take into account what type of being they are and what their basic and nonbasic interests are. This will help us decide if it would be ethically acceptable to kill them as part of conservation practice.

The final three sections of this chapter outlined how these principles may work in practice. I chose to take three broad types of problem: eating plants, nonhuman animals eating other animals and humans eating animals, in order to demonstrate the applicability of my theory. Now that I have provided sketches as to how my framework can be used, I will now move on to provide in-depth, detailed analyses of problems which have emerged in conservation policy in recent years.

In Chapter 6 I examine issues surrounding great apes and the Ebola virus, I address questions over the permissibility of killing viruses and the ethics of conducting medical experiments on animals for the sake of other nonhuman animals. Chapter 5 tackles the ethical problems with killing invasive species and examines how we should act when the interests of native and non-native species conflict. In the next chapter, I look at the ethical permissibility of killing plants and animals for ‘population control’. In this chapter I conduct 3 case studies: the first considers the ethical problems with trophy hunting and the practice of killing underpopulated animals in order to save others. The second case study looks at ‘overpopulated’ species and the concept of culling in order to save other animals and plants. In the final section I examine the concept of rewilding, which asserts that we should in effect repopulate areas which could sustain a greater degree of biodiversity than they currently do. The first three chapters have outlined and explained my theory, the remaining chapters will show how biospherical individualism can be applied in practice.

# Chapter 4. Population control

The purpose of this thesis, as a whole, is to devise a framework for solving the ethical dilemmas which arise when conservation policy advocates the killing of one being in order to save another. Thus far I have demonstrated why such a framework is necessary and I have constructed it in the form of two sets of principles: the foundational principles and the principles for resolving conflicts. My task now is to put this framework to the test. This chapter will do so by looking at the practice of population control, which looks both at reducing ‘overpopulated’ species and also at boosting ‘underpopulated’ species by killing certain individuals. I chose to cover this subject as population control is a widespread, yet highly contentious, practice in conservation. It is a useful topic to begin my series of case studies with, as I am able to demonstrate the applicability of my theory both to plants and animals and to relatively simple and complex cases.

I argue that there are cases in which population control is necessary, but that killing is neither necessary nor morally justifiable. In order to support these assertions, I will look at three case studies: the first of these looks at the African black rhino and the issue of killing to save endangered or ‘underpopulated’ animals via trophy hunting. The second and third case studies discuss the problems of killing ‘overpopulated’ groups and cover both animal and plant examples. The animal case study looks at the white-tailed deer in America which are frequently culled either by shooting, trapping or poisoning. For the plant case study, I examine the problems caused by lantana in Australia. The third and final part of this chapter will be dedicated to exploring the ethical problems which are raised by the practice of rewilding. In particular I will be looking at the issue of introducing predators as ‘hired killers’ to control herbivore and rodent populations. Before analysing these cases though I will briefly define the term ‘population control’ and explain why it is such an important part of conservation policy.

We must recognise from the outset that population dynamics are extremely complicated, unpredictable and often non-linear.[[200]](#footnote-200) For example, fishing is not intrinsically bad for fish communities (though of course it is for the individual fish that are caught). However, the relationships between fish populations, levels of exploitation by humans and other predators, pollution, climate and ecosystem changes are immensely complicated and we do not know the threshold at which entire fish populations could collapse indefinitely.[[201]](#footnote-201) We should therefore tread with caution when we encounter conservation policies which attempt to ‘control’ animal or plant numbers. We must remember that we are acting with only a limited knowledge of what the consequences of such control will be.

Although the processes involved in population changes are very complex, the definitions of overpopulation and underpopulation that I will be using are relatively straightforward. My definition of overpopulation is as follows: the Earth is a finite space with finite resources, when the number of individuals exceeds the carrying capacity of an area (the resources needed to sustain the individuals living there) that area is overpopulated. Some may take issue with my use of the term ‘carrying capacity’ as it is a concept which is flexible and not readily quantifiable.[[202]](#footnote-202) As Joel Cohen points out, the carrying capacity of a place, whether it be a single field or the entire Earth, can be altered by technology and by changes in the behaviour of the things that reside in that space.[[203]](#footnote-203) The use of organic fertiliser can improve nutrient poor soil, thus improving its carrying capacity, for example. Because of this, we do not really know what the carrying capacity of the Earth is for humans or indeed any other species. This might be troubling from an ethical perspective because the concept of carrying capacity seems to lack a solid foundation, so to use this notion to control populations (i.e. restrict the freedom of individuals to live and, potentially, reproduce) could be dangerous.[[204]](#footnote-204)

However, while I agree that we should not be using what may be termed ‘bad science’ to justify the placing of restrictions on the freedoms of others, I do not think that this criticism is applicable to the concept of carrying capacity. What makes carrying capacity difficult is the fact that it is not predictable, at least not yet, because our knowledge of how biological systems work is still very limited. We know that carrying capacities exist, the problem is that they tend not to become apparent until we have exceeded them. When crops fail or when fish stocks plummet because we have overused them, the carrying capacity of that ecosystem has clearly been exceeded, with devastating consequences for the individuals within that biotic community. The point at which this carrying capacity becomes exceeded is also known as ‘the tipping point’. Tipping points are associated with rapid ecological changes which are difficult, if not impossible, to reverse and which are of great significance in conservation because their impact on wildlife can be catastrophic, and their long-term effects unpredictable.[[205]](#footnote-205)

While I would also emphasise the need for scepticism when looking at predictive arguments like the Ehrlich's *Population Bomb*, I do not see any problem with using the term carrying capacity to describe events which have already happened or are extremely likely to. I believe that current trends such as forest degradation and ocean acidification are perfect examples of humans exploiting ecosystems to the point where they can no longer ‘carry’ other living things. While overpopulation is rarely, if ever, the sole cause of this kind of environmental degradation we must consider the possibility that it is a contributing factor.

Overpopulation, whether by humans or other species, can have many deleterious effects. Excessive consumption and/or clearing of plants leads to habitat loss and ecosystem degradation, this problem becomes most evident in forested areas.[[206]](#footnote-206) Soil erosion, for example from intensive agriculture or overgrazing, leads to decreases in food availability.[[207]](#footnote-207) Competition for resources can lead to violence, both in humans and other animals.[[208]](#footnote-208) Climate change can affect food availability and cause habitat changes, which forces populations to migrate.[[209]](#footnote-209) Finally, we know that infectious diseases spread more rapidly in populations which are tightly interconnected. This effect can be exacerbated by climate change and environmental degradation, as we shall see in the Ebola study in Chapter 6.

Underpopulation, conversely, is where a population reaches a point at which it may not be able to recover and is likely to become extinct. Groups which fall under the IUCN categories of ‘endangered’ or ‘critically endangered’ are underpopulated in this sense.[[210]](#footnote-210) Underpopulation is extremely important from a conservationist’s perspective because as more and more species become extinct there is a net loss in biodiversity. From a biospherical individualist perspective underpopulation is important, not because we are concerned with the plight of the species as a whole, but because underpopulation may be an indicator that the lives of individual living things are being severely threatened. Furthermore, even if numbers of a particular species show signs of improving, this is no guarantee that the threats to that species have been resolved. For example, while poaching is primarily responsible for the decline of rhinoceroses around the world, in places where poaching is reduced, rhinos may still face ecological changes which hamper their ability to breed, feed and subsequently thrive.[[211]](#footnote-211) I shall now move on to examine the plight of the rhinoceros, and explore the most ethical solutions to the threats they face, in more detail.

## i) Trophy hunting: killing the underpopulated African black rhinoceros (Diceros bicornis)

I begin this section by providing some background information on the African black rhinoceros (hereafter simply, the black rhino) and giving an outline of the reasons why trophy hunting is considered to be a viable conservation tool. I then refute these claims, firstly by looking at some of the most common objections to them and then by closely scrutinizing the ethical assumptions which underpin many hunters’ justifications for trophy hunting. I also show why trophy hunting is wrong under my own theory, and I use the principles for resolving conflict to look at alternative strategies which can be used to help protect the black rhino.

There are four subspecies of black rhino but for the purposes of this chapter I will be including all subspecies under the general term ‘black rhinos’.[[212]](#footnote-212) In the early 20th century black rhinos were widespread across Africa and are estimated to have numbered up to 850,000. By 1960 there were only around 100,000. By 1995 the number stood at approximately 2,410.[[213]](#footnote-213) Since then, numbers have slowly improved and the most recent available data put the population at around 5,000, but this is still around 90% lower than it was just 3 generations ago.[[214]](#footnote-214) The main cause of rhino mortality is undoubtedly hunting, initial population declines were due to legal hunting but now poaching stands as the primary threat to their continued survival. Although numbers do seem to be increasing, poaching is also on the rise and there are fears that reproduction rates will not be able to keep up with, or overtake, the death rate.[[215]](#footnote-215) Habitat loss and regional wars are also significant barriers to rhino population recovery.[[216]](#footnote-216)

Trophy hunting has been advocated as a tool for helping conserve black rhinos and other animals for several reasons. To begin with, many hunters profess a deep and profound love for nature and argue that without the support of hunters protected areas, such as national parks in Africa and the USA, would not exist as hunters have played a key role in their establishment and upkeep.[[217]](#footnote-217) Secondly, trophy hunting creates a significant amount of revenue. For example, in January 2014 a permit to hunt a black rhino sold for US$350,000. Advocates argue that the money from selling permits goes into African economies to fund conservation efforts and help local communities.[[218]](#footnote-218) In addition, trophy hunting has the potential to stimulate the economy in places which are not popular with tourists. A third argument in favour of trophy hunting is that it is sustainable under a closely monitored permit system and would not cause species declines.[[219]](#footnote-219) It is also claimed that the presence of trophy hunters can help deter illegal poaching, as it incentivises landowners to keep their property and animals secure.[[220]](#footnote-220)

These arguments have been very persuasive, to the point where charities such as Save The Rhino do not openly condemn trophy hunting.[[221]](#footnote-221) However, many critics have cast doubts on the validity of the claims that have been made by hunting advocates. For example, while it is true that the hunting community is responsible for some of the world’s most prominent conservation programs and national parks, this legacy is morally questionable. The grandfather of the national park system, US President Theodore Roosevelt, was also a model for unsustainable hunting, sending home over 10,000 carcasses (which he killed with his son) during a single year spent in Africa.[[222]](#footnote-222) Further to this, the history of the national park system is also intimately tied up with the history of colonialism.[[223]](#footnote-223) As such, many scholars have argued that the national park system was set up to put Africa (and indeed America) ‘in order’ and shape it according to European values. Native tribes were evicted from the lands they had lived on for generations and were forbidden with interacting with the wildlife there because, it was argued, native people did not know how to look after their own lands.[[224]](#footnote-224)

In response to the claims that trophy hunting is economically valuable, it is important to note that data on how much revenue is generated by trophy hunting and how that money is then spent is either non-existent or patchy. Even advocates of trophy hunting acknowledge that corruption and unequal distribution of funds among local communities could hamper the effectiveness of hunting as a conservation tool.[[225]](#footnote-225) Furthermore, judging by the small amount of data that is available, even if all the money were evenly distributed and put directly into conservation programs, it would still represent a small sum. A 2008 paper by Peter Lindsey claimed that trophy hunting generated US$201 million across Africa, which at the time had approximately 1.4 million km² of land dedicated as ‘game reserves’ (i.e. national parks where hunting is permitted). That amounts to just $143.6 per km² for an entire year. Even back in 1980, the amount of money needed to protect 1km² was said to be $200, costs today are likely to be closer to $500 per km².

Finally, there is no real evidence to support the idea that legal hunting deters illegal poaching, as poaching is in fact on the rise.[[226]](#footnote-226) The hunting of other animals, such as the recent outcry over the killing of ‘Cecil’ the lion in Zimbabwe, have highlighted the ways in which restrictions on hunting are often flouted.[[227]](#footnote-227) While each of the above arguments cast doubt upon the validity of the claims made by pro-trophy hunting factions, none of them really get to the heart of why trophy hunting is morally wrong. I will therefore proceed by looking at the traditional philosophical arguments which are used to justify practices such as trophy and other forms of ‘sport’ hunting. I will argue that these arguments do not stand up to scrutiny and as such, even if practices such as poaching were stopped, hunting for sport is still morally wrong under biospherical individualism.

Broadly speaking, we can break down traditional justifications for bloodsports into two categories: the first asserts that it is good for humans, that it is in fact a necessary part of exercising one’s humanity (or more accurately, of exercising one’s masculinity). The second kind of argument takes the environmental holist approach which argues, as indeed Aldo Leopold did, that hunting is good for the biotic community.[[228]](#footnote-228) This second kind of argument is most frequently used to justify the hunting of overpopulated species and so I will discuss it in more detail in section (ii). At this point, I shall only examine the argument that hunting for sport is a moral good because it is good for humans.

This argument claims that humans, particularly men, have an innate *need* to hunt and that the harm caused by killing another animal is less than the harm caused by inhibiting this need.[[229]](#footnote-229) It is argued that this need exists because the civilisation process has alienated us from our primitive, original selves.[[230]](#footnote-230) Hunting is the last vestige of the hunter/gatherer lifestyle that we left behind when we invented agriculture and industry. Returning to the hunt is thus our only real chance to return to ‘nature’. According to authors such as Ortega y Gasset and Paul Shepherd, no other pursuit truly reconnects man with nature; practices such as farming simply manipulate nature, while hunting engages with it.[[231]](#footnote-231) This romanticising of hunting is also seen in the work of Roger Scruton when he states:

*“It matters to us that we should be in constant relation to animals – and wild animals especially. For we seek an image of innocence, of the world before our own depredations, the world without man, into which man comes as an intruder. The burden of self-consciousness is lightened by this image: it shows us that we walk on firm ground, where the burden may from time to time be set down and upon which we may rest from our guilt.”*[[232]](#footnote-232)

Hunting then is seen as a re-creation of a time in our past when were in some sense ‘pure’ and innocent. Not only this, but of course early man had to hunt for his food so the ‘purest’ man is the hunter, the predator, and his killing is guilt-free because he was simply doing that which was ‘natural’. Scruton wanders further into the realms of the mystical by claiming that when man is in pursuit of an animal, he sees and knows that the animal is an individual, but when it is dead and captured by man, the animal is no longer an individual but rather a ‘totem’, a symbol and representation of *all* animals:

*“the universal species becomes a sacred object, to which the particular quarry is a sacrifice. The quarry dies on behalf of the species and thereby reconsecrates the sacred identity between species and tribe.”*[[233]](#footnote-233)

The hunter then is not portrayed as a sadistic killer but as a quasi-religious nobleman, for whom the act of killing is not done out of pleasure but as some kind of important ritual sacrifice.

There are numerous problems with the arguments I have just outlined, both under my own theory and simply with the coherence of the argument itself. To begin with, let us consider the idea that hunting is the last means we have of truly ‘connecting’ with other living things. While we may agree that urbanisation and mass agriculture have alienated us from most other species, the idea that hunting is the only way we can engage with them is absurd. Walking, camping, sitting on the beach or swimming in the sea are just a few examples of activities we can engage in which do not in any way seek to change the world but simply to immerse in and connect with it. Moreover, these activities do not violate principle (a) which states that we should do no harm.

Theodore Vitali argues that the act of killing is only of secondary importance and that in fact the hunter does not receive pleasure from the actual killing but rather from the chance to exercise one's ‘predatory skills’.[[234]](#footnote-234) Nevertheless he states that death is still necessary because it is the only way to bring closure to the act and for the hunter to have exercised his ‘virtuous’ skills. Hunting is not really predation, and therefore not a return to nature, unless it results in death.[[235]](#footnote-235) But this is simply not a convincing argument because primitive man did not only interact with nature when he hunted, but also when he picked berries, drank water from a stream, built shelters from plants and so forth. The modern hunter’s vision of primitive man is incredibly narrow and selective. It also ignores women and, as many eco-feminist scholars have argued, forces a separation and a patriarchal structure between men, women and the environment.[[236]](#footnote-236)

Finally, let us turn to Scruton’s claims regarding the spiritual nature of hunting. Scruton does not explicitly claim here that hunting is a Christian pursuit or that it is endorsed by any particular religion. What he appears to be arguing is that hunting invokes spiritual feelings that are valuable in and of themselves. However, it is not clear why spiritual emotions are of greater moral importance than the life of another living thing. Further to this, it is extremely doubtful that early men hunted because it was spiritually rewarding but rather because they had to, to survive. The romantic view that so many hunters hold of their hobby is based not in fact but in social constructs. These constructs are not only irredeemably entwined with patriarchy but also echo the philosophies which asserted that man should have dominion and control over nature, as I explored in Chapter 1. Nor does the claim that hunting fulfils a primal urge vindicate the hunter any more than the claim that sex is a primal urge vindicates sexual predation.

Having looked at the general problems with pro-hunting arguments, I shall now return to the specific case of the black rhino and look at the problem from the perspective of biospherical individualism. My theory will show, succinctly, both why we owe positive duties of assistance to black rhinos and why trophy hunting does not constitute an ethically acceptable method of assistance.

Those who endorse trophy hunting are arguing that what we have here is a clash of basic interests: the basic interests of the individual rhinos in continued life are being pitted against the basic interests of the rhino community in receiving protection from poachers. In saying that hunting one animal for a trophy is justified if it helps to protect others, advocates of trophy hunting are proclaiming that it is the species that is valuable, not individuals. Indeed, the director of the Dallas Safari Club has been directly quoted as saying “populations matter, individuals don’t.”[[237]](#footnote-237). My own theory directly opposes this notion. From the perspective of moral individualism, claims such as Scruton’s that prey animals are mere ‘totems’ of their species clearly goes against my second foundational principle; that all living things are individuals with equal inherent value.

In addition to this, those in favour of trophy hunting have misrepresented the relationship between the interests that are at stake. Of course is it true that all rhinos have basic interests in continued life and in being protected from poachers. However, while the pro-hunting argument assumes that individual rhinos *have to* die in order to save others, I would argue that this is not the case at all as there are alternative methods available for preventing poaching. For example, photography and other forms of eco-tourism can generate funds for supporting conservation programs, as can charitable donations. Most crucially, governments themselves should be encouraged to invest in law enforcement programs to curb poaching and support local communities. None of the pro-hunting literature clearly argues as to why the death of an animal is integral to the survival of the rest of their community. Indeed, as Marc Bekoff points out, trophy hunting often results in enormous disruption within animal communities.[[238]](#footnote-238) This is because killing adult animals creates gaps in the animals’ social structure, leading to conflict within the group.

The clash of interests here is actually between the basic interests of the black rhinos and the nonbasic interests of the hunters in acquiring a trophy. While I would agree with hunters that we have a positive duty to help black rhinos if they are in danger, it is very clear that hunting is not an ethical solution. My principles for resolving conflict effectively demonstrate why this is the case:

*Principle a) Generally, we a have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness*.

Human action has not only caused the decline of the entire species, it continues to affect the lives of individuals, many of whom have to live under armed guard.[[239]](#footnote-239) Others may be forcibly moved from their territories if, for example, civil unrest breaks out or if they are needed to repopulate an area in which rhinos have become extinct or their numbers are extremely low.[[240]](#footnote-240)

*Principle b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.*

Because of the ways in which we have both directly targeted individual animals by hunting and because we have severely damaged much of their habitat, it is quite clear that we have positive duties of assistance towards rhinos. This is not really in dispute. What is in dispute is whether or not trophy hunting constitutes an ethical form of assistance.

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests.*

Trophy hunters argue that killing individuals is in the best interests of the community. But, as we have discussed in previous cases, a community is comprised of individuals and all the individuals in question have the same interests. So, there is no relevant difference to consider.

*Principle d) When interests conflict we should prioritise basic over nonbasic interests*

Individual rhinos have a basic interest in continued life. Hunters do not have a basic interest in taking a trophy home. Nor does Scruton’s argument that hunting satisfies a deeply seated, primal urge provide moral justification for killing. One could argue that rape satisfies a deep seated, primal urge in certain people, but this does not mean that rape is therefore morally justified. The collecting of a trophy may bring people a certain degree of pleasure, and it not unreasonable to say that a decent human life must involve *some* kinds or pleasure or else we would lead miserable lives. However, the pleasure someone receives in killing an animal does not count as a basic interest because a person can quite easily lead a decent life without ever killing in this way. Rhinos however do have a basic interest in continued life and so their basic interest should take priority over the nonbasic interests of certain humans.

In conclusion, in this section I have argued that the efficacy of trophy hunting as a conservation tool is highly questionable. There is no incontrovertible evidence to show that trophy hunting is useful for funding conservation programs or for inhibiting poachers. Most importantly, I have shown that trophy hunting is not morally permissible because it pits the basic interests of the individual rhino against the nonbasic interests of the hunter. I will now move on to examine a case which deals not with endangered species, but with overpopulated ones.

## ii) Killing overpopulated species: lantana (lantana camara) in Australia and the white-tailed deer (Odocoileus virginianus) in the USA.

In this section I begin by discussing the problems posed by the lantana plant in Australia. Lantana is listed in Australia as a ‘weed of national significance’ and if it is discovered on a person’s property, that person must report it to the relevant authority in their area so that it may be destroyed.[[241]](#footnote-241) I evaluate the justifications for this policy and argue that removal of the plant may be permissible in some instances, but that under my theory a full program of eradication is neither necessary nor justifiable. I then move on to provide a short history of white-tailed deer populations in the USA and describe the conservation problems that they have caused. The most important ethical problem that arises here is the apparent threat that deer overpopulation poses to American songbirds. I evaluate the interests that are at stake and use my principles for resolving conflict to show why controlling the deer population may be necessary, but culling is not an acceptable solution. Before looking more closely at the white-tailed deer however, I shall discuss the case of the lantana plant.

***Lantana (Lantana camara)***

The lantana shrub originated in Central and South America, but due to its attractive flowers has been cultivated across the globe from as early as the 1690s when Europeans began transporting it to Europe and their colonies.[[242]](#footnote-242) It has since become established across the Asia-Pacific region, Australia, New Zealand, the West Indies and Africa.[[243]](#footnote-243) The main problem caused by lantana, is that it grows in tall, dense thickets or clumps which block light needed by smaller plant species and ground dwelling animals such as reptiles.[[244]](#footnote-244) It also produces an allelopathic effect, which means it can produce toxic chemicals to prevent other plants from growing nearby. Some varieties are also poisonous to livestock if they are very young or have not been exposed to small amounts of lantana before.[[245]](#footnote-245) As lantana is a woody plant, it can also exacerbate forest fires. A 2010 study estimated that 1,322 plant and 158 animal species are negatively impacted by lantana, although it does not list which species these are or name those most heavily impacted.[[246]](#footnote-246) Because of these impacts, it is illegal to sell or distribute lantana in Australia (where it covers around 5% of the land) and landowners may be required to remove it if it is found on their property.[[247]](#footnote-247)

Lantana can be killed either through manual removal, burning, herbicides or the introduction of ‘biological control agents’ such as the sap-sucking bug (*Teleonemia scrupulosa*) or the leaf-mining beetle (*Uroplata girardi*).[[248]](#footnote-248) The question I will now turn to, using my principles for resolving conflict, is whether such controls are ethically permissible.

*Principle a) Generally, we a have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness*.

The fact that lantana has been able to become established across the globe is partly a reflection of the adaptability of the plant, but also a reflection of the ways in which human activity has provided the perfect environment for lantana. Typically, lantana grows in open unshaded areas such as wasteland, rainforest edges, farmland, urban areas and forest floors recovering from logging or fires.[[249]](#footnote-249) It fares particularly well on roadsides, canal banks and railway tracks. It does not encroach on intact forests as adequate sunlight will not get through the canopy (though it can damage orchards and crops.) Since European colonisation, roughly 50% of Australia’s forests have been cleared and those that remain have been severely fragmented.[[250]](#footnote-250) Human activity thus not only brought lantana to Australia but has also enabled it to flourish. Historically speaking, we have not violated our duty to do no harm to lantana, in fact we have done the opposite.

When it comes to the question of whether or not we can now reverse our behaviour and kill lantana, we should consider if simply leaving it be could be considered ‘too demanding’. If it can be proven that leaving lantana alone will mean an increasing death toll of other plants and animals, then there may be a case for arguing that lantana should be dug up and possibly killed. However, we should avoid generalising and assuming that lantana is always bad. Instead we should contextualise the situation: if lantana plants are spreading through fragmented forest, then they are much more likely to threaten other plants and animals. Similarly, if they are on farm land then they may destroy crops which people need to survive. In these cases, removal of lantana may be permissible. If, however, the plants are simply growing on a roadside, or on a patch of urban wasteland, then it is difficult to see why leaving them in such places would be too demanding. Indeed, they may even be beneficial in such places as they provide food and shelter for several species of bird.[[251]](#footnote-251) If however, there is strong evidence that leaving lantana in a particular place would cause harm to other living things, we should move on to principle (b).

*Principle b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.*

The first step we must take here is to decide if we have any positive duties, either to lantana plants themselves or those plants and animals affected by them. As discussed in the previous section, our behaviour has thus far enabled lantana to flourish in Australia and we therefore do not have any positive duties towards it. We may however have positive duties to other plants and animals. By clearing and fragmenting forests and other forms of vegetation to make way for farmland and housing, we have both caused current harms (to those plants and animals killed or forced from their territories) and have made others particularly vulnerable to harms in the near future. By creating an environment which is ideal for lantana, we have made it much more difficult for other plants and animals to survive. Because we have caused these harms, we have a positive duty to assist them. It is at this point that we should question whether or not we can kill lantana in order to save or protect others. This brings us to principle (c).

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests.*

The lantana plants share one common, basic interest with the other plants and animals in question: they all have a basic interest in continued existence. They also share their basic interests in access to soil and sunlight with other plants. However, there are relevant differences between lantana and animals. The main difference is that animals have a basic interest in remaining in or near their territories as they can suffer and many die if translocated.[[252]](#footnote-252) Plants, by comparison, will not suffer if moved.

Because of this difference, there is perhaps a simple solution to the problems caused by lantana. In many cases, it would be fairly easy to simply dig up lantana plants and keep them as indoor plants. The Australian government could still maintain certain strict controls on the selling or growing of lantana seeds, which would halt or at least severely slow down the growth of future generations of lantana. Of course lantana could still grow from seeds that had already been dispersed prior to the parent plant being dug up, but close monitoring of the area and removal of young shoots should prevent full regrowth. There is no doubt that such a project would be time consuming and probably expensive, but this does not detract from the fact that it would be morally better than killing the lantana with herbicides or fire. These methods would after all be likely to kill plants and animals other than lantana as well.[[253]](#footnote-253)

Even if such a program were implemented, it should of course be undertaken with great care and in tandem with a program to replace the lantana with other, less dangerous, plants. This is because many of the animals that suffered from the clearance of forests and heathland are now dependant on lantana as a source of food and shelter.[[254]](#footnote-254) The immediate and full-scale removal of lantana could thus cause as many problems as it solves. However, it is clear that lantana can threaten the lives of other plants and animals and because it can be moved without killing it, the removal of lantana from certain sites is ethically permissible.

Many of the issues that have been presented in this case study will recur in the remainder of this chapter, and indeed throughout the thesis. Perhaps the most significant point, is that we cannot ‘blame’ lantana for all of the problems that it has caused because it is human activity that has enabled lantana to survive and spread. Acknowledging our role in these conservation problems will enable us to come up with more effective solutions. For example, it is clear that planting and regenerating forests will help to prevent lantana from re-establishing in the future. Forest regeneration is another subject that will be discussed in each case study, and I will show that although it would not solve every conservation problem by itself, it is often a morally sound and practically effective long-term solution. Having now explored the lantana case study, I move on to examine the case of the white-tailed deer and animal overpopulation.

***White-tailed deer (Odocoileus virginianus)***

White-tailed deer (hereafter simply ‘deer’) were reportedly abundant when the first European settlers arrived in North America but there is no precise data on their numbers from this time.[[255]](#footnote-255) By the early 20th century, hunting and habitat destruction had led to the extirpation of the deer from their original ranges and their near extinction across the continent.[[256]](#footnote-256) Following the introduction of strict hunting regulations, land use changes and the eradication (or near eradication) of non-human predators such as grey wolves and cougar, deer populations have recovered to a point where they are now considered to be overpopulated in many places.[[257]](#footnote-257) Their apparent overpopulation has caused a number of problems.

The first set of concerns surround the economic damage that deer can cause. Deer often live around the edges of human habitations, because these areas supply them with easy sources of food and shelter from any predators. Because of their close proximity to people’s gardens, in times when food is otherwise scarce, such as in winter, deer will feed on garden plants and often damage ornaments by knocking them over.[[258]](#footnote-258) Further damage to property is caused by road collisions. A 2005 study estimated that the combination of deer/vehicle collisions and deer consumption of agricultural and residential plants costs the US nearly $640 million per annum.[[259]](#footnote-259) The second set of problems relate to the environmental damages that can be caused by large herds of deer. Deer feed on shrubs and tree saplings and so large numbers of deer can strip significant sections of forest floor of vegetation and prevent regeneration.[[260]](#footnote-260) As a consequence of this kind of forest degradation, many songbird communities have declined.[[261]](#footnote-261) Not only are the songbirds negatively affected, deer are also causing serious harms to plant life. Because of these factors, many conservationists see deer culling as necessary for the protection of other forms of wildlife. This then brings us to the holistic argument that hunting is necessary for protecting the wider interests of the biotic community.

However, we must ask ourselves if hunting or culling are really necessary and also ethically acceptable. Some conservationists and environmental ethicists have argued that culling, or ‘therapeutic hunting’, is morally acceptable if a group of animals are overpopulated and causing damage both to the local ecosystem and indeed to one another.[[262]](#footnote-262) In such cases, it is argued that we can permissibly kill some individuals because doing so will save many more. Gary Varner argues that therapeutic hunting could be considered morally acceptable both to environmental holists and moral individualists, because ultimately the consequences of overpopulation are bad both for biotic communities and for individuals who suffer from problems such as a lack of food.[[263]](#footnote-263) One might assume that under my own theory, principle (e) would lead us to the same conclusion. However, while I do agree that in some circumstances we may be obliged to protect certain animals from the side-effects of overpopulation, I still do not believe hunting is a morally acceptable option. There are two reasons for this: the first is that there is a great hypocrisy evident where people call for the deaths of animals in order to curb ‘overpopulation’, but then ignore the problems caused by enormous human populations. As Dale Jamieson points out:

*“It is striking that people who advocate this approach to [managing] deer overpopulation do not endorse similar measures in response to suburban sprawl. Humans are a part of nature when they act as nature’s agents, but they are not part of nature in being subject to nature’s demands.”*[[264]](#footnote-264)

As I explained in the introduction, given the complexity and enormity of the problems caused by human overpopulation, and the fact that this thesis is focused on wildlife, it is not within the scope of my thesis to discuss human population much further. However, it is worth pointing out the inherent anthropocentric bias that runs throughout these population control arguments. The second reason that hunting is not an ethically acceptable means of controlling populations is that there are non-lethal options available. These are not only more ethical because they do not require killing, they are also more practically effective because they are more likely to halt overpopulation in the long-term, while controlled hunting will only ever reduce populations in the short-term.

In order to show how I have come to this conclusion, and how we should approach the various problems caused by deer, I must first assess whose interests are at stake and what those interests are: the deer have a basic interest in continued life. Songbirds have a basic interest in having places to shelter, feed and breed and plants have basic interests in continued life. Humans have nonbasic interests in keeping their gardens free from deer. From an ethical point of view, we can immediately see that culling could not be justified if it were only to protect human property, as the deer’s basic interests override our nonbasic interests. However, we face a much tougher problem with the regards to the conflict of interests between the songbirds, plants and the deer and so it will be necessary to utilise my guidelines for resolving conflict.

*Principle a) Generally, we a have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness*.

Since the middle of the last century, white-tailed deer communities have flourished. In creating habitats which are ideal for them and removing most of their natural predators, we have provided a perfect setting for deer to reside in. With the exception of those who have been hit by cars or legally hunted, our harms towards existing, individual deer have been minimal.

With regards to the songbirds however, we continue to cause significant harms. While deer thrive in the fragmented forest system we have created, songbirds suffer because predation rates are much higher. In large, contiguous forests there are far fewer predators of birds and their eggs (such as crows) because these animals primarily inhabit forest edges and suburban gardens. The spread of the cowbird parasite has also been exacerbated by forest fragmentation.[[265]](#footnote-265) Many of the bird species which are said to be negatively impacted by deer, such as birds of the warbler family, are migratory species whose tropical wintering grounds are being destroyed by humans for logging and agriculture.[[266]](#footnote-266) We must also consider pesticide use and climate change as likely contributing factors to the birds’ decline.[[267]](#footnote-267) Human actions have therefore had significant negative impacts on songbird populations, which brings us to the next principle.

*Principle b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.*

We do not have positive duties to assist the deer community because, as I have described, we have actually, inadvertently, helped them to flourish. We do however have positive duties to assist those songbirds that have been affected by the various harms I have listed in principle (a). The question now arises as to whether our positive duties of assistance should include controlling deer populations.

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests.*

There are no relevant differences to consider in this case between the deer and the songbirds as their basic interests are the same (continued life, habitat, access to food and so forth). The fact that the deer are far more abundant than the birds is irrelevant because we are dealing with the interests of individuals, not species as a whole. There are some relevant differences to consider between plants and other living things because their specific interests are very different. I shall discuss these in greater detail under principle (e).

*Principle d) When interests conflict we should prioritise basic over nonbasic interests*

It is clear in this case that we have a clash of basic interests. The white-tailed deer have an interest in continued life, the songbirds have basic interests in being able to acquire food and shelter and the plants have a basic interest in continued life. We must turn then to the final guideline.

*Principle e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on all living things.*

At present, the degree to which deer are a contributing factor to the decline of songbirds is disputable, given the long list of other factors which are likely to cause them serious harms. However, let us assume that a concrete, irrefutable case was made which showed that deer numbers caused significant harms to the songbirds. I would concede then that something should be done to reduce the number of deer because, as I discussed under principle (b), we have a positive duty to assist to the songbirds but no positive duties towards the deer.

At this juncture we should also take into account the impact that the deer have on plant life in more depth. Many studies have shown that deer consumption of seeds, tree saplings and other forms of vegetation can prevent forests from regenerating, thus damaging ecosystems and reducing biodiversity in those areas.[[268]](#footnote-268) As with our evaluation of the causes for declines in American songbirds, we must consider the possibility that other factors, which are not at all related to deer, contribute to these environmental problems. For example, the white-tailed deer have long been blamed for the decline in groups of *trillium* wildflowers, but other factors such as soil fertility and other environmental changes could be instrumental in their decline.[[269]](#footnote-269) While the relationships between individual plant species and deer are not yet fully understood, there is ample evidence to show that large deer populations can alter their local ecosystems, much to the detriment of other living things within that biotic community. Because of this, it is clear that something should be done to control the deer population. The final question then, is what methods we should utilise to do this.

Many American states advocate a controlled hunting system as the best method for controlling deer populations. Just as trophy hunters in the previous case study argued that funds generated through the selling of permits can be put back into conservation efforts, state governments and other organisations argue that hunting can contribute to flourishing forests and local economies.[[270]](#footnote-270) While hunting may reduce deer populations in the short term and go some way to helping forest regeneration, there are two problems that we need to assess.

The first is that human hunting methods are not as effective as those of the deer’s former predators, such as wolves and mountain lions. A 2012 study by the European Commission evaluated the effectiveness of hunting as a control for deer populations and found that European deer populations were on the rise despite widespread culling.[[271]](#footnote-271) The Commission found that predators such as wolves and lynx were far more effective because they hunt year round and create a ‘landscape of fear’, which alters deer behaviour, habitat choice and distribution. There is a great deal of evidence which supports the idea that predators are key to maintaining healthy prey animal communities, and I shall discuss the possibility of introducing predators in much greater depth in the final section of this chapter. However, with regards to this specific case, the main argument put forward by the Commission was that many man-made forest systems actively encourage deer populations to flourish, just as we have seen in the American case. Their recommendation therefore, was to concentrate on growing large, unfragmented stretches of ‘mixed’ forest (i.e. with a variety of plants rather than economically desirable monocultures) as this would make the area less suitable for deer.

This brings us to the second problem with hunting as an option for controlling deer populations. There are several perfectly viable, non-lethal options for controlling deer populations and for helping the American songbirds. Habitat regeneration would certainly make an enormous difference in the long term. A slightly more controversial method is the administration of immunocontraception.[[272]](#footnote-272) The two vaccines used in the USA to control numbers of deer, elk and horses and are Porcine zona pellucida (pZP) and the Gonadotropin-releasing hormone, GonaCon™.[[273]](#footnote-273) These drugs have, thus far, proven to be very effective in reducing deer populations. For example, the deer population on Fripp Island, South Carolina, was reduced by 50% in just 6 years through the use of pZP.[[274]](#footnote-274) The contraceptives are of course non-lethal, have no evident adverse side-effects and wear off after a year or more, and so are not the equivalent of irreversible sterilisation. Like all drugs however, they come with some ethical problems attached. First of all, although they do not produce any life-threatening side effects, they can cause some problems, such as lesions on the injection sites.[[275]](#footnote-275) Secondly, during trial processes selected animals are routinely euthanised so researchers can assess the effects the drugs are having on the animals’ internal organs.[[276]](#footnote-276) Researchers could avoid killing trial animals and wait until they die of natural causes, such as old age, before carrying out necropsies but this would not eliminate the risks ingrained in all drug trials. As such, although they provide a (usually) non-lethal alternative to culling, the administration of immunocontraceptives has far greater risks and is more ethically problematic than simple habitat regeneration.

Habitat regeneration is always likely to be a much more ethical and practicable solution to population problems than the continuation of hunts and culls. As we shall see however, this is a solution which comes with its own set of problems. I will now move on to the final part of this section which examines habitat regeneration as part of a wider practice which is becoming very fashionable in conservation circles: rewilding.

## iii) Rewilding

Rewilding, the process of encouraging the growth of forests, wetlands or other non-anthropogenic environments, is often advocated as a form of population control.[[277]](#footnote-277) In Europe for example, formerly barren areas have been rewilded to encourage the growth of local species which have become underpopulated, such as the wolf, brown bear and ibex.[[278]](#footnote-278) Many advocates of rewilding argue that these same predatory animals should not only have their current territories expanded for their own sake, but should also be introduced to new areas in order to control overpopulated herbivores, such as the deer I discussed in the previous section. In this final part of the chapter then, I will look at the ethical problems which arise when rewilding practices deliberately use certain plants and animals to control the populations of others. I will argue that while many forms of rewilding are ethically sound some, such as the introduction of predators, do in fact have serious moral problems attached which are rarely considered.

During the course of this thesis I will, at several junctures, argue for the restoration of forests and other habitats. I do so both on practical and moral grounds: when habitat destruction is responsible for harming other living things, habitat restoration is often the most obvious solution to reversing said harms. Equally, because we have caused these harms I argue that we owe itto the affected individuals to restore that which we took away. To many, habitat restoration is synonymous with the concept of ‘rewilding’ as it involves the ‘giving back’ of land, trees, rivers and so forth to nonhumans to enable them to flourish. However, there are in fact several different types of rewilding, some of which are very different from the well-established practices of reforestation and restoration that I have advocated thus far.

The term ‘rewilding’ has only come into use in the last couple of decades but has been used to describe several different practices. In this section I will focus on two distinct definitions of the term ‘rewilding’: Pleistocene rewilding and predator reintroductions. While there are many other forms of rewilding, I have chosen to focus on these two kinds as they are specifically designed to control certain species populations, while other forms of rewilding as more concerned with returning land to a ‘natural’ state without targeting particular species. The first kind of rewilding I will discuss is Pleistocene rewilding; the rewilding of barren/abandoned land and the reintroduction of recently extirpated predators from a given area.[[279]](#footnote-279) I will argue that Pleistocene rewilding, which does not specifically target over or under-populated species but rather seeks to strike a kind of equilibrium between all populations, should not be pursued, because it is both impractical and unethical.

The second kind of rewilding I discuss is predator reintroduction. It could be argued that introducing wolves, lynx and other predators is in fact akin to hiring assassins to do the conservationist’s dirty work. I will argue that this would in fact be the case if we were to introduce predators into new areas with the sole intention of using them as ‘killing machines’. If, however, we were to expand the range of already existing predators in order to make up for harms that we have caused them, this would be ethically acceptable. As I have stressed throughout my work though, judgements as to the ethical permissibility of an action must be made in context and on a case-by-case basis. I do not assert that all predator introductions are good, or that all are wrong, but that circumstances will dictate what will be the right thing to do.

In 2006 C.J. Donlan and his colleagues published an article in *The Scientific American* in which they call for the reestablishment of America’s ‘lost’ megafauna, such as elephants and lions.[[280]](#footnote-280) The authors define their objective in the following way:

*“Pleistocene rewilding would deliberately promote large, long‐lived species over pest and weed assemblages, facilitate the persistence and ecological effectiveness of megafauna on a global scale, and broaden the underlying premise of conservation from managing extinction to encompass restoring ecological and evolutionary processes.”*[[281]](#footnote-281)

On one level their goals are similar to those of many other conservationists, they wish to create the conditions for wildlife to be able to flourish without constant human intervention. However, what makes their idea so radical is that in order to achieve this end they argue that we must replace extinct carnivores and large herbivores with similar species that still exist today, and that this should ultimately be done on a global scale. It is argued that by introducing carnivores to better control herbivore numbers and large herbivores to control plants numbers, it would be possible to restore a certain kind of pre-human ecological balance to the countryside. This would involve introducing elephants, camels and lions (among others) to places such as North America. They also argue, by way of further justification, that such a move would help protect the few megafauna remaining in Africa and Asia and prevent their seemingly imminent extinction.[[282]](#footnote-282)

There are some points upon which I would agree with Donlan and his colleagues’ article. They argue, for example, that we have an ethical duty to restore the habitats of plants and animals that are being harmed by human action. They are also right to stress the importance of carnivores and large herbivores in producing the trophic cascade in various ecosystems. However, though it is important to consider how our past actions have caused harm, Donlan *et al* play down the terrible harms which could be inflicted on the individuals that they propose to use in their own rewilding experiment.

Many critics of Donlan’s article have pointed out that there are two critical factors which would make the introduction of proxy species to America potentially dangerous. The first problem is that just because two species are related, this does not mean that they are genetically similar enough for translocations to work.[[283]](#footnote-283) The animals themselves could die because they are not adapted to their new surroundings, as happened when Bactrian camels were introduced to the American Midwest in the 19th Century.[[284]](#footnote-284) The second problem is that even if the translocated individuals do well, they could produce unexpected changes in disease ecology and in the structure of the existing ecosystems, thus harming numerous members of the biotic community.[[285]](#footnote-285)

The final problem with Pleistocene rewilding is that it is centred on a romanticised version of the past, before humans moved in and altered the biosphere.[[286]](#footnote-286) While many may envision such a space as idyllic the simple truth is that the biosphere changes, it always has done and it always will. We should acknowledge our role in these changes and seek to minimise current and future harms, but to try and return to a past state is to detach oneself from the way biology actually works.[[287]](#footnote-287) The soils, climate, flora and fauna may in some places still resemble the Pleistocene era, but they are not the same. This is a problem which also emerges in the next chapter, where I challenge the idea that we should kill invasive species in order to prevent certain kinds of environmental change. Trying to organise the world and the other living things within it to try and fit our imagined version of Eden is ultimately both futile and ethically undesirable because it puts the human, nonbasic interest in seeing a particular order in the world against the basic interests of the plants and animals that we need to share the world with.

Although it is relatively easy to see the ethical problems with Pleistocene rewilding, predator introductions, or reintroductions, present us with a more complex set of problems. Although I have consistently argued that, generally, the harms caused by predation in the wild by animals do not give us reason to interfere, the *introduction* of predators is more ethically problematic. This is because in deliberately introducing them with the intention that they will kill other animals, we are in effect hunting by proxy. The question is not whether the predators themselves are committing an immoral act, but whether we are committing an immoral act in ‘hiring’ these killers.

At this point it is important to draw a clear distinction between assisting predators because of past harms we have caused, and relocating them in order to serve our own conservation goals of reducing herbivores. It would be perfectly acceptable to assist predators through rewilding if, for example we have caused them past harms by hunting them or destroying their habitat. For instance, a combination of hunting, illegal trappings by gamekeepers and road accidents are known to have contributed to the decline of the Iberian lynx (*Lynx pardinus*).[[288]](#footnote-288) Habitat loss is also of course likely to have exacerbated these problems.[[289]](#footnote-289) For most of the late 20th century they have fluctuated between the IUCN categories of ‘endangered’ and ‘critically endangered’ and are severely underpopulated. According to my own theory then, particularly under principle (b), it is clear that we owe some individual Iberian lynx duties of assistance.

By contrast the Iberian lynx’s cousin, the Eurasian lynx (*Lynx lynx*), presents us with a more complex problem. Taken as a whole, the Eurasian lynx population is well sustained and falls under the IUCN’s category ‘of least concern’.[[290]](#footnote-290) There are however subpopulations, in the Balkans for example, which are in severe decline and the individuals within those communities are suffering from the same problems as those experienced by the Iberian lynx, such as persecution by humans and a loss of food sources and habitat.[[291]](#footnote-291) This example reminds us that despite the fact that an aggregate population may be healthy, we may still owe duties of assistance to individuals within that community under my theory, as it is the individuals that have inherent value, not the species.

However, the reason I have chosen to focus on lynx in particular at this stage is because there have recently been proposals to introduce the Eurasian lynx (but not its endangered cousin the Iberian) back to the UK, despite the fact that they have been absent for approximately 2000 years. It is argued by the charity The Lynx Trust that

*“Their presence will return a vital natural function to our ecology, helping control numbers of deer and a variety of agricultural pest species whilst protecting forestry from deer damage caused by overpopulation.”*[[292]](#footnote-292)

The goal of reintroducing lynx to the UK is thus clearly to use them as a means of population control. This is wrong under my principles of biospherical individualism, as I shall now demonstrate. The interests at stake are those of British prey animals in continued survival and our own human interests in controlling ‘overpopulated’ species such as deer. Although the lynx also clearly have interests, because they are individuals with inherent value, I would argue that their interests are not really being served or considered by this reintroduction program. I explain my reason for asserting this when I discuss principle (b) below. First however, let us look at principle (a) from my principles for resolving conflict:

*Principle a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness*

At present, given that both Eurasian lynx and deer populations across Europe are healthy (with the exception of those individuals I have already mentioned), it does not seem that we have caused significant harm to either of these animal communities. If we were to introduce lynx to the UK, we would inevitably cause harm to the deer and other prey species, thus immediately violating our negative duty. One could argue though that the overpopulated deer are causing such harms in the UK by overgrazing, and that to simply leave them be would be considered ‘too demanding’. If this case could be made convincingly, we would turn to the next principle.

*Principle b) positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.*

As I have already stated, none of the individuals whose interests are at stake here have been caused serious harms in the past by humans and so we do not have positive duties to assist either the Eurasian lynx or the deer/other prey communities. Those few individual Balkan lynx that are being threatened would benefit from conservation efforts in their own current habitats far more than they would benefit from reintroduction to the UK. This is because reintroductions are not as straightforward as one may assume. Translocating animals from one place to another will be extremely stressful, to the point where it may hinder their ability to survive.[[293]](#footnote-293) Furthermore, as I discussed earlier in this section, habitats change significantly over time and thus we do not know with sufficient certainty that the UK would be suitable for Eurasian lynx. Even in cases where we do have positive duties to individual lynx then, those interests are not best served by translocation to the UK.

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests.*

There are no relevant differences to consider in this particular case. Both the individual deer and lynx in question have specific, basic interests in continued life and access to sufficient sources of food, water and shelter.

*Principle d) When interests conflict we should prioritise basic over nonbasic interests*

As we saw in principle (a), the only basic interests at stake here are those of the deer and other prey animals living in the UK, who have basic interests in continued life. Our human interest in rewilding by introducing lynx is nonbasic as our own lives are not dependant on it and nor are those of any other plant or animal. Because of this, and because the interests of the lynx themselves are not best served by translocation, the ethical course of action is to refrain from reintroducing Eurasian lynx to the UK. Arguments could be made for ‘rewilding’ in the sense of replanting forest as this would reduce deer numbers in the long-term, as we saw in the previous section. The important point to note here however is that using predators as tools for killing herbivores is ethically problematic and should not be done in this instance as it would also risk the lives of the predators themselves.

Chapter conclusions

In this chapter I have examined three different forms of population control: trophy hunting to control underpopulated animals, hunting or culling to control overpopulated species and rewilding as a means of restoring ecological ‘balance’ between species. The aim of the chapter was to both put my own framework to the test and to show that it can come up with practical, ethical solutions to some of the most significant problems facing conservation policy today.

I began by looking at the practice of trophy hunting and highlighted the flaws in arguments which suggest that it is an ethical and effective method of conservation. I showed that there is very little evidence to support the idea that trophy hunting provides an ample source of revenue for conservation. Furthermore, there are no relevant differences between the ‘trophy’ animals and the other members of its species which would dictate that it is ethically acceptable to kill one in order to save the other. While we certainly have positive duties towards animals such as the black rhino, these duties are best served by our undertaking programs of habitat regeneration and anti-poaching initiatives.

I then explored the problems associated with the practice of hunting or culling ‘overpopulated’ species and used the cases of the lantana plant in Australia and the white-tailed deer in North America. In these instances, and in sharp contrast to the rhino case, it became clear that the lantana and deer were causing significant harms to other living things. However, this alone cannot justify killing them. I argued that their success is in fact deeply entwined with our own actions. By fragmenting what were once large, contiguous forests we have provided an ideal habitat both for lantana and white-tailed deer, while simultaneously making it much more difficult for many other living things to survive. Because of the harms we have caused, we have positive duties to assist these affected individuals. It may be the case that the removal of lantana, or the administration of immunocontraceptives to deer, could be useful for reducing populations in the short-term. However, the best long-term strategy is to restore large portions of the Australian and American forests which were previously destroyed by humans.

The final part of this chapter looked at the issue of rewilding, which seeks to boost numbers of numerous species by converting large areas of land into a certain kind of ‘wilderness’. There are two main problems with rewilding programs, the first is that although the aim to increase numbers of future plants and animals may be a noble one, we may end up overlooking the interests of currently existing individuals. The second problem specifically concerns policies which seek to introduce predators into a new area in order to ‘control’ other living things. By using the example of the Eurasian lynx, I showed that the use of ‘hired killers’ in contexts such as this is not morally acceptable.

Throughout this thesis I show that killing one individual (or a group of individuals) in order to save another is a practice fraught with ethical problems. However, by using my principles for resolving conflict I demonstrate that we can deal with conservation problems without undermining the inherent value of individual living things. As I stress throughout my work, the examples I use should not be used to make sweeping generalisations as to whether or not, for example, rewilding is always right or wrong. Rather, these examples demonstrate the ways in which the conflicts of interests we are faced with in conservation policy can be dealt with on a case-by-case basis by using the framework of biospherical individualism. In the next chapter, I use this method to tackle the question of whether or not it is ethically acceptable to kill ‘invasive’ species in order to save ‘natives’.

# Chapter 5. ‘Invasive’ species and hybridisation

In the previous chapter I examined the ethical problems with killing animals and plants in the name of population control. By using my principles for resolving conflict I was able to show how we may be able to show that non-lethal strategies, such as habitat regeneration, are both more ethical and practically effective conservation measures in the long-term. I also highlighted the importance of humans taking responsibility for the role that our actions may play in causing the conservation problems caused by overpopulation. The debates surrounding non-native species are often similar to those in the overpopulation argument, as non-native species are only usually targeted when they are perceived to be too numerous.

The subjects of killing in defence of another, human responsibility and the importance of habitat regeneration, are all themes that run throughout this thesis. However, each chapter looks at these themes in different contexts and the results of my analysis will differ slightly in accordance with each case. This is because the principles of my theory, biospherical individualism, are not dogmatic. The theory is designed to be a tool that we can use to think through answers to difficult questions within a non-anthropocentric moral framework. The theory should be used on a case by case basis and the results from one will not necessarily yield results which are applicable to all others.

In this chapter I will look at two instances involving the killing of so-called ‘non-native, invasive’ species. I will argue that the invasive species narrative should have no place in conservation policy as it is both unethical and serves no real practical purpose, other than to stir up prejudices against ‘foreign others’. Of course it is true that some species can cause damage to other living things or to the environment. It is also not unreasonable to argue that we should place some form of value on our local flora and fauna. The problem is that once we take a close look at the invasive species debate we soon realise that we cannot boil the conflict down to a simple case of ‘invader versus native’. It is also crucial to note that in reducing living beings to a homogenous group (in this case invasive ‘species’) conservation policies risk completely ignoring the interests of individuals, thus undermining their inherent value.

The overarching question that I will be dealing with in this chapter is as follows: both ‘native’ and ‘non-native’ animals and plants have inherent value, but when the two come into conflict, how should we resolve the situation? In order to address this question it is important that I begin by providing some context. Therefore, parts (i) and (ii) of this chapter will look at why the invasive species discussion has become so prominent in conservation practices today. Part (i) will look at the ethical problems with the language surrounding ‘native/non-native’ species and how poor linguistic choices can lead to unethical practices. In part (ii) I will argue that branding species ‘invasive’ is not only unethical but it also based on a complete misconception of evolution and of Earth’s history. The reason that the rhetoric of invasive species has become so popular is because it provides a simplistic account of what are in fact very complicated biological processes. As such, the invasive species discourse is too often used as a political tool to scapegoat other living things for problems that are in fact caused or exacerbated by humans.

To illustrate this, in part (iii) I carry out a case study of the UK policy concerning the ruddy duck (*Oxyura jamaicensis*). The ruddy duck stands accused of being the greatest threat to the survival of its endangered cousin, the white-headed duck (*Oxyura leucocephala*), because the two species can successfully mate with one another. This example will not only show why categorising species as ‘non-native’ is morally problematic as a general rule, but will also look at the issue of hybridisation. The issue of how to ‘manage’ the process of hybridisation is highly contentious and, as we shall see, is deeply troubling as it elevates the value of certain types of individual while devaluing others. By examining this case study beyond the narrow framework of native = good, non-native = bad, I will be better positioned to answer the question over what to do when the interests of native and non-native species clash.

Having considered the case of the ruddy duck, I will move on to a second case study in which I will discuss a species which really does pose a significant threat to other living things: the common cat (*Felis catus*) (I use the phrase ‘common’ to include both feral and house cats, but at the exclusion of ‘wild’ cats such as lynx, lions and so forth.) The case of the common cat will highlight an important discrepancy between the way we treat the non-native species that we take into our homes and the ‘wild’ ones that disrupt our, often skewed, vision of what the natural world should look like. There are around 2,000 animals and plants listed as ‘invasive’ in the UK alone, and there are therefore a great number of examples that I could have chosen. However, I chose the ruddy duck and cat cases as they present us with particularly complex problems. In the case of the ruddy duck, it is not being targeted because it kills other living things, but because of its breeding behaviour. The fact that this is portrayed as a legitimate reason for killing them thus leads us into some serious moral problems. The cat, by contrast, is an example of an animal which does kill other living things, yet we are unwilling to implement any policies which might prevent people from owning cats. These two cases therefore work together to highlight the illogical and morally suspect nature of the invasive species discourse.

In each of the case studies I will be using my principles for resolving conflict and I will show why the culling of the ruddy duck in Europe is a highly unethical policy, but why a scheme which places greater restrictions on cat numbers would be ethically justifiable. I do not advocate a cull of cats, but rather argue for greater restrictions on the extent to which we humans are permitted to breed and transport them. In looking at these case studies I will demonstrate why the killing of species on the grounds that they are non-native ‘invaders’ is morally wrong. Policy would be much more effective and ethically sound if we focused on the specific harms certain species (including humans) cause, rather than placing any great significance on where these species come from.

## i) ‘Invasive’ species: definitions and dilemmas

The categorisation of animals and plants as ‘native’ and ‘non-native’ or ‘invasive’ species only began in earnest in the nineteenth century, when amateur botanist H.C. Watson sought to devise a way to distinguish between long established and newly emerging plant species in Britain.[[294]](#footnote-294) He defined native species as those who were not introduced by human agency. To this day, the conservation community has largely stuck by this definition but, as we shall see, it is far too dubious to be the basis of sound conservation policy. Watson made the distinction between native and non-native species largely as part of an exercise in data collection and cataloguing, but he fully acknowledged that we could not always put species into these categories with absolute certainty, because our knowledge of their history is limited.[[295]](#footnote-295)

Today however, this system of classification is no longer only of interest to botanists and zoologists, it is part of public policy. Watson’s definition of native species is used today by organisations such as the Non-Native Species Secretariat (NNSS), which advises the UK government on how to deal with non-native species.[[296]](#footnote-296) The term ‘invasive’ however is only used to describe non-native species that cause damage, either to the environment, economies or to human health. It is also often used by the media in a way which portrays conflict between natives and non-natives as a story of good versus evil. This ignores the inherently pliable nature of the term ‘native’ and simply brushes over much of biogeographical history. This is hugely problematic from an ethical point of view as it grossly oversimplifies the ways in which species and the environment behave and interact. It also automatically places the inherent value of native species over that of non-natives which, as we shall see, is simply morally wrong. In refusing to acknowledge the innate weaknesses of the native species discourse we risk demonising and killing other living things with little or no sound justification.

In this section I will look at the problem arising from linguistic connotations. Words such as ‘invaders’, ‘foreigners’ and ‘aliens’ have a long and inglorious history of being attached to ideas of xenophobia and colonialism. Their place in modern conservation politics is therefore highly questionable. For the most part, issues in conservation biology and policy are either framed in cold, scientific and seemingly objective terms or else they are sympathetic in tone, after all the aim of conservation strategies is usually to protect living things. However, the branch of conservation studies known as ‘invasion biology’ takes a very different tone. The following extract comes from *The Ecology of Invasions by Animals and Plants,* by Charles S. Elton, who is often considered to be the ‘grandfather’ of invasion biology:

*“[...] I have described some of the successful invaders establishing themselves in a new land or sea, as a war correspondent might write a series of dispatches recounting the quiet infiltration of commando forces, the surprise attacks, the successive waves [...] of attack and counter attack (sic) and the eventual expansion and occupation of territory.”* [[297]](#footnote-297)

We may be tempted to forgive Elton for his preoccupation with militaristic metaphors, he had after all lived through both World Wars and was writing during the era of Vietnam and the Cold War. Unfortunately, this combative way of writing about non-native species has proven to be a significant part of Elton’s legacy. Both in journal articles and newspapers to this day, species are frequently described as ‘aggressive killers’, ‘enemies’ who ‘slaughter’, ‘wreak havoc’ and ‘run rampant’. By way of response we must ‘wage war’, ‘control’ and form ‘defence strategies’ against them.[[298]](#footnote-298) This personification and demonising of other living things is morally unacceptable because metaphors like these are not simply artistic embellishments, they are designed specifically to provoke emotions such as fear and revulsion.

As [Matthew Chew](http://www.sciencemag.org/search?author1=Matthew+K.+Chew&sortspec=date&submit=Submit) and Manfred Laubichler described in an article for the journal *Science*, metaphors can be used by scientists to make complicated biological process accessible to the general public. This is not in-and-of-itself a bad thing, but in doing this there is always a risk that the metaphor can be misunderstood or misappropriated.[[299]](#footnote-299) Nowhere is this more true than in the invasion biology discourse. Of course it is safe to say that some species cause some damage in some circumstances, and in cases where the arrival of new species may introduce fatal diseases such as malaria we must of course take some form of action. But to paint animals and plants as malicious conquerors is to completely miss several very important points.

The first is the issue of intention; no biologist would argue that organisms such as bacteria, insects, grasses or trees can literally be intent on destruction, because they do not have the mental capacity to form intentions. Yet the image of invading hordes suggests that other living things are not only capable of such things but that this is *actually* what they are doing. While one may be able to argue that primates and other large mammals may be capable of forming something akin to intentions, it is still a huge stretch to suggest that these intentions are malicious and directed towards us. When wolves kill sheep or beavers bring down trees it is ridiculous to suggest that their doing so is a deliberate act contrived to make our human lives more difficult, they are simply doing what they need to to survive; they are following their own interests in their own way. This may inconvenience us or cost us money is not a valid excuse for killing them.

The second issue is that holding ‘non-native’ species responsible for the damage they cause is hugely hypocritical when it is humans who have enabled them to establish themselves. Species, whether native or non-native, will only flourish where the environment is suitable. If species migrate because of climate change, for example, we really have no one to blame but ourselves.[[300]](#footnote-300) Furthermore, the non-native discourse tends to overlook the fact that most non-native species are either completely harmless or very useful in their new environment. For instance, wheat, rice, cattle, poultry and honeybees are all non-native to the USA, yet no one is calling for their eradication.

The final and perhaps most troubling issue with the language surrounding invasive species, is that adjectives such as ‘aggressive’ and ‘killer’ are frequently coupled with terms such as ‘foreign’, ‘exotic’ and of course ‘non-native’. The coupling of these terms is worrying because it reflects the xenophobic and even racist narratives that often accompany discussions of human immigration. In his article ‘The Aliens Have Landed!’, Banu Subramaniam points to several parallels which can be drawn between the way we describe foreign species and the way we describe foreign people.[[301]](#footnote-301) Non-native species and humans are depicted as ‘others’, somehow fundamentally different from ourselves. They are often painted as aggressive, sexually voracious and likely to be ‘here to stay’, if given half the chance. They are also depicted as a silent hoard, taking over ‘our’ lands and waterways, often by stealthy and subversive means.[[302]](#footnote-302) For example, a 2012 poster by the U.S. Fish and Wildlife Service came with the following opening statement:

*“This Halloween you might be expecting a parade of monsters, ghosts, vampires and werewolves to come knocking on your door [...] But even more frightening is the knowledge that every day alien invaders [...] are sneaking into our lakes, rivers, streams and even oceans and these critters aren't polite enough to knock!”*

While such blatant attempts at fear mongering are far less likely to appear in government documents regarding human immigrants, the media is still rife with headlines and stories which attempt to evoke the same basic emotions. Take for instance a story from 2015 in the UK’s Daily Telegraph which argued that illegal immigrants are a threat to the nation’s food supply, because they “sneak” into lorries containing fresh food, which then has to be discarded.[[303]](#footnote-303)

This leads us to another parallel that is drawn between invasive species and immigrant humans: they are invariably described as destructive in some way. Just as immigrants are accused of taking local people’s jobs, so invasive species are accused of out-competing native flora and fauna. At their very worst, arguments such as these take on an overtly xenophobic tone. This has led several scholars to draw comparisons between current ecological, nativist movements and Heinrich Himmler’s ‘rules of the design of the landscape’, which demanded the exclusive use of native German plants in gardening.[[304]](#footnote-304)

While the comparison of organisations such as Natural England to Nazi Germany may seem a little extreme, there is one very clear commonality between their ideologies. Both have a very skewed vision of what it means for a thing to be ‘native’, their systems of categorisation are arbitrary and show a complete disregard for biogeographical history. This will be the subject of the next section of this chapter. In closing this section, it is important to note that public perception of non-natives is often tainted by the language that this discourse is couched in. The terms ‘alien’, ‘invasive’ and ‘non-native’ evoke fear of ‘the other’. Many critics have argued that such language stirs up xenophobic sentiments and the creation of such negative emotions makes it harder to take a more objective ethical stance on how to manage conflicts between members of different species. Furthermore, the behaviour of these ‘invaders’ is often described using militaristic tones and metaphors. By personifying and painting these living things as thugs or barbarians intent on destruction, groups and policy makers intent on carrying out culls are better able to gather public support through this appeal to fear. Native species by contrast as usually described with adjectives such as ‘delicate’, ‘vulnerable’ or ‘defenceless’. We shall see in the next section why this is a false representation of reality.

## ii) The incoherence of the ‘non-native’ argument

‘Invasive’ species stand accused of a number of crimes, from costing the global economy trillions of dollars each year to being *the* greatest threat to biodiversity on remote islands.[[305]](#footnote-305) The validity of such claims will be considered and challenged in this section of the chapter. I do not dispute the notion that under certain circumstances, some species can cause significant harms. However, these harms are usually only a small part of a broader problem and the invasive species discourse is unhelpful as a part of conservation practice as it only serves to distract us from wider, and often much deeper, problems.

As I mentioned in the previous section, distinctions such as ‘native/non-native’ and ‘invasive’ are often used by both scientists and politicians as a simple means of explaining very complex processes. The most significant process, in this context, is species migration. By conflating the concept of nativeness with the arrival of humans the ‘biological invasion’ discourse projects a false image of biogeographical history. This results in several ethical and practical problems. The first problem is that it assumes that humans have dominion and centrality in the way that the Earth is organised; that we are the shapers of this world and that we alone should dictate which species go where. From the outset we can see that this goes against the first of my foundational principles: that humans are not special. But not only does this bring us back to the egocentric, anthropocentric problems that we discussed in Chapters One and Two, it also assumes that before humans came along that nature was in a state of disorder and that we have formed order from the chaos. Ken Thompson, in his book *Where do Camels Belong?* criticises this belief in what he calls ‘the frozen moment’.[[306]](#footnote-306) The frozen moment envisions humanity as a metaphorical glacier, as it sweeps across the globe the animals and plants behind it become frozen. Where they find themselves at this time is where they are ‘meant’ to be. This vision of the world forever compels other living things to reside in the time and space that we have allotted for them.

This is an extremely dangerous conception from an ethical point of view because, as Thom van Doornen argues, it provides people with a justification and “a sense moral comfort” about killing those who are deemed not to belong. It renders the lives of non-native species “illegitimate” and not only accepts the necessity of their death but in fact supports the idea that conservation practice *demands* it.[[307]](#footnote-307) When the value of individuals’ lives are diminished in this way, we do not only open the floodgates to a tide of unnecessary killings, but also to extreme cruelty. Van Doornen illustrates this with the example of foxes in Australia, who over decades have been subjected to programs of steel traps, strychnine and other painful poisons.[[308]](#footnote-308)

Not only does the frozen moment idea produce abhorrent, unethical policies, but the notion that there is a right place for living things is nonsensical, given both our knowledge of the Earth’s history and in light of what may happen in the future. Since Alfred Wegener published *The Origins of Continents and Oceans* in 1915, geologists have gathered ample proof that the Earth’s continents move over time. Continental drift explains why fossils, such as that of the long extinct fern *Glossopteris*, have been discovered across modern day South America, Antarctica, Africa, India and Australia.[[309]](#footnote-309) Species have been moving across oceans and continents for practically as long as life has existed, sometimes they move because of changes in climate and geography; some perform annual migrations to feed and breed; seeds, larvae and new-born sea creatures are often carried across oceans on the whims of the currents and the winds. Not only is this true of Earth’s past, it happens today and it is certain to continue; indeed, it may even accelerate if the effects of global warming become more manifest.[[310]](#footnote-310) The movement of living things over the Earth is nothing new and indeed nothing special in-and-of-itself. Of course humans have accelerated the rate at which species can move around and there may be an argument to say that we should do something to slow the rate of change down. This though is a very different argument from that which states that species should only ever remain within the confines of certain boundaries.

Because it is built on such questionable foundations it is very difficult, if not impossible, to form any coherent conservation policy around the notion of the ‘frozen moment’. What follows is a case in point: in the UK, any species which appear to have been in Britain when humans arrived at the end of the last ice age, roughly 8,000-12,000 years ago, is considered native. However, we simply cannot say with any certainty which other living beings were here at that time, our ancestors did not document them, fossil records are incomplete and to this day we do not have a full catalogue of all the living things inhabiting this island. Many species are either very rare or inconspicuous, the Attenborough’s hawkweed (*Hieracium attenboroughianum*) for example, was first discovered in 2004. It wasn’t until 2014 though that botanists were able to declare that the plant is both a newly discovered, distinct species and that it was also a ‘native’, having probably been around since the last ice-age.[[311]](#footnote-311) If we cannot say with any certainty which species arrived when, then the whole concept of nativeness already seems to be built on shaky ground.

But the problems do not end here. *Homo Sapiens* spread across the globe from Africa, gradually, beginning approximately 60,000 years ago and continuing until around 1,200 years ago when we reached remote places such as New Zealand and Iceland. So, if we wish to use the ‘frozen moment’ definition of nativeness, we have to accept that living things ‘froze’ and became natives at radically different points in time. A short thought experiment will show us why this is problematic. Imagine two species, A and B. Both species exist at the same point in time, about 60,000 years ago, but species A lives in Africa while species B lives in the Middle East. Humans are living in Africa but have not yet migrated to the Middle East. So species A is a native of Africa but species B is not considered native to anywhere. The global climate warms slightly, species B doesn’t fare well in the heat but is able to spread out and inhabit more northerly lands in Europe. Species B leaves the Middle East almost completely around 50,000 years ago, just as humans arrive there. If the climate were to cool again and species B retreated back to the Middle East, under the frozen moment argument, they could not be considered natives of the Middle East, even though they had been there long before humans.

At first glance perhaps this might not seem too troubling, after all the above example is based on events thousands of years ago. However, the very same type of argument is being used to construct conservation laws today. For example, the UK laws which deal with invasive species are largely covered by the Wildlife and Countryside Act of 1981 which states that a non-native species is one which “*is of a kind which is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state”*.[[312]](#footnote-312) Schedule 9 of the Act currently lists 54 animal and 32 plant species as non-native and invasive, as such it is illegal to release these species (or any hybrids) into the wild. Under proposed amendments to part 3 of the UK’s Infrastructure Bill, native species could be classed as non-native (and thus added to schedule 9) if they become extinct in the UK.[[313]](#footnote-313) The argument for this is that once a species becomes extinct it is “not ordinarily resident” and so can be classed as non-native. This would prevent species such as the European beaver (*Castor fiber*), which had been hunted to extinction in the UK by about the 16th century, from re-establishing.

The history of beavers in the UK can serve as a clear example of how easily the concept of nativeness can be manipulated, and it becomes easy to see why this definition of nativeness is incompatible with the principles of my theory. To begin with many species, such as the European beaver, became extinct due to human action through a combination of hunting and habitat loss. The principles for guiding action illustrate why the policy to prevent beavers from re-establishing is unethical. Principle (a) states that in general we have a negative duty to do no harm. We neglected our duty to do no harm by destroying their homes and by deliberately killing these animals. If, as the European beaver has, a species makes attempts to return to its old habitats, then according to principle (b) we have positive duties of assistance.

The form this assistance takes can of course differ. For example, wild European beavers had not been seen in the southern UK for around 500 years, largely due to hunting, until a family was recorded in Devon in 2014.[[314]](#footnote-314) Given that these animals have established themselves without human assistance and seem to be thriving, the duties that we have need not be very extensive or demanding. Simply leaving the beavers to continue in their normal behaviours and ensuring the river is kept free of pollutants should, at this point, be enough to ensure the beavers are able to lead lives which are decent for them.

In some instances, though we may be required to assist in a much more interventionist manner. As a contrast to the example of the European beaver in the UK, let us consider the case of the dipteran parasite (*Philornis downsi*)*,* which poses a significant threat to the mangrove finch (*Camarhynchus heliobates*). Only 80 wild mangrove finches are known to be left in the wild on the remote Galapagos Islands. The bird's numbers have been depleted both by human development and by the introduction of the parasite in the 1960s.[[315]](#footnote-315) The parasite larvae feed on the blood of new-born chicks, which either kills them quickly or else severely impedes on their development. Both the parasitic fly and the European beaver are considered to be non-native invasives, but a quick run through my principles will show us why they should be treated very differently. Principle (a) states that we should do no harm to other living things. As we have seen, we have caused significant harms to beavers in the past, while conversely we have enabled the parasite to flourish. Therefore, while we may owe certain positive duties towards the beaver, we have none towards the parasite. However, because we introduced the parasite and took other actions which threaten the lives of mangrove finches, we have generated positive duties of assistance to the finches. Research has shown that the bird’s chances of survival are greatly increased when eggs are incubated in laboratories and the chicks are let back into the wild at 3 months old.[[316]](#footnote-316) This works because the parasitic fly lays its eggs in the finch’s nest and the larvae feed off the fledglings, but in laboratories the chicks can be kept parasite free. As this method is, currently, the best method we have for protecting the affected mangrove finches, under principle (b) we have a duty to continue implementing it.

As we can see then, the fact that both the fly and the beaver are ‘non-native’ is irrelevant, it does nothing to help us decide which conservation strategy would be most effective or the most ethical. By focusing on the specific attributes of a species or individual and by thoroughly evaluating the impact they have through my principles for resolving conflict, my theory is able to come to conclusions which are both practically useful and ethically sound. Of course thus far I have only skimmed through a few examples, my task now will be to take a much more in-depth look at conflicts which arise between so-called ‘native’ and ‘non-native’ species. I now move on to my first case study, which will examine issues surrounding the ruddy duck.

## iii) Case study: the ruddy duck

By looking at conservation policies relating to the ruddy duck I will be able to look in greater depth at issues raised earlier in this chapter regarding the incoherence of policies which vilify non-native species. This case study will also bring up a new issue: some species are labelled ‘invasive’ because they are able to breed with ‘native’ species and produce hybrid offspring. Many scholars and policy-makers have argued that preventing hybridisation (in this case by culling the ruddy duck) is justifiable when one member of the mating pair is a much rarer species. I will be challenging the ethical assumptions behind this argument and contend that culling is both the least ethical and least useful course of action.

Prior to this discussion though, I will give a brief outline as to why the ruddy duck is considered invasive in the UK and other parts of Europe. The ruddy duck has long been established in North America but was introduced to the UK in 1948 as part of a private collection. Escaped birds have since bred in the wild and spread steadily across Europe.[[317]](#footnote-317) The ruddy duck is not harmful to ecosystems. The reason it has been categorised as invasive is because they are ‘the main risk to the survival of the white-headed duck’ (*Oxyura leucocephala*).[[318]](#footnote-318) They do not pose a risk because they physically harm the white-headed duck but because they interbreed and are capable of producing fertile offspring, as the two species are fairly close evolutionary relatives.[[319]](#footnote-319)



Female white-headed duck Female ruddy duck



Male white-headed duck Male ruddy duck

Because the white-headed duck is now an endangered species, (according to IUCN data there are somewhere between 7,900-13,100 individuals left in the wild, spread between Europe and South/Central Asia) it is feared that the ruddy duck will essentially hybridise the white-headed duck out of existence.[[320]](#footnote-320) As a result, the UK government has spent over £5 million on an eradication program, killing over 6,000 birds.[[321]](#footnote-321)

It could be argued that the UK and other EU governments are killing ‘in defence of another’ and that this is morally permissible (the killing in defence of another argument will be discussed at length in Chapter 6, when I discuss killing viruses). However, there are two problems with this attempt to justify killing the ruddy duck. The first issue is that hybridisation does not threaten any present, living individuals nor would future generations suffer in any way, so it is not clear who is being ‘defended’. The second problem is that preventing individuals from mating is designed to protect ‘genetic purity’. This is deeply morally troubling if we consider the implications such a policy would have if we applied it to humans. Later in this section, I will use my principles for guiding action to show that it is morally wrong to kill living things in order to simply prevent hybridisation and I will propose alternative methods for preventing the extinction of the white-headed duck.

Before doing this however, it is important to note the ways in which this case further demonstrates the futility of the invasive species narrative. Despite the fact that much has been made of the fact that the ruddy duck is non-native, the white-headed duck is not actually native to Northern Europe either. The white-headed duck is considered native only in South and Central Asia, North Africa and the European countries of Spain, Greece, Cyprus, Bulgaria and Romania. It has also been found in more northerly parts of Europe, where it is considered non-native, but it is not persecuted because it is endangered. The ruddy duck, in contrast is subject to eradication programs in the UK, Spain, Portugal and France.[[322]](#footnote-322) What seems to have happened is that because the white-headed duck is native to some EU countries it has become a defacto native in others. Indeed, since 1997 the white-headed duck has been subject to special protection measures across the EU under the Bern Convention.[[323]](#footnote-323) It is because of this policy that ruddy ducks have been culled in the UK, even though there are no established populations of white-headed ducks here.

At this point, if we ask ourselves whether or not the native/non-native distinction has made any useful contributions to the creation of this particular conservation policy in the UK, the answer is clearly negative. But even if we expand the same case to countries in which the white-headed duck is considered native, the native/non-native distinction still does nothing to help us gain an in-depth understanding of the problems that the white-headed duck faces. In Spain, for example, ruddy duck culls have frequently been linked to a stable white-headed duck population. However, ruddy ducks were not spotted in Spain until 1983, at which point the white-headed duck was already close to extinction, with only 22 birds documented in 1977.[[324]](#footnote-324) The white-headed duck numbers have been steadily increasing since then, but the policy most likely to be responsible for their recovery was a prohibition on hunting.[[325]](#footnote-325) The justifications for the culling of ruddy ducks thus look very weak.

Furthermore, the white-headed duck is also in decline across Asia, where the ruddy duck is not currently present. Habitat loss and hunting are the most common causes of decline in these areas.[[326]](#footnote-326) It is certain that the same is true in Europe, but the ruddy duck provides a convenient scapegoat, it is after all easier to create a single, common and silent enemy than it is to battle against powerful hunting lobbyists and industries. As Jonathan Balcombe writes:

*“It is a common theme of ours: we persecute the members of one species [...] to the point of rarity, then we turn our sights on another [...] for its marginal impact on the first species. We may sympathise with the efforts to secure the protection of endangered species, but doing so at the expense of other animals is misguided, and hypocritical when we continue to threaten the endangered species through our own activities.”*[[327]](#footnote-327)

Once again, we can see that the ‘nativeness’ of the birds has nothing to do with why species become endangered, why we should protect them or what we can do to help future generations. In viewing the ducks as primarily valuable at the species level, the invasion discourse also ignores the inherent value of individual living things.

There is no contention that white-headed ducks face significant threats and, in accordance with principle (b), because we are responsible for some of those threats we have positive duties to protect them. But we must also remember that we have duties to the ruddy duck. In order to work out exactly what our duties are to each species, I will go through each of my principles for guiding action and apply them to the white-headed duck and the ruddy duck in turn.

*Principle a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.*

With regards to the white-headed duck, it is clear that we have already violated this principle by hunting them to, or close to, extinction across the continents and by depleting their natural habitats. Ruddy ducks may not be endangered but they are still individuals with inherent value, capable of pursuing their own ends, and as such we still have a duty to do no harm. It could be argued that to leave the ruddy duck alone would be ‘too demanding’, as doing so would condemn the white-headed duck to extinction. But as we have already seen, in mating with the white-headed duck, the ruddy does not harm the individual white-headed ducks or the environment.

What is at stake here is the ‘genetic purity’ of the white-headed duck. If we were to ask if it were morally acceptable to kill other humans in order to protect the genetic purity of a particular race the answer would be a resounding no. Of course one may point out that all humans are of the same species while the ruddy and white-headed ducks have diverged and become distinct species. But it is important to note that this is an extremely complex area, just as we should avoid categorising non-natives as bad and natives as good, so we should avoid labelling all ‘pure’ species as good and all hybrids as bad. Even humans hybridised with other, related species in the past. Modern, non-African humans still carry Neanderthal genes and there is evidence which suggests that the *Homo sapiens* which stayed in Africa at this time may have mated with other, now extinct, groups.[[328]](#footnote-328) We should therefore examine the effects of hybridisation very carefully in each situation before we resort to persecution.

Hybridisation is viewed quite differently by botanists, who tend to see it as a normal part of evolution, while zoologists generally find the process to be more problematic. This is likely to be because hybridisation is known to have influenced the evolution of around 25% of plant species, but only 10% of animal species.[[329]](#footnote-329) Perhaps the main reason zoologists are concerned about genetic ‘purity’ is because preserving as many distinct species as possible is equated with preserving biodiversity. It is feared that if members of one non-endangered species can successfully breed members of an endangered species, this is likely to result in the homogenisation of that group, resulting in an overall reduction in global biodiversity. The mallard duck for example, a native of arctic regions, is often cited as a cause of decline in species endemic to Hawaii, Florida, New Zealand, Australia and parts of the USA because of hybridisation.[[330]](#footnote-330)

However, it can be argued that such fears are not justified for every case. The first reason for doubt is simply that our understanding of the genetic heritage of most species is limited. Given that we do not have complete genetic histories for most species, we run the risk of making morally reprehensible errors of judgement if we use this as the basis of policy making. For instance, the red wolf *(Canis rufus*) was thought to be at risk from extinction through crossbreeding with coyotes (*Canis latrans*) and so was placed under protection in the US. When it was discovered that the red wolf itself was most likely a hybrid of the grey wolf (*Canis lupus*) and coyote there were suggestions that the protection order should be lifted as the red wolf no longer represented a pure species.[[331]](#footnote-331) Fortunately the red wolf remains protected, but this example shows us that focusing on genetic purity distracts us from the principle of do no harm.

The second reason that we should call into question the validity of arguments against hybridisation, is that it can actually be good for evolution and for biodiversity. In the human case, it is probable that mating with Neanderthals allowed *Homo Sapiens* moving out of Africa to adapt to the new climate.[[332]](#footnote-332) This would not only have been beneficial to the species as a whole, it would also have made life better for our early ancestors as individuals. Hybridisation can also produce new, distinct and stable species.[[333]](#footnote-333) Ferrets for example are likely to be the result of hybridisation between the European and Steppe polecats.[[334]](#footnote-334) While hybridisation is relatively rare in mammals it is much more common in birds, particularly ducks and geese (Anseriformes). While it is estimated that roughly one in ten bird species are known to hybridise, the figure increase to approximately one in two for Anseriformes.[[335]](#footnote-335) The fact that the ruddy and white-headed ducks can hybridise should therefore come as no surprise, nor should it be considered a good reason to cull the ruddy duck and their hybrid offspring. Because the hybrid birds are fertile, there is a possibility that the hybrids could eventually form a distinct lineage. In the event that the white-headed ducks do become extinct in certain places, the hybrid could in effect compensate for the loss of biodiversity.

Finally, when evaluating claims that a certain policy will help biodiversity we must always ask ourselves what is actually being meant by the term ‘biodiversity’. While we may assume that ‘biodiversity’ refers to the value of *all* life, conservation policies regarding invasive species are often framed in such a way that excludes non-natives.[[336]](#footnote-336) The ruddy duck is a perfect example of this, as ‘biodiversity’ in this case does not refer to all life, but only to the lives of those species which are deemed to ‘belong’. This brings us back to the frozen moment argument which was discussed and rejected in part (ii) of this chapter. The idea that leaving the ruddy ducks alone would be too demanding for the concerned conservationist is therefore a very weak argument. The primary threats to white-headed-ducks are habitat loss and hunting, not hybridisation. Our duty to do no harm to the ruddy ducks still stands. What does in fact happen is that because of the harms we have caused, positive duties towards the white-headed duck are generated.

*Principle b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our past actions have caused existing individuals serious harms, or if they are particularly vulnerable to harms in the near future because of actions we have taken.*

Even if we accept that hybridisation may spell the end of the ‘pure’ white-headed duck in Spain, there are other significant factors which contributed to the white-headed ducks’ initial decline and which may continue to affect it in other parts of the world. I have already mentioned that habitat loss and hunting are the two main drivers of population collapse. In addition to this, lead poisoning has long been recognised as a cause of decline in many kinds of waterbird.

Lead poisoning occurs when birds swallow discarded bullet fragments as they forage for food and grit. A 2006 study of white-headed ducks found dead in Eastern Spain, discovered that 71% of the birds had ingested lead shot from hunter’s guns.[[337]](#footnote-337) The effects of lead shot ingestion can be exacerbated by lead from polluted water supplies and petrol spills.[[338]](#footnote-338) This not only affects the birds that directly ingest the lead but can be passed down from hens to chicks and become deposited in their bones. This problem is likely to be the leading cause of decline in other waterbird species. An earlier study found ingested lead shot in 38% of ruddy ducks (which, ironically, had been shot to death) and a single ferruginous duck (*Aythya nyroca*), a species near extinction in Spain, was found with 30 ingested lead bullets in its digestive system.[[339]](#footnote-339)

It is quite clear at this point that our contribution to the diminution of the white-headed duck vastly outweighs any threat posed by hybridisation. Because we have endangered the white-headed duck to such a degree, we have a positive duty to make good on our past wrongs. This can be done through habitat restoration and, as many countries have now done, by implementing and enforcing hunting bans. By restoring habitat across the duck’s range, isolated groups would once again be able to interbreed, significantly diminishing any chances of extinction through hybridity. We do not have any positive duties towards ruddy ducks, after all they were flourishing until we began the eradication programs, however we do still have the negative duty to do no harm. Having established the kinds of duties we have towards each type of bird, we must now work out how to protect their interests and resolve any which may conflict.

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests*.

One may argue that because the white-headed duck is endangered, this is a relevant difference which requires us to treat them differently. In some sense this is true, as I have already noted, we owe it to white-headed ducks to help in the reconstruction of their habitat and to protect them from hunters. We may treat the two species of duck differently in terms of the legal protections we afford them and in terms of the active, positive duties we have. However, there is no relevant difference which distinguishes them as less morally important, or which dictates that it is less wrong to kill a ruddy duck than it is to kill a white-headed duck. The ruddy and white-headed ducks have equal basic interests in continued life. Rarity does not confer higher inherent value; there is a much greater number of people in India than there is in Luxembourg, this does not mean that it is less wrong to kill an Indian than it is a Luxembourgian. A species’ rarity may confer other kinds of value, such as economic and perhaps aesthetic value but it does not change their inherent value.

The ruddy and white-headed ducks have practically identical specific interests, the most important one in this case being in engaging in sexual activity. In hybridising, these species are no different to many other species. The parent and hybrid birds flock together, forage together and are susceptible to many of the same external pressures, such as lead poisoning.[[340]](#footnote-340) In mating with one another they are simply carrying out their own interests in their own way. It is easy to forget that in producing hybrids the ruddy ducks are also reducing the ‘purity’ of their own genetic lineage. Studies have shown that the Spanish population of white-headed ducks has undergone a reduction in its genetic diversity because of its isolation.[[341]](#footnote-341) This puts them at even greater risk from extinction, as inbreeding can result in harmful genetic mutations and reduced overall fitness. In mating with the ruddys the white-headed ducks are increasing their genetic diversity, countering the deleterious effects of inbreeding.[[342]](#footnote-342) This strongly suggests that if we are to treat each species in accordance with their specific interests, then the correct course of action is to let hybridisation occur.

At this juncture it is evident that there is no clash of interests between the ruddy and white-headed duck and as such there is no need for us to use the final two principles for guiding action. In conclusion, it is quite clear that the ruddy ducks do not harm the white-headed ducks in hybridising with them, it is even possible that it may increase the genetic strength of future generations, even if the lineage is not ‘pure’. There are two possible reasons as to why the threat posed by the ruddy duck has been so greatly exaggerated: the first is to provide a scapegoat and avoid taking on the huge responsibilities that governments would have to take up in order to counter the threats of habitat loss and hunting. The second possibility is more benign, in seeing the ruddy duck as a threat many conservationists may see a problem that is fixable as opposed to the mammoth task of large scale habitat restoration and changes to environmental policy. Whatever the reason may be, in carrying out the culls on the ruddy duck we have implemented an immoral policy.

Of course not all instances involving so-called ‘invasive’ species will have the same results as this case. Here I have examined a case in which the perceived threat posed by the species has been overstated. There will however be cases in which the assumption that a species is damaging to others is correct, and perhaps even understated. I will now move on to such a case and analyse how we should balance the competing interests of species when there really is a serious clash.

## iv) Case study: the common cat

The modern, common cat (*Felis catus*) is rarely depicted as a foreign invader, their long history of domestication has ensured that in most cases we think of common cats (hereafter simply ‘cats’) as lovable companion animals. Yet if we consider their history and the impact that they have on other living things we soon see a contradiction emerge between the way we treat cats and the way we treat other non-native species. While we stigmatise species such as Japanese knotweed or Asian carp, we simultaneously pour adulation over our feline friends.

In this section I will put forward two arguments: the first is that in choosing to overlook the harms that cats cause through predation, we are ignoring the moral duties we have towards other living things. In some instances, the non-lethal removal of cats from a certain area can be an ethically sound conservation strategy. As an example, I will examine the case of the cat eradication program that took place on Ascension Island between February 2002 and January 2006. The cats were eliminated because they were preying on local birds to the point where they were declining in significant numbers. I will argue that the plan to remove cats from the island was justified, but that culling them with poison was wrong. I will use my principles for resolving conflict to show both why the removal of cats was acceptable and how it should have been carried out.

The second point I will be discussing surrounds the issue of predation more generally. After all, if there can be instances in which we should stop cats from hunting, it would seem to follow that we have duties to prevent other animals and carnivorous plants from killing too. However, I will argue that we do not have a duty to end all predation, and that in fact to try and do so would go against the principles of my theory. Before delving into the case study however, it is important to highlight the fact that, once again, the invasion biology discourse is unhelpful as an analytical tool as it neither helps us to see when cats are a problem, nor does it provide any clear solutions.

Cats are only technically ‘native’ to the Middle East and Egypt.[[343]](#footnote-343) After their introduction to other countries and continents, cats occasionally hybridised with native species, which is why some wild cats look remarkably similar to domestic breeds. Some cats are therefore ‘half native’ which immediately calls into question the usefulness of the native/non-native distinction. It would make sense to assume that hybrid species are native: if, for example, cat A (only native to the UK) mates with cat B (Middle Eastern) and produces cat C (the hybrid) cats of type C may not exist anywhere else in the world apart from the UK. Because of its non-native parent, cat C would officially be considered non-native but this leads us to the question of where exactly it would be a native, its genetic mix would make it no more a native to the Middle East that to the UK. We can see then that the non-native discourse leaves countless plants and animals in a kind of no-man’s land, seemingly belonging neither here nor there.

Turning specifically to the conservation issues involving cats: cats can cause a great deal of harm to other living things. In the USA alone, free-ranging cats are estimated to kill between 1.3–4.0 billion birds and 6.3–22.3 billion mammals annually.[[344]](#footnote-344) Despite these huge figures, the greatest impact cats have in terms of the harms they cause to individuals and communities are on small islands, not large landmasses.[[345]](#footnote-345) From a conservationist’s perspective, cats present a significant threat to the birds, small mammals and reptiles that are endemic to islands, usually because they have evolved in ecosystems that do not contain apex predators. As a result, when cats, rats and other predators are introduced the local fauna have no coping mechanisms and populations can decline rapidly. The most recent global review of the impact cats have on island wildlife suggests that 175 vertebrate species are negatively affected. It also argues that cat predation has contributed to the extinction of a further 33 species.[[346]](#footnote-346) In instances such as this, where cat predation is clearly an issue that needs addressing as part of conservation policy, some form of intervention may be ethically required.

To see why this is the case and how it should be done, I will turn to the case study of cats on Ascension Island. Before analysing this case study through the lens of my principles I will provide a brief background because, as I have previously emphasised, every case must be examined in context. The island is approximately 97km² and lies in the tropical South Atlantic, because it is volcanic it stood largely dry and desolate up until 1815 when a small British naval garrison was stationed there. Because of its barrenness British naval officers gradually imported fruit trees, crops and timber in order to set up a small, permanent colony.[[347]](#footnote-347) Today, some 90% of Ascension’s plants and animals are non-native, even its national flower is South American in origin.[[348]](#footnote-348) The colonists also introduced cats, although it is unclear whether this was accidental or designed specifically to control rodents. The majority of the island’s native species are seabirds who nest along the shores during their breeding seasons. These avian communities have suffered significantly due to predation from cats, with many species abandoning the island completely, while those who stayed declined significantly in numbers.[[349]](#footnote-349) Fearing that endemic birds such as the Ascension frigate bird (*Fregata aquila)* could be driven to extinction from cat predation, as had happened to the Guadalupe storm petrel (*Hydrobates macrodactylus)* in the early 1900s, the RSPB decided to implement a cat eradication program.[[350]](#footnote-350) The program eradicated feral cats using a combination of live trappings and sodium monofluoroacetate (otherwise known as “1080”) in poison baits. Domesticated cats were legally required to be registered, microchipped and neutered. As cat numbers have declined nesting bird numbers have slowly but steadily increased and birds which had abandoned Ascension have begun to return.[[351]](#footnote-351)

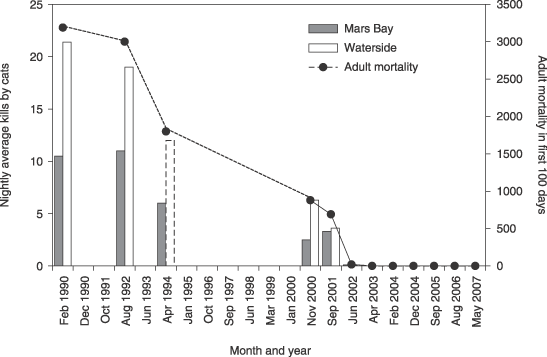
In terms of achieving its aim to protect the affected birds, the program appears to have been a success and indeed I will argue that we do have a duty to protect them. However, the killing of the cats was neither necessary nor justifiable. I will now show why this is the case using my principles for resolving conflict:

*Principle a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.*

Cats are individuals with inherent value and we thus have a negative duty to do them no harm. However, the birds of Ascension Island also have inherent value and by introducing cats we have harmed them. This presents us with a conundrum; in encouraging one species to flourish, we have harmed others and created a clash of interests. The principle of do no harm cannot, by itself, tell us what we should do to resolve this clash, so we move on to principle (b).

*Principle b) positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when we have caused existing individual living things serious harms in the past, or if they are particularly vulnerable because of actions we have taken.*

In previous examples, I have argued that positive duties have arisen because our actions have caused such extensive harms that we owe the affected individuals some form of compensation. In this case, the introduction of cats caused several significant harms to other living things: to avoid predation, all but one species of seabird (the exception being the sooty tern *Onychoprion fuscata*) were forced to cease nesting on the main island and became confined to sheer cliffs, sea stacks and a 1km² strip of rock called Boatswain Bird Island, 250 km away.[[352]](#footnote-352) Not only did this prevent many pairs from breeding, but isolating these birds to such an extraordinary degree left parent birds, their eggs and hatchlings extremely vulnerable. On Ascension itself, cats preyed heavily on adult sooty terns, as the graph below demonstrates, and subsequently chick mortality also increased.



*Mortality of adult breeding sooty terns attributed to cat predation on Ascension Island, 1990 -2007*[[353]](#footnote-353)

We can see then that in introducing cats we both caused serious harms to the individuals residing on the island when cats arrived and endangered the lives of those birds who either sought shelter elsewhere, or who stayed on Ascension. We therefore had a positive duty to reverse, or at least significantly reduce, the harm we had caused. However, I believe that this did not necessitate the culling of feral cats. The remaining principles will show why this is the case and outline the measures that should have been taken instead.

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests.*

There is no relevant difference between cats and birds in this context, all have specific interests in eating, breeding and engaging in other behaviours which are normal for their kind. Nor was there a relevant difference between feral and domesticated cats in this context. This is because domesticated cats can kill other animals just as feral cats do. Their interest in hunting (a normal cat behaviour) is not usually altered by their domestication. House cats, which do not venture outdoors, would of course be an exception but as our discussion here is on free-ranging cats the important point to note is that cats and other living things should all be allowed to pursue their individual interests. This leads us to the question of how to balance these competing interests:

*Principle d) When interests conflict we should prioritise basic over nonbasic interests.*

It is very clear that the seabirds’ interest in continued life is a basic interest and that death by predation is a violation of this interest. We must now question whether or not the cat’s interest in killing is a basic one. One may wish to argue that without human owners, feral cats do indeed have a basic interest in killing seabirds as they have to kill to survive. But while it may be true that they need food to survive it is not the case that this can only be obtained by letting them hunt. Cats do require the amino-acid taurine in their diet and this is most readily found in meat. However, it can also be produced synthetically and so it would be feasible to provide cats with an adequate diet without resorting to killing other animals. The act of hunting is of course a normal cat behaviour, and as such one may wish to argue that it constitutes a basic interest. However, I would argue that just as the nutritional needs of these particular cats could be met with alternative food sources, so too could we provide cat with other opportunities to engage in hunting-like behaviour. For example, numerous toys and games have been devised to help cat owners who wish to let their cats engage in hunting behaviour without putting the lives of birds or small mammals at risk.[[354]](#footnote-354) The cat’s interest in hunting and killing in cases like this is therefore nonbasic.

In order to prioritise the bird’s interest in survival over the cat’s nonbasic interest in killing, we would of course have to capture the cats and provide them with shelter. This could be done either by homing them with people or placing them in shelters with other cats if they do not respond well to living solely with humans. In 2001 there were an estimated 600-800 feral cats on Ascension, although capturing such a number would be time consuming it would certainly have been possible.[[355]](#footnote-355) Although non-lethal traps would be likely to cause the cats some stress, their nonbasic interest in being free from short-term stress is overridden by the birds’ basic interest in continued life. With regards to the domestic cats which were allowed to remain on the island, there was an additional measure which could have been used to reduce their predation levels. All collars could have been fitted with bells. This would have been cheap, easy and completely harmless to the cats. This simple step has been shown to reduce the number of kills a cat can make by almost half.[[356]](#footnote-356)

It would also be ethical to neuter any remaining cats to ultimately have them fully removed from the island, as the RSPB did on Ascension. This is acceptable as neutering, if done by a professional veterinary surgeon, is painless and causes no real harm to the individual cat.[[357]](#footnote-357) Although some cats have been shown to gain weight after neutering, this is easily controlled through appropriate feeding and ensuring the cats are able to exercise.[[358]](#footnote-358)

This case study provides a clear example of an instance in which a so-called ‘invasive’ group of individuals posed a threat to the survival of other living things. Because of our role in introducing cats to Ascension Island, we had a clear duty to intervene and to place the basic interests of the seabirds ahead of the nonbasic interest of the cats in killing. However, by killing the cats we violated their basic interest in continued life, even though non-lethal options were available. The culling of the island’s cats was thus morally wrong. We must also take care to not fall into the trap of the invasion biology discourse and start scapegoating cats as the sole cause of bird or small mammal declines. As we saw in the case of the ruddy duck, the primary threats to declining species are things such as habitat loss environmental degradation caused by human activity. The Ascension Island seabirds also faced threats from rats preying on their eggs, goats destroying their nesting sites by grazing, and adult birds are still frequently caught and accidentally killed in vast fishermen’s trawler nets.[[359]](#footnote-359) It is important then that we see issues such as predation as *part* of the problem, rather than *the* problem.

Of course this discussion reveals a wider problem: as I have already mentioned, cats also kill billions of birds and small mammals around the world each year. If we have a duty to protect the birds of Ascension Island against cats, do we also have a duty to stop all cats from hunting? After all, most common cats have all been introduced to their local environments by humans and as such we have caused harm to many individual animals. According to principle (b) then, positive duties towards these animals have been generated. Just as it was ethical to neuter the cats on Ascension Island with the aim of eventually ‘phasing out’ cats altogether, in some instances it could be ethical to do the same in other places. For example, in 2013, a campaign began in New Zealand to have cats completely eradicated from the country in order to protect local wildlife.[[360]](#footnote-360) Although, at this point in time, nothing has come of this idea there could be strong arguments to support such a plan. Cats were introduced to New Zealand between the late 19th and early 20th century and have had a significant impact on birds and lizards in particular, as they have no natural defences against cats, much like the birds on Ascension Island.[[361]](#footnote-361) If studies were conducted which proved that cat predation is a leading cause of local wildlife deaths, and other factors such as habitat are taken into consideration, then it may well be the case that cats should be steadily reduced until New Zealand is cat-free. Culling however is not an ethical means for doing this, as I have discussed, but a program of neutering could be permissible and indeed necessary in order to make right on the harms we caused by introducing cats.

This is not to say however that we should force cats into extinction all over the world. Although it seems likely, under my theory, that there are numerous instances in which our positive duties to other animals mean that we have a duty to reduce, and perhaps ultimately seek to eliminate, cats from an area, this will not always be the case. In order to assess whether such action would be necessary, conservationists or governmental organisations would have to carry out studies to answer questions pertaining to: the history of cats in the area; the type and degree of harms they are causing; whether or not confinement to a home would be an ethical solution and what additional factors may be contributing to wildlife deaths. In many cases, I believe that we may not have to remove cats from an area completely. However, we must ensure domestic cats have access to adequate nutrition and that we engage and ‘play’ with them in ways which satisfy they their hunting instincts. This may also can reduce the amount of time they spend hunting live prey. Additional measures such as fitting them with collars with bells or bright colours can greatly reduce the number of animals killed by cats as they alert the prey to that cat’s presence long before they strike.[[362]](#footnote-362)

Of course this would not prevent all the harms or deaths caused by cats, but in some instances we must also consider the possibility that if we eliminated cats we would cause harm other living things. Cats, like other predators, can play an important role in certain ecosystems by controlling rats and other rodents. It is possible, for example, that rats are responsible for the decline of petrels in New Zealand and that their plight would become even worse if we immediately removed all cats.[[363]](#footnote-363) To remove all cats from the world could therefore have very bad consequences for other living things. While empirical research on this particular issue is limited, given what we know about food webs and species interdependence, it is unlikely that eradicating cats would have only good consequences. We should therefore not rush to judgement but look at each case in isolation and consider the ethical course of action in context.

One may still ask the question: if we were able to genetically engineering cats or other predators to become herbivores, should we aspire to?[[364]](#footnote-364) Although it would certainly be controversial, it is still worth considering such ideas, because if we could answer it in the affirmative it would mean we could consider creating a peaceful world in which individual animals would never be subjected to predation from cats. The inherent value of their lives could no longer be threatened. I will put aside the technical difficulties in this, because it is not a question of what we can do, but what we ought to do.[[365]](#footnote-365) I still believe however that there are serious ethical problems with this Eden-esque vision of a future without cats or other similar predators.

Let us think back to the foundational principles of my theory:

|  |
| --- |
| 1) Humans are not special: humans have inherent value, but so too do other living things. Because of this, we have certain moral obligations towards certain nonhumans.  2) The moral value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way. |

The idea that we may be able to genetically engineer all living predators to become herbivores, although perhaps far-fetched, is not obviously problematic. In choosing not to eradicate them, just to change them, we would not have to deny them their equal inherent value. We try to change our own bodies all the time, through activities, our diets, medications and so forth. This is not because we think that doing so somehow increases our inherent worth but because it makes our lives, and sometimes the lives of others, more enjoyable. However, genetic engineering does still undermine the fact that other living things are individuals with the ability to pursue their own good in their own way. Genetic engineering dictates that things pursue humans’ conception of the good rather than their own. This line of thought simply takes us back to the anthropocentric view of humans being the ‘stewards’ of the earth. The foundational principles of biospherical individualism thus show us that the notion of ending all predation is not in fact an ethically sound idea.

Forcing the extinction of other living things from the entire planet conflicts with my foundational principles. All living things have equal inherent value, but the idea that some groups of individuals should be completely eliminated suggests that they somehow have less inherent value. This is because although the forced extinction idea may not necessitate physically harming the individual predators that are currently alive, it still undermines their inherent value because it implies that they *should not* exist, that they are intrinsically ‘bad’ which is simply not the case as common cats, like their larger cousins, can play an important part in the trophic cascade. Furthermore, the concept of forced extinction ignores the fact that predators are individuals pursuing their own goods in their own way. We should not exterminate other kinds of being simply because they are predators.

In summary, although we do have positive duties towards the animals that are threatened by our introduction of cats, in some cases these threats can be dealt with through non-lethal methods such the use of collars and by providing cats with food and games which satisfy their natural inclination to hunt. In other cases, such as on Ascension Island, we may need to physically remove cats from certain locations in order to protect their victims. Indeed, it may be the case that we should seek to reduce and remove cats from many places in the world. However, it would not be ethical to cull the cats in order to achieve this, rather neutering and, in some instances, confinement are ethical solutions.

***Chapter conclusions***:

In this chapter I have examined two case studies of living things which would fall into the category of ‘invasive species’. In scrutinising these cases it has become clear that the invasive species narrative should not have a place in conservation policy as it is vague, impractical and most importantly, highly unethical. Though both cases looked at non-native ‘invasives’, there is glaring discrepancy in the way we treat them. Despite the fact that the ruddy duck is not aggressive and does no harm to the wider ecosystem, UK and EU governments have condemned thousands of them to death. Cats meanwhile are generally left to their own devices, though their behaviour causes far more destruction than that of the ruddy duck.

On a practical level I have shown that categories such as ‘non-native’, ‘exotic’ or ‘invasive’ do absolutely nothing in helping us to evaluate the degree of harm certain organisms can cause. Where a living thing comes from has absolutely no bearing on the impact it will have on other living things and the wider environment. It is of course true that sometimes newly arriving species and individuals will have negative effects on their new homes, but these harmful impacts are actually extremely rare compared to the number of positive effects that new species can have.

Where species are causing serious harms, we may well be obliged to intervene, but the reasons as to how and why we must act should be carefully examined on a case-by-case basis and not be influenced by our prejudices against ‘foreign’ beings.

I believe the invasive species discourse should be abandoned as part of conservation policy because it unjustly scapegoats certain species while simultaneously distracting us from much greater harms caused by human activity. If we refuse to address the damage that we, the most invasive species on Earth, cause then conservation policies will only ever be as effective as a plaster on a broken bone. In this chapter I have shown how my principles for resolving conflict are able to help us find ethically robust answers to the difficult question of what to do with harmful species. Biospherical individualism can assess different types of perceived threats and deal with them while still respecting the inherent value of each of living things involved. In the next chapter I shall once again look at an issue in wildlife conservation policy which entails the killing of one individual (or a group of them) in order to save another. This time the issue will concern killing viruses and testing vaccines on nonhuman animals.

# Chapter 6. Vaccinations, Animal Testing and Conservation

Throughout this thesis I have looked at conservation policies which involve killing certain individuals in order to save others. In the previous chapter I looked at instances in which so-called ‘non-native’ species have been killed in the name of conservation. I argued that whether or not an individual is native has no bearing on their inherent value and therefore we should always scrutinise the way it is utilised in conservation policy. In this chapter I will be looking at an unusual case study which involves African great apes and the Ebola virus. In this case, there is an ongoing debate as to whether or not we should be testing and administering an Ebola vaccine to protect great apes in Africa. This case is relevant to my thesis as it exemplifies the difficult moral questions which conservationists often face when trying to assess the ethical permissibility of killing. In this particular instance, there are two key questions to consider: the first is whether or not it is ethically acceptable to kill viruses if they are living things. The second question concerns how vaccines should be tested: is it ethical to risk the lives of the test subjects in order to potentially save other apes?

Part (i) of this chapter will look at the potential ethical problems involved in killing viruses. One of the central tenets of biospherical individualism is the notion that all life has inherent value. An obvious objection to vaccination or other treatments then is that they are destroying living things, viruses and bacteria, and thus violating one of my theory’s key ethical principles. I will discuss two ways of countering this objection: the first argument states that viruses are not actually alive, so killing them does no harm. While it may be tempting to concur with this idea, I find it to be based on weak evidence. Furthermore, even if we accept that viruses are not alive, we still have to answer the question of whether or not we can kill bacteria, which are unquestionably living things. I will thus be arguing in favour of a different justification for killing viruses, I argue that although viruses do have inherent value, it is permissible to kill them on the grounds of self-defence.

Having established the ethical permissibility of killing microbial life, I move on to the great ape study in part (ii). In part (ii) itself I simply describe the case study and show why the Ebola virus is a significant threat to the lives of apes. I also outline my argument that, although a vaccination program would be desirable if a safe vaccine were available, testing new vaccines on captive apes is not ethically permissible. This is because it creates an unjustifiable clash of basic interests. In part (iii) I then detail why we have a positive duty to protect great apes against Ebola and then follow this with a discussion of how this can be done ethically. In order to lay the groundwork for this case study, I will begin with a discussion on the ethics of killing viruses.

## i) Killing viruses

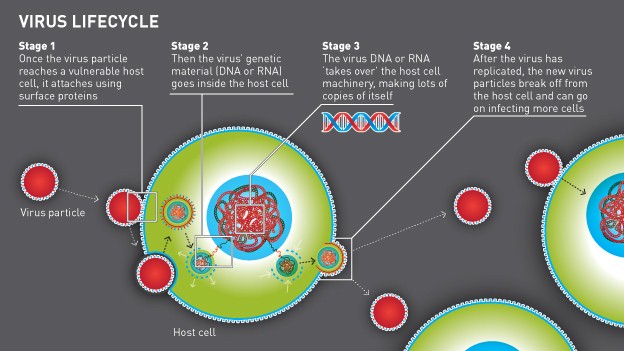
In this section I address the following problem: if all living things have inherent value (including microbial life) then is it morally permissible to kill viruses and bacteria? There are two ways to answer this question in the affirmative: the first is to argue that viruses are not in fact alive. The second is to use the justification of self-defence and argue that the killing of another living organism is permissible if that organism threatens your own life (or perhaps that of another). With regards to the idea that viruses are not alive, this issue forces us to confront a question which, up to this point has not been addressed but which is of critical importance. The question here is: where do we draw the line between living and non-living things? Thus far I have emphasised the importance of attributing value to all living things without addressing this question, because to say that humans, plants and animals are living things is not in any way a contentious statement. However, when we are discussing viruses our intuitive notions about what is and what is not alive are put to the test.

***Viruses as non-living entities***

The problem here, both for scientists and philosophers, is over where we should draw the line between what *is* alive and what only appears to be. Professor of microbiology, Patrick Forterre, provides us with rather a succinct definition of what makes a life:

*“life is the mode of existence of living organisms [and a living organism is] a collection of integrated organs (molecular machines/structures) producing individuals evolving through natural selection.”*[[366]](#footnote-366)

Although this definition seems to fit neatly within evolutionary theory, not all evolutionary theorists agree with Forterre’s conclusion that viruses fit into this definition. For Forterre, viruses are living organisms because they are composed of two ‘organs’; a replicon (which allows its genes to be multiplied) and a capsid (the structure which allows it to enter and exit cells and protects its genetic material). These enable the virus to enter a host cell, take it over and replicate itself or mutate using the cell’s genetic material. This process is illustrated in the diagram below.[[367]](#footnote-367) Because viruses can perform these actions on their own and because, like other living things, they evolve over time the evidence seems to strongly suggest that viruses are living things, pursuing their own good in their own ways.[[368]](#footnote-368)



However other scientists, such as David Moreira and Purificación López-García, argue that viruses do not fall under the definition of a living organism because viruses cannot replicate or evolve without these host cells.[[369]](#footnote-369) In other words they are evolved *by* cells, just as computer viruses are ‘evolved’ by humans and as such natural viruses are no more ‘alive’ than computer viruses are.[[370]](#footnote-370) This comparison misses an important point though, in that computers and computer viruses are both created by humans, neither could have been created without us. Viruses and cells however exist completely independently and natural viruses, unlike their digital counterparts, can pursue their interests in attaching to cells without human assistance. This independence sets them clearly apart from computer viruses and so the idea that they are not alive seems tenuous.

There are other arguments though which suggest that viruses are not alive. For many people, because of their minuteness (measuring 500 nanometres or less, viruses are only visible under electron microscopes, while some cells are visible to the naked eye and bacteria are visible under light microscopes) and because of their simplistic structure, viruses are often assumed to be an evolutionary missing link between cells and smaller molecular particles such as DNA.[[371]](#footnote-371) However, given the parasitic nature of viruses, their size alone is not a satisfactory indication of their age or place in the history of evolution. Indeed, viruses do not even fit on the phylogenetic tree (the tree of life) because they do not share genetic material with their hosts, nor do viruses have a common genetic ancestor.[[372]](#footnote-372) Their inability to self-replicate or self-sustain, coupled with their polyphyly (lack of structural historical continuity) means that the virus seems to be a reasonable place for us to draw that crucial line between the living and the non-living. Drawing the line here also prevents us from floundering in discussions of whether or not DNA molecules or proteins and so forth have moral value. These things may be necessary for life to exist but they cannot in themselves be said to be ‘alive’ in a way which gives them moral value.

If we accept this argument then there is no moral problem with killing viruses, because as non-living things they cannot be said to have interests. However, there are several problems with using this particular line of reasoning. The main problem is that the argument here seems to be that viruses *might* not be alive; the scientific evidence is currently inconclusive. All we can currently say with certainty is that viruses are very different from the forms of life that we are familiar with. The fact that viruses can pursue their own interests independently strongly suggests that they are alive and thus have the characteristics necessary for inherent value, and so I will hereafter be working on the assumption that this is the case.

A further problem is that even if viruses could be definitively proven to be non-living entities, we are still left with the problem of whether or not it is permissible to kill bacteria. We therefore still to need to investigate the question of whether or not we can ever be justified in killing bacteria and other microbes.

***Killing in self-defence***

Perhaps the most reasonable way to justify the killing of viruses and other disease carrying organisms is on the grounds of self-defence. In many justice systems, homicide or other serious assaults can be justified on the grounds that *‘such force [...] is reasonable in the circumstances for the purposes of self-defence or defence of another’[[373]](#footnote-373)* In other words you may be justified in killing someone if they are, for example, running towards you with a cleaver. However, the phrase ‘reasonable in the circumstances’ shows us that there are limits to the applicability of self-defence, so that it may not be used if you were to kill someone who is running towards you unarmed.

The degree of force used must always be reflective of the degree of threat you face, if someone slaps you around the face, for example, you are not justified in using deadly force. If someone is holding a knife to your throat or thrusting an axe at your body however, you may be entitled to do so. The justification of self-defence is thus rather simple to comprehend; if you are trying to seriously injure or to kill me I can use enough force as is necessary to stop you, but no more. Killing in self-defence is therefore only permissible if your life, or the life of another, is being threatened.[[374]](#footnote-374) This is linked to my first principle for resolving conflict; generally, we have a negative duty to avoid causing harm to other living things, but this duty is constrained by demandingness. While we do not need to defend ourselves against all bacteria and viruses (as I shall discuss below) when a particular kind of pathogen tries to attack us, it would be overly demanding to assert that we should do nothing, as this puts our health, and perhaps our lives, at risk. Although this is relatively simple concept we must be clear about the contexts in which we can use this principle to justify killing or causing harm to others.

First of all, let us consider when it may be permissible for us to kill another animal, not for food, as this was discussed in Chapter 3, but because we are being attacked. In *Respect for Nature* Paul Taylor asserts that force must only be used when another organism threatens one's life or basic health.[[375]](#footnote-375) On these grounds we may be permitted to, for example, kill a wolf if it is attacking us. However, there are limits to the extent to which we may use this justification. For example, Taylor argues that in order for the self-defence rule to be applicable, we must have taken every reasonable precaution to avoid the danger which the attacking animal posed.[[376]](#footnote-376) If, for example, the wolf attacked us because we had knowingly entered her den or were threatening her cubs then the self-defence rule could not be applied because we had not taken any reasonable precaution to avoid the danger. If we were merely walking in the woods when a wolf suddenly attacked then the self-defence rule would apply, but the act of provoking the wolf by threatening her renders the self-defence justification void.

The reasoning behind this takes us back to one of our original foundational principles: all living things have inherent worth. The fact that the ‘attacker’ in this situation is a wolf has no bearing on our application of the self-defence rule. Let us reimagine the situation with a person in place of the wolf: if I should try to kidnap someone’s child, the parent is justified in using whatever force is necessary to stop me. To stretch the self-defence rule, which is already deeply ingrained in our understanding of normative ethics, to include other animals thus does not require any great conceptual leap if we accept the idea that all living things have equal inherent value. It may however, seem more difficult to stretch it to include the world of microscopic organisms.

Taylor’s discussion of self-defence is largely directed at the question of what humans may do in regards to protecting themselves against other animals. He only addresses the issues of microscopic organisms in a single sentence in which he states that people should take reasonable precautions to guard against organisms which carry disease or are poisonous.[[377]](#footnote-377) It is not entirely clear what he means by ‘guard against’ but it reasonable to assume that this would involve both the actual avoidance of the animals or plants that harbour diseases and poisons, and that it may also include humans vaccinating themselves, after all we cannot always see mosquitos, ticks or other tiny disease carriers.

Of course there are also pathogens which may only end up causing moderate harms, such as the common cold. As to whether or not we can justify killing these microbes, I believe it is still morally permissible on the grounds of self-defence, but this is something of a complicated issue because it is our immune system which does the killing for us. If it were not for our immune system, a simple cold virus could easily kill us, the only reason it does not is because different organs, cells and proteins in our body work together to kill these pathogens. In a sense our bodies are constantly killing in self-defence. Not only would it be intuitively bizarre to suggest that we should stop this, there is also no moral reason as to why we should consider doing so because our immune system is using ‘reasonable force’ to keep us alive.

We should also remember that while many viruses and bacteria threaten us with serious and deadly harm there are millions of other viruses and bacteria which either do us no harm or in fact do us good. Without bacteria we would not be able to digest the food we eat, dead plants and animals would not be broken down to fertilise soil and evidence suggests that the world’s oceans are heavily dependent on viruses for the cycling of nutrients.[[378]](#footnote-378)

This is not a question then of us being justified in always killing viruses and bacteria wherever we find them. To begin with such an enterprise would be almost impossible; estimates suggest ‘there may be a hundred million times more viruses on Earth than there are stars in the universe.’[[379]](#footnote-379) Secondly, as I have mentioned, many bacteria and viruses are integral to our existence. As with plants and animals, viruses and bacteria are living things which by and large enhance, and indeed are needed for, our existence. However, in situations where our lives are threatened it is morally permissible for us to use appropriate force to stop them. We can do this in numerous ways, by washing our hands, cooking our food and vaccinating ourselves. These actions are justifiable because the threats microbes pose for us are potentially deadly.

Furthermore, as Taylor points out, to say that we have the same inherent value as other living things does not mean that we should sacrifice our own lives for their benefit.[[380]](#footnote-380) So there is no imperative for us to stop washing, cooking or taking medicines because these are acts of self-defence, justified by our basic interest in preserving our own health and existence. The fact that they are preventative actions rather than those which are taken after an ‘attack’ is also irrelevant because the threat of attack is predictable. If someone is pointing a gun at my head and says “I am going to shoot you” I do not need to wait until he has pulled the trigger in order to defend myself. Once again, national laws often run in parallel with this idea: there is no rule in British law, for example, which says that a person must wait to be struck first before they may defend themselves.[[381]](#footnote-381)

Before concluding I will elaborate on how we can also use the concept of self-defence here to act in defence of another. This is again permissible in criminal law: the 1884 case of R. v Rose established that self-defence covers force used to protect oneself, one's family, or anyone else against attack or threatened attack.[[382]](#footnote-382) When we vaccinate our children or our pets we do so out of a desire to protect them from harm. We are therefore, in a very real sense, acting in defence of another; the microbe is the attacker and the most effective weapon we have to stop it is the vaccine. Whether or not we can use this principle to vaccinate wild animals is of course a different question, both because this will involve new tests being carried out and because of the practical difficulties in administering the vaccines. These are issues we shall address in part (ii) of this chapter.

Having outlined the reasons as to how we can justify the killing of potentially harmful microbes, I will now move on and present the case study of primates and the Ebola crisis. I will then be able to outline the ethical dilemmas brought up in this case study and propose a solution using the guidelines for resolving conflicts from Chapter 3.

## ii) The threat to great apes and other primates from the Ebola virus

There has been much coverage of the devastation that Ebola has wrought on humans in recent years. However, very little media attention has been paid to the effects that it has had on our fellow primates. In 2006, an article published in the journal *Science* was the first to prove that the Ebola virus was linked to a mass die-off of wild primates on the DRC-Gabon border between 2002-2003. In this study, out of 238 Western gorillas (*Gorilla gorilla*) which were being individually monitored by scientists, 221 died after an outbreak of ZEBOV, the Zaire strain of Ebola.[[383]](#footnote-383) By applying this data to surrounding areas, in accordance with known nest sites, the researchers estimated that approximately 5000 gorillas had died in this period.[[384]](#footnote-384) With mortality rates at approximately 95% for gorillas and 77% for chimpanzees (*Pan troglodytes*) it is clear that Ebola poses a serious threat to the survival of wild primates. This matters, from a moral perspective, as primates are beings with inherent value and so too are the numerous plants and animals then depend on apes for their own survival.[[385]](#footnote-385) As the authors of the study concluded:

*‘Lossi [the area of research] represents only a small fraction of the western gorillas killed by ZEBOV in the past decade or indeed of the number at high risk in the next 5 years. Add commercial hunting to the mix, and we have a recipe for rapid ecological extinction.’[[386]](#footnote-386)*

Indeed, a previous outbreak in the mid 1990’s is reported to have killed over 90% of the gorilla population in Minkébé Park in northern Gabon and current estimates suggest that a third of the world’s gorillas have died from outbreaks since then.[[387]](#footnote-387)

The IUCN red list of endangered species has had the Eastern Gorilla (*Gorilla beringei*) listed as endangered and the Western Gorilla as critically endangered since 2008.[[388]](#footnote-388) It is clear then that some form of action is needed if the wild populations of these primates are to survive. Although Ebola can be spread after contact between humans and other primates, neither species is considered to be the virus’ host or source.[[389]](#footnote-389) Therefore, although it is advisable that human and wild primate populations be kept apart as much as possible, to simply leave these animals alone would not aid in their recovery. A vaccination program has the potential to halt the spread of this painful and devastating disease which, in tandem with other measures, could bring the primate numbers back up to stable levels.

In protecting the great apes from harm however, we will be creating conflicts of interest between them and other beings with inherent value. The first conflict is between the apes and the Ebola virus, since both have inherent value and basic interests in continued life. However, as I have shown in the previous section, we can justify the killing of microbial life in order to act in defence of another. The important question to answer now is whether or not we have a positive duty to intervene in this way.

In the next section I argue that we do have such a duty and I shall use my principles for resolving conflicts to demonstrate why this is the case. But this will create a second set of conflicts: in order to test the efficacy of the vaccine and ensure that it is safe, it will eventually have to be tested on apes themselves. This will therefore mean risking the lives of some individuals in order to save others. This is a much more difficult problem to resolve and I shall argue that, although a vaccination program is extremely desirable, it would not be ethical to risk the lives of captive apes in order to save ‘wild’ individuals.

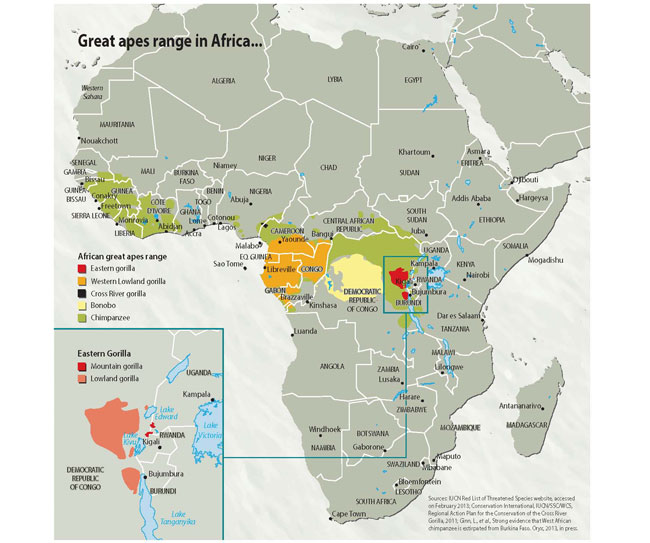
## iii) Proposed methods for the conservation of apes affected by Ebola

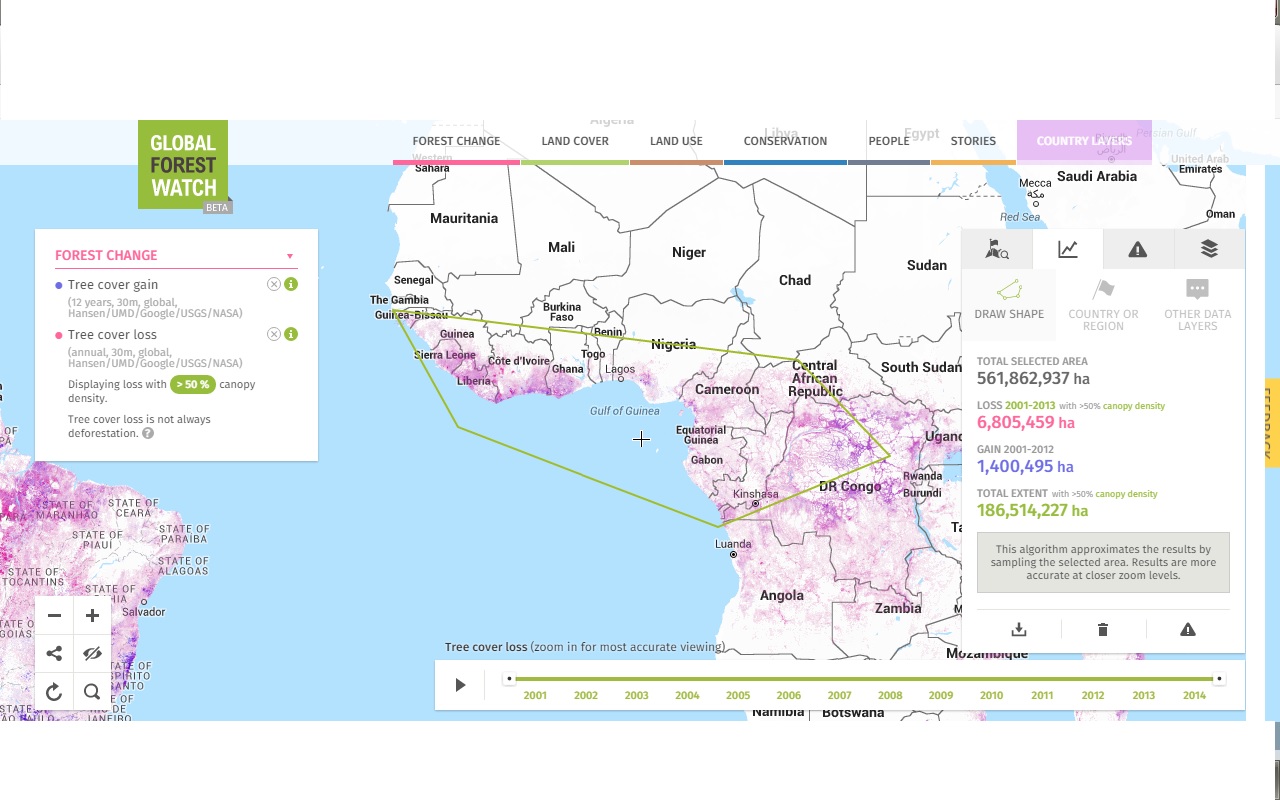
In this section I will argue that there are two conservation methods that we should undertake in order to protect African great apes from Ebola. The first is forest regeneration, as this would help decrease the apes’ chances of becoming infected. The second action we should take is to invest in technologies which negate the need for drugs to be tested on living things, at least in their early phases. However, before I can discuss these methods in detail I must first explain why we owe positive duties of assistance to those apes threatened by the Ebola virus. In order to elaborate on this, it will be useful to begin with a recap of my principles for resolving conflict:

|  |
| --- |
| a) Generally, we have a negative duty to avoid causing harm to other living things. This duty is constrained by demandingness.  b) Positive duties are generated in two types of situation: the first is in cases of easy rescue. The second, is when our actions cause individuals serious harms in the present, or if they are particularly vulnerable to harms in the future because of actions we have taken.  c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests    d) When interests conflict, we should prioritise basic over nonbasic interests    e) In the case of a stalemate, a decision should be made in reference to the consequences of an action on the wider biotic community. |

It is my assertion that we have already contravened the first principle by decimating apes’ habitat and taking other actions which have not only harmed them directly but have also increased their vulnerability to diseases, including the Ebola virus. As we can see from principle (b), this means that we have generated certain positive duties of assistance. In order to see why this is the case, I will first provide a brief description of the harms we have inflicted on African apes and then move on to discuss which kinds of duties have been created as a result.

Human practices such as forest clearing and hunting, along with climate change and diseases spread by humans, have had a disastrous effect on Africa’s gorilla, chimpanzee and other primate populations.[[390]](#footnote-390) Below are two maps, the first shows the range of the following great ape species: the Eastern, Western and Cross River Gorilla, chimpanzees and bonobo.[[391]](#footnote-391) The second map uses data from NASA’s Landsat satellite program to show forest loss rates between 2001-2014. The darker the purple shading, the greater the intensification of forest loss. The figures on the right hand side of the map show data for within the green lines.





As we can see from the maps on the previous page, much of the forest that is being lost in Central and West Africa is home to great ape species. Although there are some unavoidable causes of forest loss, such as fires, the vast majority of habitat destruction in this region is caused by human practices such as logging, mining and agriculture. Habitat loss is one of the three main drivers of great ape mortality, alongside poaching and disease.[[392]](#footnote-392) Not only are these factors damaging in and of themselves, but one often exacerbates the other. The spread of Ebola is a perfect example of this phenomenon.

Habitat loss, poaching and the spread of Ebola are linked in three ways. First of all, the concentration of ape populations into small areas increases the likelihood of uninfected groups coming into contact with infected groups.[[393]](#footnote-393) The second link lies in the virus’s host, fruit bats. As their habitats are taken away they (and other animals) are forced into the small remaining areas of forest, bringing them into more frequent contact with apes.[[394]](#footnote-394) Thirdly, deforestation is linked to soil erosion and climate change.[[395]](#footnote-395) The areas around the Congo rainforest are now seeing extended periods of aridity which are often followed by heavy rain, which causes the fruiting plants which both apes and bats feed on to delay fruiting until the rains. This causes a rush whereby all the animals which rely on these fruits gather in condensed areas at the same time, again increasing the chances of disease transmission.

Poaching not only harms the individual apes that are killed (for bushmeat) but also increases the risk of infections spreading.[[396]](#footnote-396) Because humans and other apes are so genetically similar, infections can pass between species with great ease and rapidity. This serves to expose both species to infectious diseases against which they have no natural immunity, such as Ebola. As a further example, human-born respiratory viruses, which for us would cause a nasty but usually nonfatal chest infection, can be a cause of widespread mortality in nonhuman primates. As interactions between humans and apes become more frequent, so the risk of infection increases.[[397]](#footnote-397)

It is evident then that we have taken actions which both harm living individual apes directly and which threaten the lives of others in the future. Following principle (b) we therefore have a positive obligation to ‘make good’ on those harms. In working out what form our reparations to great apes should take, it is useful to think back to Clare Palmer’s conception of what reparation can mean in the context of wildlife conservation: “*[reparations should involve] practical benefits that will make living easier and less dangerous for them so that [their] lives are now [...] closer to their lives before the development.*”[[398]](#footnote-398) In the context of this case study, I believe there are two courses of action that we could take to satisfy Palmer’s conception of reparation and to thus ‘make good’ on the harms we have caused. The first thing we should do is undertake an intensive program of habitat restoration and expansion. The second action, would be to vaccinate the most vulnerable individuals against Ebola, but only if the vaccine could be verified as safe without testing on captive apes or other animals. Both of these programs would of course face significant difficulties and I will discuss these in the remainder of this section. However, whatever practical difficulties we may face should not detract from the point that we have a moral duty to undertake habitat restoration programs and ethically sound medical treatments.

The first goal should not be considered controversial or surprising, although it may be the case that such a proposal is unlikely to be realised without strong political endorsement. My argument here is that conservation policy should focus on the specific and basic interests of all wild primates (and other living things) and that these interests are best served in the long run through the maintenance of long established ecosystems and the prevention of habitat loss. The idea that we should focus on the conservation of habitats is by no means novel and this issue has been covered in depth by a range of environmental and animal ethicists.[[399]](#footnote-399) Therefore my main aim here is not to expound upon the numerous virtues of conserving habitat, but it is necessary for me to raise the issue insofar as it pertains to my theory and to this case study.

In relation to my theory, the conservation of habitats is necessary because of principles (a) and (b). Our negative duty to do no harm implies that we should refrain from destroying the homes of living things as this causes stress, disrupts their food sources and also makes them particularly vulnerable to other problems such as climate change and disease. In cases where this destruction has already occurred, we have a positive duty to compensate the affected individuals. The destruction of habitat is of great concern because the environments and ecosystems in which animals have evolved are key to their ability to achieve their individual notions of the good. Great apes have a basic interest in living in their natural habitats as these provide them with all the space they need to manoeuvre, to hunt, to mate and engage in any other form of desired activity. As Donaldson and Kymlicka describe, in these ways animals have an interest in self-determination.[[400]](#footnote-400) They also have a basic interest in living healthy, disease free lives and as we have seen the fragmentation of their habitat has had a huge impact on this.

It could be objected that under my theory we seemingly have an obligation to reforest the majority of the planet as, at some point in history, the act of building towns, cities and other human developments have harmed other living things. In response to this I would in fact agree that if we were to undertake a comprehensive survey of the planet, the findings would probably suggest that we do have duties to reforest vast swathes of the Earth. However, as I argued in Chapter 3, ‘rewilding’ may be unethical if, in seeking to protect some individuals, we end up harming others. Therefore, I would not advocate such broad ideas as reforesting the whole Earth, but rather would suggest that we look at areas that have been degraded and analyse the correct course of action on a case-by-case basis. Let us assume though that we do have a duty to reforest much of the Earth. This would of course be a very demanding undertaking but it would not be impossible, it would not be *too* demanding and it would be the right thing to do in many instances.

The practicability of reforesting large portions of the Earth is set out by E.O. Wilson in the book *Half-Earth*.[[401]](#footnote-401) In his book Wilson identifies numerous areas that, although they have been damaged, could plausibly be ‘reclaimed’, protected and expanded to provide space, shelter and sustenance for wildlife and humans. This does not entail forcing humans to abandon cities, or to return to living like our early human ancestors. In fact, as Wilson points out, technology and research using modern equipment could play a significant role in helping us to identify, track and prevent harms to others.[[402]](#footnote-402) An example of this, which I shall discuss below, is the technology which has been developed to create artificial body parts, which could eventually help eliminate animal testing. Another good example is NASA’s Landsat program, which has enabled researchers to map and analyse changes in the world’s forest cover over several decades.[[403]](#footnote-403) In Brazil, the government has used satellite data such as this to create an ‘early warning system’ to track illegal loggers felling trees, which has reportedly resulted in in an 80% decrease in illegal logging since 2004.[[404]](#footnote-404)

Technology and other aspects of modern human life therefore certainly do not need to be abandoned. In giving back forest, wetlands and other habitats to wildlife, we will certainly have to give up certain things. Some will be easy, such as plastic ‘exfoliants’ in cosmetic products; other things, like fossil fuels, will be less straightforward but it is still possible to envision a world in which humans live good lives without these products.[[405]](#footnote-405) As such, though my theory demands a lot of us, it certainly does not demand that we make our own lives miserable or unliveable.

Furthermore, reforestation alone may not be enough to fulfil the duties we have to other living things. In the case of the apes, reforestation could do a great deal to promote the wellbeing of primates and other living things affected by Ebola. However, conservation efforts need to do more than simply focus on replanting trees. To be as effective as possible, conservation policies will need to include measures which tackle the problems of the bushmeat trade and illegal wildlife hunting. A 2007 article by Carol Rizkalla and colleagues predicted that if hunting and Ebola outbreaks both continued at their recent rates, gorilla populations could decrease by as much as 97% over the next century.[[406]](#footnote-406) While it is reasonable to say that improving and enforcing the laws governing hunting in these regions will be difficult, it is certainly feasible. What is needed above all else is the political will to put these measures into place.

There are of course certain limits to these conservation methods. The main problem is that even if reforestation programs and anti-hunting measures are effectively put in place, forests and other ecosystems can take years to re-establish, while diseases can spread in a matter of weeks or even days. Therefore, if a safe vaccine could be developed we would be able to protect the specific interests of the animals without compromising their ability to be self-determining. There is a vaccine that has been developed by Dr Peter Walsh, but it has not yet been verified as safe and effective for apes as there are restrictions in place in many countries governing testing on great apes.[[407]](#footnote-407) This brings us to the most difficult issue in this chapter: for vaccines to be developed and proven safe they will, at some stage, need to be tested on individual animals. This creates a clash of basic interests between the test subjects and the intended recipients of the vaccine. Because of this clash of basic interests, it would not be ethical to subject captive apes to tests in order to save the ‘wild’ individuals. In the remainder of this section I shall show why this is the case.

The first issue to consider is what is involved in each stage of the vaccine development process. The initial development of vaccines inevitably involves carrying out experiments in order to assess whether or not a certain set of chemicals will work and kill the target virus/bacteria without also killing the affected animal. The horrors and suffering involved in this process are well documented, and each year millions of animals are bred for the specific purpose of being exposed to diseases or toxins.[[408]](#footnote-408) Their lives, to paraphrase Hobbes, are usually solitary, nasty and short. Even when the aim of the experiments is to develop a vaccine *for that kind of animal* I do not believe that it is ethically permissible to breed and keep animals in such conditions. Principle (c) clearly shows us why this is the case:

*Principle c) Different treatment of living things is justified only on the grounds of relevant difference. Therefore, we should treat all living things according to their specific interests*

Both the captive apes (or indeed any other animal) and their ‘wild’ counterparts have the same specific, basic interests in continued life and, in this case, in being free from potentially tortuous experiments. There is no relevant difference which could justify us conducting tests on one set of animals but not on another. Fortunately, this need not mean that we will never be able to create safe vaccines for nonhumans. There are several alternatives to animal experimentation which now exist, such as in vitro and computer modelling techniques.[[409]](#footnote-409) At this point in time, the technologies I discuss below are designed to serve as replacements for human bodies, however we may assume that if artificial human organs can be created then so too can artificial ape or other animal organs. One of the most promising new technologies is an artificial ‘liver’ called Biomimiks*®*. When new drugs are created, typically, they are tested on liver slices and bodily fluids from nonhuman animals. Biomimiks however negates the need for animal testing, as it works by mimicking the chemical reactions which take place in the human liver. Although it is a very new piece of technology and is not yet widely used, it has received awards from the American Chemical Society and is being used in several universities, laboratories and hospitals in America and the University of Cambridge in the UK.[[410]](#footnote-410) Another recent, potential alternative to animal testing has been created in the computer science department at the University of Oxford. The ‘Virtual Assay’ computer program imitates human heart cells, allowing researchers to model the effects of drugs on the heart quickly and without the need for living tissue.[[411]](#footnote-411) A similar program exists in Germany called TissUse*®*, which can emulate a variety of human organs.[[412]](#footnote-412) All of these products are now available for use within academic and industrial settings yet, as Dr Katherine Chapman of the National Centre for the Replacement, Refinement and Reduction of Animals in Research points out, it will probably be years before they are widely used. This is because there will be a reluctance within pharmaceutical companies to replace animals with these technologies until years of data on their efficacy have been accumulated.[[413]](#footnote-413)

Although companies and laboratories may have good economic reasons for being reluctant to use these new machines instead of animals, there is no doubt that it would be more ethical to do so if they can prevent the deaths and torture of hundreds of millions of animals across the globe. As Hope Ferdowsian and Nancy Beck remind us, it has been almost 60 years since William Russell and Rex Burch published *The Principles of Humane Experimental Technique,* which emphasized reduction, refinement, and replacement of animal use, which are the principles which have since been referred to as the “3 Rs” in the scientific community.[[414]](#footnote-414) Yet in intervening years the number of animals used in experimentation has not been reduced but has risen.

Another reason for advocating the use of artificial organs is that they are likely to be much better predictors of chemical reactions than animal bodies. This is because there are key differences between the molecular and metabolic pathways, both between humans and nonhumans and between individuals of the same species, which mean that individual bodies react very differently when exposed to chemicals.[[415]](#footnote-415) As Andrew Rowan argues, when we consider both the ethical and practical reasons for investing in alternatives to animal testing we can clearly see that such alternatives are “attainable, desirable and ethically obligatory”.[[416]](#footnote-416)

This is of course a controversial area and many within the medical community disagree with the idea that animal testing is either not very useful or is unethical.[[417]](#footnote-417) For example, arguments have been made both by pro and anti-animal testing advocates based on the Thalidomide disaster of the 1950s and 1960s.[[418]](#footnote-418) Thalidomide had been deemed safe for human use after tests on animals, which suggests that animals did not provide a good model for testing. Proponents of toxicity testing however argue that the model only failed because the drug was not tested on pregnant animals, and had they done so the side effects would have been seen and the drug would never have been put on the market.

From the perspective of my own theory however, killing animals to test drugs is not ethical as it both violates the principle to do no harm and does not satisfy the difference principle. All animals have basic interests in not being subjected to tortuous and potentially lethal experiments and there is a great deal of evidence that shows that animals suffer considerably in laboratory conditions. In the case of great apes, laboratories do not allow very important normal behaviours such as socialising, grooming, playing or key events, such as sexually mature males leaving the family group to find a mate and create a new group. It is in the specific and indeed basic interest of apes to engage in such behaviours and there is a significant amount of evidence which shows that apes suffer physical and psychological harms in captivity.[[419]](#footnote-419) This then goes against the principle of treating animals in accordance with their specific interests and severely impedes on their ability to pursue their own interests in their own way which is one of the cornerstones to treating animals in accordance with their inherent value.

If we were to imagine a human equivalent to captive breeding programs, in which people were bred purely for the purposes of testing vaccines or cancer medicines for example, most of us would consider such a prospect nightmarish. Captive breeding prevents animals from selecting their own mates at will and may result in harmful genetic mutations as a result of inbreeding. As Dale Jamieson describes

“*After a few years in captivity, animals can begin to diverge both behaviourally and genetically from their relatives in the wild. After a century or more it is not clear that they would be the same animals, in any meaningful sense, that we set out to preserve*”[[420]](#footnote-420)

This shows that not only is captive breeding and testing harmful to existing individuals, but it could also harm future apes. If drugs are created for one set of individuals and then administered to a genetically different group, the results could be very harmful. Not only then would captive breeding and testing violate our negative duty to do no harm, it would also undermine the positive duty to assist those who are likely to be harmed in the future.

An alternative to captivity in laboratories has been proposed by Beatrice Hahn, who argues that instead of breeding and keeping apes in laboratories, we could conduct tests on individuals who already live in sanctuaries.[[421]](#footnote-421) If existing sanctuaries are equipped with the facilities to carry out certain procedures like vaccination (and she argues that many sanctuaries already have such facilities) then laboratories will not be needed. Hahn’s alternative is certainly preferable to keeping apes in laboratories, the first reason for this is that they could eliminate the demand for captive breeding for medical purposes. Secondly, if sanctuaries provided large amounts of space and were filled with the same plants and food sources as primates would experience in the wild then this also minimises the amount of psychological harm they may experience. Thirdly, veterinarians would be able to monitor the individuals at a distance but also be able to approach and treat them if they need urgent attention. As the animals would be used to human contact this would be less harmful than it would to wild individuals. However, despite these factors, Hahn’s proposal does not solve the central problem, which is that the captive apes and wild apes have equal inherent value and there is no relevant difference which could legitimate treating them differently.

It might seem at this point as if the situation is rather hopeless and that all we can do is carry out forest regeneration programs and hope that there is not another Ebola outbreak too soon. However, there are still reasons to think that a vaccine program could be viable in the near future. Using the technologies I have previously discussed, it may be possible to conduct further tests on the vaccine developed by Dr. Walsh. Once this process is complete, there are a number of measures which have been used to vaccinate wild animals against rabies and other diseases in the past. The history of vaccination programs in Europe, the Americas and a few other countries indicate that with adequate funding and policy implementation, the eradication (or near eradication) of a disease is possible. Rabies has been largely eradicated in Europe following a series of programs which vaccinated animals by placing the vaccine in bait, which was left in areas with high numbers of foxes and other susceptible animals.[[422]](#footnote-422) This method was also used in 1966 by Jane Goodall to halt a polio outbreak in chimpanzees in Gombe.[[423]](#footnote-423) Administering vaccines with darts has also been successful in cases such as the control of brucellosis in American elk.[[424]](#footnote-424)

There are of course some serious, potential risks and practical difficulties with vaccination by these means. On the practical side, we have to consider the fact that most apes live in very isolated locations and as such both administering and monitoring the progress of the vaccines would be difficult.[[425]](#footnote-425) Ethical concerns would include the fact that darting could injure the intended recipient and animals eating baited food could get sick if they consume too much.[[426]](#footnote-426) Because of these risks it is not possible for me to state with any certainty which method would be suitable in the Ebola case, but for the purposes of this thesis it is enough to assert that the ethical vaccination of apes against Ebola is possible in the future, if not at this precise moment in time.

Chapter conclusions

My aim in this chapter was to utilise my ethical framework to look at one of the most difficult dilemmas to have emerged in conservation policy in recent years. I chose to look at the case of African apes affected by the Ebola virus, as this is a perfect example of a case in which numerous moral problems emerge. I began this process by considering whether or not microbial lifeforms should be considered as beings with inherent value, which is a question frequently overlooked by environmental ethicists. Although we do not yet know enough about viruses to give a definitive answer, the current scientific literature provides evidence which suggests that they are beings which pursue their own interests in their own way. If this is true, then they should be considered to be beings with inherent value. Given this, I then moved on to the question of whether or not we can justify killing them in order to protect the life of another. I believe that we can be justified in killing potentially fatal viruses and bacteria on the grounds of either self-defence or defence of another.

I then proceeded to discuss my specific case study, which raised two important ethical issues: 1) even if it is ethically permissible to kill the Ebola virus, do we have any positive duty to do so for the sake of the apes? 2) If we are to vaccinate apes against Ebola, can we justify risking the lives of some individuals, in the testing phase, in order to save others? I have argued that we do have positive duties of assistance under principle (b) of my theory. These show that because we have caused significant harms to individual apes which have left them particularly vulnerable to Ebola, we now have a duty to help them. There are two ways in which I think this should be done, the first is through extensive habitat restoration and the second is through a vaccination program, but only if a vaccine could be produced using machines instead of animals as test subjects. While the habitat restoration option does not throw up new ethical dilemmas, the vaccination option is much more complicated.

Currently, vaccines and other drugs are tested either on live animals or on the body parts of euthanised animals. This is not ethically acceptable as it pits the basic interests of some individuals against the basic interests of others. There is no relevant difference which makes the creation of such a clash acceptable. However, although this means that we cannot administer an Ebola vaccine to nonhuman primates at this point in time, there are many reasons to be optimistic about the future of medical treatments for animals. The development of new technologies may, in years to come, negate the need for animal-based toxicological testing. Darting and baiting techniques may also be improved during this time and so it is certainly conceivable that an Ebola vaccine for apes could be utilised in the future. While these problems are being resolved, we can and should be implementing forest regeneration programs in order to lower the risks of disease transmission and make amends for the past harms we have caused by destroying the apes’ habitat.

# Conclusions

This thesis was designed to analyse the ethical permissibility of killing plants and animals as part of wildlife conservation policy. My investigation centred around two central questions: 1) is it ever permissible to kill in the name of conservation and 2) how do we come to the conclusion that killing is right or wrong in a given situation? In order to address these questions I constructed an original ethical framework, which helps us to resolve the different conflicts of interest that frequently arise in wildlife policy. These conflicts of interests typically take the following basic form: ‘X has an interest in obtaining or doing A, but Y has an interest in that event not happening’. This is then followed by the question: ‘is it acceptable to kill X in order to prevent him from doing A, thus protecting Y?’

The creation of this new framework, and the analyses I have undertaken, are important because they present a clear and succinct way of challenging the assumption that killing can be both an ethical and effective way to conserve wildlife. This assumption appears to be widely held in many conservation spheres, as is evidenced by the millions of animals and plants killed each year by organisations such as the USA’s Wildlife Services.[[427]](#footnote-427) By critiquing the arguments that are used to justify such policies and by presenting alternative methods, I have been able to show that not only are many of these policies unethical but they are also ecologically unsound.

This final chapter brings together the arguments that I have made throughout the thesis and shows how, in creating my framework and answering the research questions, I have made a valuable contribution to the existing literature in this field. In order to do this, the chapter will be divided into two parts: in part (i) I consider the theoretical and political implications of my work. This will involve a brief recap of how my thesis was created, and I show how my thesis fits in with, and adds to, the existing literature. I also consider the political impact that my theory could have if it were put into practice. In part (ii) I then discuss the limitations to the thesis and explore potential avenues for future research.

## Part i) The theoretical and political implications of the research

There is a considerable amount of literature available on the subjects of environmental and animal ethics. However much of the theoretical background in this thesis has been inspired by the work of three key authors: James Rachels, Paul Taylor and Gary Varner. As I noted in the Introduction, their works each take a slightly different approach to the question of how we should value wildlife. In *Created from Animals*, James Rachels focuses on the ways in which science and evolutionary theory have proven that we are closely related to our fellow animals, and that the anthropocentric notion that we are somehow morally special should be challenged in light of this knowledge. In his book *Respect for Nature*, Paul Taylor uses the same kind of arguments from biology, but also provides an in-depth account of what it means to behave in accordance with the idea that all living things have inherent value. Although he does not use the term, Taylor’s work is very much about environmental citizenship, the idea that we have a responsibility to think about the responsibilities we have as members of Earth’s community.[[428]](#footnote-428) The goal of Gary Varner’s *In Nature’s Interests*, on the other hand, is to explore the possibility that animal ethics and certain anthropocentric arguments are not, as some might claim, incompatible with a strong environmentalism.

My own work has taken certain elements from each of these books: both Rachels and Taylor argue that scientific discoveries and an understanding of animal and plant behaviour can and should be used to inform our ethical outlook and indeed our own behaviour towards other living things. This is a point that I not only discussed in Chapter 2 when justifying my foundational principles for biospherical individualism; I have also used scientific evidence to back up the arguments made in each of my case studies.

Varner’s critique of environmental holism also played a huge part in shaping my theory, as it highlighted the significant weaknesses with theories such as deep ecology. The idea that individualism gives us the most convincing account of the inherent value of other living things, is a view shared by all three authors. They also use this idea to create their own sets of moral principles. However, as Varner acknowledges in the conclusion of *In Nature’s Interests*, these moral principles “do not answer many practical, real-world policy issues.”[[429]](#footnote-429) The originality of my theory thus lies not in my advocacy of moral individualism in environmental ethics, but in my construction and application of a framework which can address practical, real-world policy issues.

In the process of constructing my framework I was able to answer the first of my research questions: is it ever permissible to kill in the name of conservation? It became clear while considering the inherent value of individuals that the answer to this question was that killing may be justified, but only in a very limited number of circumstances, i.e. in self-defence or defence of another. This is because although we generally have a negative duty to do no harm to other beings with inherent value, if you are being attacked or threatened with attack then you may be justified in using as much force as is necessary to protect yourself, or another. In some cases, this may mean that killing is justified, as the case of the Ebola virus exemplified in Chapter 6.

I began to formulate the answer to my second research question, concerning how we come to the conclusion that killing is right or wrong in a given situation, in Chapters 2 and 3. In Chapter 2 I set out my foundational principles for biospherical individualism: 1) humans are not innately special. If humans have inherent moral value it must be because of certain characteristics they possess, rather than the simple fact they are ‘human’. 2) The inherent value of living things is derived from the fact that they are individuals with the ability to pursue their own good in their own way. I also discussed the concept of interests, which was important as we need to be able to define what the interests of an individual are in order to decide how that individual should be treated. Setting up these principles and defining my use of the term ‘interests’ allowed me to show why individuals have inherent value, however it did not give any practical guidance as to how we should act. This then was the task of Chapter 3, in which I built upon my foundational principles and extrapolated from them a series of steps which we can use as a guide for informing our actions.

Once I had justified my use of these particular principles, or steps, I was able to put them to the test throughout the second half of the thesis in Chapters 4-6. It is in these chapters that I have consistently addressed the question of how we can decide whether or not killing is right or wrong in a particular situation. I have examined a range of examples, encompassing life forms as diverse as bacteria, plants, birds and mammals. I have also discussed the importance of habitat regeneration and the maintenance of existing ecosystems. This shows that my thesis not only provides answers to questions of animal ethics or environmentalism, but in fact provides a bridge between the two fields. Mine is of course not the first theory which attempts to do this, as Varner and several other scholars have also argued that individualism and broader environmental ethics are entirely compatible.[[430]](#footnote-430) My work contributes to the debate however by providing a different framework for both thinking about the value of nonhuman beings and working out how we should behave towards them.

In writing this thesis, my aim has been not only to contribute to the philosophical literature on the value of wildlife, but also to offer a theory which could be used to inform policy. I have designed the framework in such a way that it can be used almost as a manual; I have deliberately used a small number of succinct principles which can be applied to real-world scenarios. As such, the framework could be particularly useful for people working directly in the field, who will be investigating specific problems, such as the decline of a particular species and trying to decide on the best course of action.

There are also much broader, and much more controversial, political implications to my theory. In asking people to treat all living things as beings with inherent value I am in effect asking for two major changes: the first would entail a significant shift in certain government policies. In focusing on the inherent value of individual beings, I have shown that they are not objects to be managed but individual entities who should, by and large, be allowed to pursue their own good in their own way. This would mean that policies such as the ‘management’ of species such as deer and other ‘pests’ would have to be halted in many cases and alternative methods found. This idea is likely to be met with a great deal of resistance as it could be expensive and many conservationists may question the practicality of such costly methods. As well as wildlife management policies, policies on the widespread use of many chemical products would have to be seriously reconsidered. For example, the use of neonicotinoid pesticides is known to be hugely harmful to bees, yet it is still used in the UK despite an EU-wide ban.[[431]](#footnote-431) Again, the prospect of banning such products is hugely controversial, but the point I have stressed throughout this thesis is that just because something is controversial, this does not mean we should not do it.

The second major change that my theory calls for is not as much about policy as it is about changing the way many of us live our day-to-day lives. Treating living things in accordance with their specific interests would mean that, for example: we should not eat meat unless we have to to survive, we should end all forms of animal testing and we should not kill weeds just in order to fulfil our aesthetic desires. Such changes would of course be extremely unpopular with many, which could be problematic as far as the implementation of my theory is concerned. This brings us to the final part of this thesis, in which I discuss both the practical and theoretical limitations to my work and explore potential routes for future research.

## Part ii) Limitations to the thesis and ideas for future research

Following on from the last section, perhaps the most obvious problem with my theory is that although it is designed to inform policy, it is likely to be met with a significant amount of political opposition. This means that the chances of my ideas being implemented would, at this stage, be very limited. This challenge does however present several possible areas for my research to follow in the future. One possibility would be to consider how my theory might be used, not only as a guide for people working in conservation, but how it could be implemented in legislation. This could be done in a number of ways; for example, it could involve an empirical study on public attitudes to the proposed changes in policy that my theory advocates. Understanding and, in some cases, changing people’s attitudes towards nonhumans and the environment would be an important step towards understanding how we might be able to change their behaviour and create effective policies.

A substantial amount of research has already been on exploring factors that affect people’s attitudes and behaviour towards wildlife and the environment.[[432]](#footnote-432) However, investigating these questions in the context of my own theory could still be beneficial. One area which is only just beginning to be investigated empirically is the extent to which people’s engagement in outdoor activities and nature-based tourism affects their ‘pro-environmental’ behaviour in everyday life.[[433]](#footnote-433) It could be useful therefore to continue this line of enquiry with an empirical study of how people’s engagement with wildlife affects their pro-environmental behaviour.

Another possible way to expand upon my research would be to think about ways in which wildlife could be given greater degrees of political representation. One way in which to do this could be through considering animals and plants as stakeholders in sustainable development policy. It is widely assumed, both in the fields of animal ethics and wider environmental policy, that sustainable development by humans will automatically benefit wildlife and promote biodiversity. This is not an unreasonable assumption as it seems self-evident that a less polluted or degraded environment will be better for both humans and nonhumans. However, because the existence of this causal link is so widely accepted, the importance of promoting animal welfare, in particular, is largely overlooked during the process of forming sustainable development initiatives. An example of this can clearly be seen in the UN Paris Agreement of 2015.[[434]](#footnote-434) In this 32-page document, the words ‘animal’ or ‘wildlife’ do not appear once. The term ‘biodiversity’ makes a single appearance on page 21 in reference to the importance of climate justice. This is then unashamedly a document by humans, for humans.

This example alone would of course not be cause for consternation as this document’s primary focus is on climate change, but I believe the omission of animal welfare from this agreement is part of a larger, worrying trend. The European Initiative for Sustainable Development in Agriculture (EISA) is comprised of 6 associate member organisations.[[435]](#footnote-435) Of these 6, only 2 list animal welfare as a priority in their mission statements, despite the prevalence of animal use in agriculture. The International Institute for Sustainable Development (IISD) does not list any recent publications on wildlife or the welfare of farm animals.[[436]](#footnote-436) In the literature dispensed by such powerful organisations, nonhuman life is primarily referred to as a commodity, a good that is valuable only insofar as it is useful to us. The preservation of life for its own sake is simply not an expressed concern. From the perspective of animal and environmental ethicists this should be a rather troubling pattern, as wildlife numbers continue to decline and issues such as illegal wildlife trafficking continue to grow.[[437]](#footnote-437) Yet relatively little has been written on the importance of integrating wildlife policy with sustainable development initiatives. There are a few examples of attempts to do this, but these are generally restricted to studies of rural conservation in Africa and Asia.[[438]](#footnote-438)

The notion that animals and plants can be considered as political stakeholders is an area that has barely been studied at all. Research in this area would thus fill a sizeable gap in the philosophical literature and would have substantial heuristic value as one of the first in-depth explorations of this issue. Ultimately, work in this field could address the following kind of question: what will a just political arrangement look like if we consider animals to be stakeholders in sustainable development programs?

Some work has been done by Elizabeth Clancy on the inclusion of pets as community stakeholders.[[439]](#footnote-439) Her argument however, would not apply to wild animals. Continuing and expanding upon the arguments set out in my thesis, it could be argued that animals can be stakeholders in the political process because a) they are beings with lives that are valuable in-and-of themselves, independently of their use value to humans; b) they are directly affected by sustainable development policies which involve issues such as climate change and environmental degradation and c) as living things they themselves can also affect change in the biosphere.

To say that animals can be stakeholders is neither as bizarre as it may sound, nor is it the same as arguing that they have rights. This is because the definition of ‘rights’ and the capacities one needs in order to hold them are still highly contested. Roger Scruton, for example, argues that we cannot attribute rights to animals because they are not moral beings in the sense that humans are.[[440]](#footnote-440) In order to be a stakeholder however, one does not need a particular set of moral attributes, but rather animals need only have the capacity to hold interests which can either be promoted or set back, and this is something I have clearly asserted in my thesis.

One substantial limitation to my thesis however, is the fact that I have not explored the potential economic costs of my proposals. This is a deliberate omission as the aim of my research here has been to explore the moral and philosophical problems with killing in conservation. My research questions are not concerned with what are the most cost-efficient measures, but whether they are morally right or wrong. However, one might reasonably object that many of the policies I have advocated would be expensive and there are limits on what governments and NGOs can spend. This is a serious potential obstacle in terms of implementing policies such as widespread habitat regeneration, which would require years of substantial funding. It could therefore be extremely useful to further investigate the economic, as well the ideological, barriers that my framework could face.

An additional area that I was not able to explore within the scope of this thesis was the issue of what we should do in cases such as human overpopulation. As I discussed in the Introduction, discussing the potential problems with controlling the global human population was far too large a topic, and it raises questions which detract from the central focus of this thesis, which is on killing wildlife. However, exploring problems such as overpopulation or humans as ‘invasive’ species could show the wider applicability of my framework, as I could examine issues beyond wildlife conservation, in the fields of global justice and sustainable development.

As I have shown in this final chapter, there are a number of directions in which my future research could go. Despite its limitations, this thesis makes a valuable contribution to the existing literature by providing a novel ethical framework for evaluating the ethical permissibility of killing wildlife as part of conservation policy. Although at this stage these are only theoretical contributions, the nature of the framework means that it has the potential to also be used in future conservation practice.

# Bibliography

Abernethy, V. D. 2001. ‘Carrying Capacity: The Tradition and Policy Implications of Limits’ *Ethics in Science and Environmental Politics* 1(1): 9-18.

The Aldo Leopold Foundation Webpage. 2014.

<http://www.aldoleopold.org/AldoLeopold/teachingtools.shtml> accessed 03/02/2014.

Aldred, J. 27 February 2014. ‘Wild Beavers Seen in England for First Time in Centuries’ *The Guardian*

<http://www.theguardian.com/environment/2014/feb/27/wild-beavers-england-devon-river> accessed 15/03/2015.

Alexander, L. 2000. ‘Deontology at the Threshold’ *San Diego Law Review* 37: 893-912.

[Allendorf](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X), F. W., Leary, [R. F.](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X), Spruell, [P. and Wenburg, J. K. 2001. ‘The Problems with Hybrids: Setting Conservation Guidelines’ *Trends in Ecology & Evolution* 16(11): 613-622](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X).

Angus, I. and Butler, S. 2011. *Too Many People?* Chicago: Haymarket Books.

‘Animals Taken by Wildlife Services’ United States Department of Agriculture. 2014. <https://www.aphis.usda.gov/wildlife_damage/prog_data/2014/G/Tables/Table%20G_ShortReport.pdf> accessed 01/05/2016.

Ares, E. and Montgomery, J. 2015. *Full Report on Infrastructure Bill: Invasive Species*.

London: Commons Briefings Papers.

<http://www.parliament.uk/business/publications/research/briefing-papers/SN07086/infrastructure-bill-invasive-species> accessed 14/03/2015.

Aristotle. 2004. *The Nicomachean Ethics.* London: Penguin Books.

Ascension Island Government Webpage: 2015. ‘Frigate Birds on Ascension Island’  
<http://www.ascension-island.gov.ac/wp-content/uploads/2012/12/FRIGATE-BIRD-SAP-draft.pdf> accessed 18/05/2015.

Attfield, R. 1984. ‘Value in the Wilderness’ *Metaphilosophy* 15: 289-304.

Balcombe, J. 2010. *Second Nature: The Inner Lives of Animals* London: Palgrave MacMillan

Balharry, E., Staines, B.W., Marquiss, M. and Kruuk, H. 1994. ‘Hybridisation in British Mammals’. *JNCC Report* *154* Peterborough: Joint Nature Conservation Committee.

Bauhn, P. 2013. ‘The Duty to Rescue and the Duty to Aid the Starving’ *ID: International Dialogue, A Multidisciplinary Journal of World Affairs* 3: 4-37.

* 2011. ‘The Extension and Limits of the Duty to Rescue’ *Public Reason* 3(1): 39-49.

Bawden, T. 20 February 2016. ‘UK Government Urged to Follow US Example and Ban Plastic Microbeads’ *The Independent* <http://www.independent.co.uk/environment/uk-government-urged-to-follow-us-example-and-ban-plastic-microbeads-a6886351.html> accessed 20/04/2016.

Bayern, A.M.P., Heathcote, R.J.P., Rutz, C. and Kacelnik, A. 2009. ‘The Role of Experience in Problem Solving and Innovative Tool Use in Crows’ *Current Biology* [19(22](http://www.cell.com/current-biology/issue?pii=S0960-9822%2809%29X0023-0)): 1965-1968.

Beaune, D. 2015. ‘What Would Happen to the Trees and Lianas if Apes Disappeared? [*Oryx*](http://journals.cambridge.org.eresources.shef.ac.uk/action/displayJournal?jid=ORX) 43(3): 442-446.

Becquemont, D. 2011. ‘Social Darwinism: from Reality to Myth and from Myth to Reality’ [*Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486) [42(1](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486/42/1)): 12–19.

Beer, G. 1996. ‘Introduction’ in Charles Darwin: *The Origin of Species* New York: Oxford University Press.

Behrouzi-Rad, B. and Ghaeimi, R. 2015. ‘Changes in the Population of Wintering Waterbirds in Gomishan Wetland at Caspian Sea Coast, Iran’ *International Journal of Marine Science* 5(12): 1-7.

Bekoff, M. 2000. ‘Animal Emotions: Exploring Passionate Natures’ *Bioscience* 50(10): 861-870.

* 15 September 2015. ‘Killing Mountain Lions to Grow Mule Deer: Colorado’s Planned Cull Is Ill-Conceived and Unscientific’ *Huffington Post* <http://www.huffingtonpost.com/marc-bekoff/killing-mountain-lions-to_b_8128072.html> accessed 02/04/2016.
* 2004. ‘Wild Justice and Fair Play: Cooperation, Forgiveness, and Morality in Animals’ *Biology and Philosophy* 19: 489-520.

Bell, D. 2013. ‘Environmental Citizenship: Global, Local and Individual’ in Paul G. Harris (ed.) *Routledge Handbook of Global Environmental Politics* London: Routledge. pp. 347-58.

Benton, M. 2010. ‘Why Haven’t Crocodiles Changed?’ *The Naked Scientists*<http://www.thenakedscientists.com/HTML/questions/question/2624/> accessed 02/01/2014.

Bermejo, M. Rodríguez-Teijeiro, J.D., Illera, G., Barroso, A., Vilà, C. and Walsh, P.D. 2006. ‘Ebola Outbreak Killed 5000 Gorillas’ *Science* 314(5805): 1564

Bible Study Online. <http://www.biblestudy.org/question/does-bible-forbid-eating-meat.html> accessed 02/02/2016

Bilbro, J. 2011. ‘Helping People Love the World: An Interview with Gary Snyder’ *Interdisciplinary Studies in Literature and Environment* 18 (2): 431-441.

BirdLife International Species Factsheet. 2015. ‘Guadalupe Storm-petrel  
 *Hydrobates macrodactylus’*: <http://www.birdlife.org/datazone/speciesfactsheet.php?id=3982> accessed 16/05/2015.

Boakes, R. 1984. *From Darwin to Behaviourism: Psychology and the Minds of Animals* Cambridge: Cambridge University Press.

Bordnick, P.S., Thyer, B.A. and Richie, B.W. 1994. ‘Feather Picking Disorder and Trichotillomania: An Avian Model of Human Psychopathology’ *Journal of Behaviour Therapy and Experimental Psychiatry* 25(3): 189-196.

Boxill, B. 2011. ‘Black Reparations’ in Edward Zalta (ed.) *The Stanford Encyclopedia of Philosophy* <http://plato.stanford.edu/archives/spr2011/entries/black-reparations/> accessed 24/03/2016.

Bradshaw, C.J.A. 2012. ‘Little Left to Lose: Deforestation and Forest Degradation in Australia Since European Colonization’ *Journal of Plant Ecology* 5(1): 109–120.

[Bradstock](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Ross+A.+Bradstock%22&source=gbs_metadata_r&cad=9), R.A., [Williams](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Jann+E.+Williams%22&source=gbs_metadata_r&cad=9), J.E. and [Gil](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Malcolm+A.+Gill%22&source=gbs_metadata_r&cad=9)l, M.A. 2002. *Flammable Australia: The Fire Regimes and Biodiversity of a Continent* Cambridge: Cambridge University Press.

Brandt, R. 1990. ‘The Science of Man and Wide Reflective Equilibrium’ *Ethics* 100(2): 259-278.

Breed, M.D. and Moore, J. 2015. *Animal Behaviour* Cambridge MA: Academic Press.

Brennan, A. and Lo, Y.S. 2015. ‘Environmental Ethics’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy*

<http://plato.stanford.edu/entries/ethics-environmental/#FemEnv> accessed 03/01/2016.

Brett, D., Pospisil, H., Valcárcel, J., Reich, J. and Bork, P. 2002. ‘Alternative Splicing and Genome Complexity’ *Nature Genetics* 30: 29-30.

Breitenmoser, U. Breitenmoser-Würsten, C., Lanz, T., von Arx, M., Antonevich, A., Bao, W. and Avgan, B. 2015. ‘Lynx lynx’ *IUCN Redlist*

[http://www.iucnredlist.org/details/12519/0 accessed 01/08/2015](http://www.iucnredlist.org/details/12519/0%20accessed%2001/08/2015).

British Broadcasting Corporation, Science. 24 Jan 2013. ‘Why Can’t We Beat Viruses?’ <http://www.bbc.co.uk/science/0/21143412> accessed 04/10/2014.

Britton, O.J,  [Bueno-Orovio, A](https://www.ncbi.nlm.nih.gov/pubmed/?term=Bueno-Orovio%20A%5BAuthor%5D&cauthor=true&cauthor_uid=23690584)., [Van Ammel, K](https://www.ncbi.nlm.nih.gov/pubmed/?term=Van%20Ammel%20K%5BAuthor%5D&cauthor=true&cauthor_uid=23690584)., [Lu, H.R](https://www.ncbi.nlm.nih.gov/pubmed/?term=Lu%20HR%5BAuthor%5D&cauthor=true&cauthor_uid=23690584)., [Towart, R](https://www.ncbi.nlm.nih.gov/pubmed/?term=Towart%20R%5BAuthor%5D&cauthor=true&cauthor_uid=23690584)., [Gallacher, D.J](https://www.ncbi.nlm.nih.gov/pubmed/?term=Gallacher%20DJ%5BAuthor%5D&cauthor=true&cauthor_uid=23690584). and [Rodriguez B](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rodriguez%20B%5BAuthor%5D&cauthor=true&cauthor_uid=23690584). 2013. ‘Experimentally Calibrated Population of Models Predicts and Explains Intersubject Variability in Cardiac Cellular Electrophysiology’ *PNAS* 110(23): 2098-2105.

Brown, B. 2011. ‘Ethics in Darwin’s Melancholy Vision’ [*Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486) [42(1](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486/42/1)): 20-29.

Brown, K. 2003. ‘Integrating Conservation and Development: A Case of Institutional Misfit’ *Frontiers in Ecology and the Environment* 1(9): 479–487.

[Brüne](http://www.sciencemag.org.eresources.shef.ac.uk/search?author1=Martin+Br%C3%BCne&sortspec=date&submit=Submit), M., [Brüne-Cohrs, U. and McGrew](http://www.sciencemag.org.eresources.shef.ac.uk/search?author1=Ute+Br%C3%BCne-Cohrs&sortspec=date&submit=Submit), W.C. 2004. ‘Psychiatric Treatment for Great Apes?’ *Science* 306(5704): 2039.

[Calheiro](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0195666315003189)s, J.G.M.M. and [Oliveir](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0195666315003189)a, A. 2015. ‘Attached to Meat? (Un)Willingness and Intentions to Adopt a More Plant-Based Diet’ [*Appetite*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663) [95](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663/95/supp/C): 113–125.

Callicott, J.B. 1989. *In Defence of the Land Ethic: Essays in Environmental Philosophy* New York: SUNY Press.

* 1998. ‘The Conceptual Foundations of the Land Ethic’ in Zimmerman, M. (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* Upper Saddle River NJ: Prentice Hall. pp. 101-123.
* 2014. *Thinking Like a Planet: The Land Ethic and the Earth Ethic* Oxford: Oxford University Press.

Cambridge University News: 2013. ‘Aesop’s Fable Unlocks how we Think’  
<http://www.cam.ac.uk/research/news/aesops-fable-unlocks-how-we-think/accessed> 25/01/2013.

Campbell, R. 2014. ‘Reflective Equilibrium and Moral Consistency Reasoning’ *Australasian Journal of Philosophy* 92(3): 433-451.

Caney, S. 2007. ‘Global Poverty and Human Rights: The Case for Positive Duties’ in Thomas Pogge (ed.) *Freedom from Poverty as a Human Right: Who Owes What to the Very Poor?* New York: Oxford University Press. pp. 275-302.

Carrington, D. 8 August 2014. ‘Shooters Set Their Sights on UK’s Last Remaining Ruddy Ducks’ *The Guardian* <http://www.theguardian.com/environment/2014/aug/08/ruddy-ducks-cull-invasive-species> accessed 22/03/2015.

Centre for Biological Diversity. 2014. ‘New Data: 2.7 Million Animals Killed by Rogue Federal Wildlife Program in 2014'

[http://www.biologicaldiversity.org/news/press\_releases/2015/wildlife-services-04-13-2015.html accessed 10/11/2015](http://www.biologicaldiversity.org/news/press_releases/2015/wildlife-services-04-13-2015.html%20accessed%2010/11/2015).

Chen, I.C., [Hil](http://www.sciencemag.org/search?author1=Jane+K.+Hill&sortspec=date&submit=Submit)l, J.K., [Ohlemülle](http://www.sciencemag.org/search?author1=Ralf+Ohlem%C3%BCller&sortspec=date&submit=Submit)r, R., [Ro](http://www.sciencemag.org/search?author1=David+B.+Roy&sortspec=date&submit=Submit)y, D.B. and [Thoma](http://www.sciencemag.org/search?author1=Chris+D.+Thomas&sortspec=date&submit=Submit)s, C.D. 2011. ‘Rapid Range Shifts of Species Associated with High Levels of Climate Warming’ *Science* 333(6045): 1024-1026.

[Chew](http://www.sciencemag.org/search?author1=Matthew+K.+Chew&sortspec=date&submit=Submit), M.K. and Laubichler, M.D. 2003. ‘Natural Enemies: Metaphor or Misconception?’ *Science* 301(5629): 52-53.

Chollet, S. and Martin, J.L. 2013. ‘Declining Woodland Birds in North America: Should we Blame Bambi?’ *Diversity and Distributions* 19(4): 481–483.

Cinini, S.M., [Barnabe, G.F](https://www.ncbi.nlm.nih.gov/pubmed/?term=Barnabe%20GF%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [Galvão-Coelho, N](https://www.ncbi.nlm.nih.gov/pubmed/?term=Galv%C3%A3o-Coelho%20N%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [de Medeiros, M.A](https://www.ncbi.nlm.nih.gov/pubmed/?term=de%20Medeiros%20MA%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [Perez-Mendes, P](https://www.ncbi.nlm.nih.gov/pubmed/?term=Perez-Mendes%20P%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [Sousa, M.B](https://www.ncbi.nlm.nih.gov/pubmed/?term=Sousa%20MB%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [Covolan, L](https://www.ncbi.nlm.nih.gov/pubmed/?term=Covolan%20L%5BAuthor%5D&cauthor=true&cauthor_uid=24733997)., [Mello, L.E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Mello%20LE%5BAuthor%5D&cauthor=true&cauthor_uid=24733997). 2014. ‘Social Isolation Disrupts Hippocampal Neurogenesis in Young Non-Human Primates’ *Frontiers in Neuroscience* 8(45): 1-9.

Clancy, E. 2014. ‘Animals as Community Stakeholders: Inclusion of Pets in Social Policy and Practice (Occasional Essay)’ *Families in Society: The Journal of Contemporary Social Services* 95(4): 285-289.

Clubb, R., Rowcliffe, M., Lee, P.C. and Mason, G.J. 2008. ‘Compromised Survivorship in Zoo Elephants’ *Science* 322(5908): 1649.

Cochrane, A. 2012. *Animal Rights Without Liberation* New York: Columbia University Press.

Conservation Force Webpage: 2015. ‘Conservation Force Mission Statement  
 <http://www.conservationforce.org/roletwo.html> accessed 04/06/2015.

Cooper, C., Larson, L., Dayer, A., Stedman, R. and Decker, D. 2015. ‘Are Wildlife Recreationists Conservationists? Linking Hunting, Birdwatching, and Pro-Environmental Behavior’ *The Journal of Wildlife Management* 79(3): 446–457.

Cossins, D. 2014. ‘Plant Talk’ *The Scientist*  <http://www.thescientist.com/?articles.view/articleNo/38727/title/Plant-Talk/> accessed 23/09/2015.

Council of Europe Webpage: 2015. ‘Recommendation No. 61 on the Conservation of the White-Headed Duck (*Oxyura leucocephala*)’

<https://wcd.coe.int/ViewDoc.jsp?Ref=Rec(1997)61&Language=lanEnglish&Ver=original&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864> accessed 26/03/2015.

Cox, G.W. 2004. *Alien Species and Evolution: The Evolutionary Ecology of Exotic Plants, Animals, Microbes, and Interacting Native Species* Washington: Island Press.

Cronon, W. 1995. ‘The Trouble with Wilderness; or, Getting Back to the Wrong Nature’ in William Cronon (ed.) *Uncommon Ground: Rethinking the Human Place in Nature* New York: W.W. Norton and Company Inc. pp. 69-91.

Cruelty Free International. 2015. ‘Facts and Figures on Animal Testing’

<https://www.crueltyfreeinternational.org/why-we-do-it/facts-and-figures-animal-testing> accessed 15/02/2015.

Curtis, P.D. and Sullivan, K.L. 2001. ‘White-Tailed Deer’ *Wildlife Damage Management Fact Sheet Series* Ithaca NY: Cornell University <http://wildlifecontrol.info/pubs/Documents/Deer/Deer_factsheet.pdf> accessed 01/04/2016.

Dalton, R.W. 2015. *Children’s Bibles in America: A Reception History of the Story of Noah’s Ark in US Children’s Bibles* Bloomsbury: T&T Clark.

[Daneshjou](http://www.ncbi.nlm.nih.gov/pubmed/?term=Daneshjou%20K%5Bauth%5D),K., [Jafarieh](http://www.ncbi.nlm.nih.gov/pubmed/?term=Jafarieh%20H%5Bauth%5D), H., and [Raaeskarami](http://www.ncbi.nlm.nih.gov/pubmed/?term=Raaeskarami%20SR%5Bauth%5D), S.R. 2012. ‘Congenital Insensitivity to Pain and Anhydrosis (CIPA) Syndrome; A Report of 4 Cases’ *Iranian Journal of Pediatrics* 22(3): 412–416.

Daniels, N. 2013. ‘Reflective Equilibrium’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy* <http://plato.stanford.edu/archives/win2013/entries/reflective-equilibrium> accessed 17/08/2015.

Darwin, C. 1981. *The Descent of Man, and Selection in Relation to Sex* Princeton, NJ: Princeton University Press.

[Davis, T.E. III, Grills-Taquechel, A.E. and Ollendick](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0005789410000328), T.H. 2010. ‘The Psychological Impact From Hurricane Katrina: Effects of Displacement and Trauma Exposure on University Students’ [*Behavior Therapy*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00057894) 41(3): 340–349.

De Bruxelles, G.L. and Roberts, M.R. 2001. ‘Signals Regulating Multiple Responses to Wounding and Herbivores’ *Critical Reviews in Plant Sciences* 20(5): 487-521.

De Moraes, C. M., Lewis, W. J., Pare, P. W., Alborn, H. T. and Tumlinson, J. H. 1998. ‘Herbivore-Infested Plants Selectively Attract Parasitoids’ *Nature* 393: 570-573.

Des Jardins, J.R. 1993. *Environmental Ethics: An Introduction to Environmental Philosophy* Belmont California: Wadsworth Inc.

Department of Agriculture, Fisheries and Forestry Biosecurity Queensland Factsheet. 2016. ‘Lantana: Lantana camera’

<https://www.daf.qld.gov.au/__data/assets/pdf_file/0009/62010/IPA-Lantana-PP34.pdf> accessed 01/04/2016.

Devall, B and Sessions, G. 1985. *Deep Ecology: Living as if Nature Mattered* Layton, Utah: Gibbs Smith.

Donaldson, S. and Kymlicka, W. 2011. *Zoopolis: A Political Theory of Animal Rights* Oxford: Oxford University Press.

Donlan, C.J., Berger, J., Bock, C.E., Bock, J.H., Burney, D.A., Estes, J.A., Foreman, D., Martin, P.S., Roemer, G.W., Smith, F.A. and Soulé, M.E., 2006. ‘Pleistocene Rewilding: An Optimistic Agenda for Twenty-First Century Conservation’ [*The American Naturalist*](http://www.jstor.org/action/showPublication?journalCode=amernatu) 168(5): 660-681.

Dowling, T.E. and Secor, C.L. 1997. ‘The Role of Hybridization and Introgression in the Diversification of Animals.’ *Annual Review of Ecology and Systematics* 28: 593-619.

Drake, D., Paulin, J.B., Curtis, P.D., Decker, D.J. and San Julian, G.J. 2005. ‘Assessment of Negative Economic Impacts from Deer in the Northeastern United States’ *Journal of Extension*. 43(1): 1RIB5.

Driscoll, C.A., Menotti-Raymond, M., Roca, A.L., Hupe, K., Johnson, W.E., Geffen, E., Harley, E.H., Delibes, M., Pontier, D., Kitchener, A.C. and Yamaguchi, N. 2007. ‘The Near Eastern Origin of Cat Domestication’ *Science* 317(5837): 519-523.

Dubos, R. 2006. ‘Franciscan Conservation versus Benedictine Stewardship’ in Berry, R.J. (ed.) *Environmental Stewardship: Critical Perspectives Past and Present* London: T&T Clark. pp. 56-59.

Dudaniec, R.Y., Gardner, M.G., Donnellan, S. and Kleindorfer, S. 2008. ‘Genetic Variation in the Invasive Avian Parasite, Philornis downsi (Diptera, Muscidae) on the Galápagos Archipelago’ *BioMed Central Ecology* 8(13): 1.

Dunayer, J. 2004. *Speciesism* Derwood: Ryce Publishing.

Duffy, R. 2001. *Killing for Conservation: Wildlife Policy in Zimbabwe* Bloomington: Indiana University Press.

Earth First! Webpage: 2014. [http://www.earthfirst.org/about.htm accessed 03/02/2014](http://www.earthfirst.org/about.htm%20accessed%2003/02/2014).

Eaton, R.L. 2015. *Why We Hunt* University of Calgary Webpage

<http://people.ucalgary.ca/~powlesla/personal/hunting/eaton.txt> accessed 01/11/2015

Ehrlich, P.R., Dobkin, D.S. and Wheye, D. 1988. ‘The Decline of Eastern Songbirds’ Stanford University Webpage

<https://web.stanford.edu/group/stanfordbirds/text/essays/Eastern_Songbirds.html>

accessed 05/06/2015.

Elton, C.S. 1958. *The Ecology of Invasions by Animals and Plants* London: Methuen & Co. Ltd.

Emslie, R.H. 2012. ‘Diceros bicornis’ *The IUCN Redlist*

<http://www.iucnredlist.org/details/6557/0> accessed 04/06/2015.

Emslie, R.H. and Knight, M.H. 2015. ‘Update on African Rhino Status and Poaching Trends from IUCN SSC African Rhino Specialist Group’ Rhino Resource Centre: <http://www.rhinoresourcecenter.com/pdf_files/140/1406156621.pdf>

accessed 04/06/2015.

Engbeck Jr, J.H. 2015. *The Enduring Giants* California State Parks

<http://www.parks.ca.gov/?page_id=1151> accessed 04/09/2015.

Eshleman, A. 2014. ‘Moral Responsibility’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy* <http://plato.stanford.edu/archives/sum2014/entries/moral-responsibility/> accessed 20/03/2016.

European Commission DG Environment News. 2012.‘Deer Culls are not Effective for Forest Protection’ <http://ec.europa.eu/environment/integration/research/newsalert/pdf/275na4_en.pdf> accessed 15/06/2015.

European Initiative for Sustainable Development in Agriculture Annual Report. 2015. Berlin: EISA Publications.

<http://sustainable-agriculture.org/wp-content/uploads/2016/01/EISA-AR-2015-final.pdf> accessed 25/01/2016.

Farber, D.A. 2007. ‘Basic Compensation for Victims of Climate Change’ *University of Pennsylvania Law Review* 155(6): 1605-1656.

[Fausther-Bovendo](http://www.sciencedirect.com/science/article/pii/S1879625712000703), [H., Mulangu](http://www.sciencedirect.com/science/article/pii/S1879625712000703), [S., Sullivan, N.J. 2012. ‘Ebola Virus Vaccines for Humans and Apes’ *Current Opinion in Virology* 2(3): 324-329](http://www.sciencedirect.com/science/article/pii/S1879625712000703).

Feinberg, J. 1984. *The Moral Limits of the Criminal Law: Vol 1 Harm to Others* Oxford: Oxford University Press.

Ferdowsian, H. and Beck, N. 2011. ‘Ethical and Scientific Considerations Regarding Animal Testing and Research’ *PLoS ONE* 6(9): 1-4.

Ferreras, P., Rodríguez, A., Palomares, F. and Delibes, M. 2010. ‘Iberian Lynx: The Uncertain Future of a Critically Endangered Cat’ in MacDonald, D. and Loveridge, A. (eds.) *The Biology and Conservation of Wild Felids* Oxford: Oxford University Press. Ch. 24.

Fettman, M.J., Stanton, C.A., Banks, L.L., Hamar, D.W., Johnson, D.E., Hegstad, R.L. and Johnston, S., 1997. ‘Effects of Neutering on Bodyweight, Metabolic Rate and Glucose Tolerance of Domestic Cats’ [*Research in Veterinary Science*](http://www.sciencedirect.com/science/journal/00345288) 62(2): 131–136.

Flinn, M.V., Geary, D.C. and Ward, C.V. 2005. ‘Ecological Dominance, Social Competition and Coalitionary Arms Races: Why Humans Evolved Extraordinary Intelligence*’* *Evolution and Human Behavior* 26(1): 10–46.

Fitch, W.T. 2004. ‘Kin Selection and “Mother Tongues”: A Neglected Component in Language Evolution’ in Oller, D.K. and Griebel, U. (eds.) *Evolution of Communication Systems: A Comparative Approach* Cambridge MA: MIT Press.

Fitzgerald, B. M. and Veitch, C.R. 1985. ‘The Cats of Herekopare Island, New Zealand; Their History, Ecology and Affects (sic) on Birdlife’ *New Zealand Journal of Zoology* 12(3): 319-330.

Forterre, P. 2010. ‘Defining Life: The Virus Viewpoint.’ [*Origins of Life and Evolution of Biospheres*](http://link.springer.com/journal/11084) 40(2): 151-160.

Forward, M. and Alam, M. 2003. ‘Islam’, in Armstrong, S.B. and Botzler, R.G. (eds.) *The Animal Ethics Reader* London: Routledge. pp. 235-237.

Fouts, R.S., Chown, B and Goodin, L. 1976. ‘Transfer of Signed Responses in American Sign Language from Vocal English Stimuli to Physical Object Stimuli by a Chimpanzee’ *Learning and Motivation* 7(3): 458–475.

Fox, W. 1990. *Towards a Transpersonal Ecology: Developing New Foundations for Environmentalism* New York: SUNY Press.

Frank, D. and Dehasse. J. 2004. ‘Differential Diagnosis and Management of Human-Directed Aggression in Cats’ [*Clinical Techniques in Small Animal Practice*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/10962867) 19(4): 225–232.

Fraser, C. 2014. ‘The Crucial Role of Predators: A New Perspective on Ecology’.  [*Environment 360* http://e360.yale.edu/feature/the\_crucial\_role\_of\_predators\_a\_new\_perspective\_on\_ecology/2442/](file:///C:\Users\Think\Documents\Environment%20360%20%20http:\e360.yale.edu\feature\the_crucial_role_of_predators_a_new_perspective_on_ecology\2442\) accessed 03/05/2014.

Fyumagwa, R.D. and Nyahongo, J.W. 2010. ‘Black Rhino Conservation in Tanzania: Translocation Efforts and Further Challenges’ *Pachyderm* 47: 59-65.

Gajanan, M. 28 July 2015. ‘Cecil the Lion’s Death Prompts Calls to Ban Trophy Hunt Imports to U.S.’ *The Guardian* <http://www.theguardian.com/world/2015/jul/28/cecil-african-lion-import-ban-trophy-hunting> accessed 28/07/2015.

Gallup, G.G. 1979. *‘*Self Awareness in Primates*’ American Scientist* 67(4): 417-421.

Gansberg, M. 27 March 1964. ‘37 Who Saw Murder Didn’t Call the Police’ *New York Times* <http://www.nytimes.com/1964/03/27/37-who-saw-murder-didnt-call-the-police.html?_r=0> accessed 24/03/2016.

Genovart, M. 2009. ‘Natural Hybridization and Conservation’ [*Biodiversity and Conservation*](http://link.springer.com.eresources.shef.ac.uk/journal/10531)

18(6): 1435-1439.

Ghia, R. 16 April 2014. ‘Ebola: Outbreak Causes Crisis for Great Apes and Humans’ *Jane Goodall Institute of Canada News* <http://janegoodall.ca/get-involved/ebola-outbreaks-cause-crisis-great-apes-humans/> accessed 21/09/2014.

Gilabert, P. 2005. ‘The Duty to Eradicate Global Poverty: Positive or Negative?’ *Ethical Theory and Moral Practice* 7(5): 537-550.

Gill, R. 2000. ‘The Impact of Deer on Woodland Biodiversity’ *Forestry Commission Report* <http://www.forestry.gov.uk/pdf/fcin36.pdf/$FILE/fcin36.pdf> accessed 01/02/2015.

Gill, V. 27 June 2014. ‘Is Animal Ethics Killing Wild Apes?’ *BBC News* <http://www.bbc.co.uk/news/science-environment-27896589> accessed 15/10/2014.

Gionfriddo, J.P., Denicola, A.J., Miller, L.A. and Fagerstone, K.A. 2011. ‘Health Effects of GnRH Immunocontraception of Wild White-Tailed Deer in New Jersey’ *Wildlife Society Bulletin Special Issue: Ecology and Management of Deer in Developed Landscapes* 35(3): 149–160.

Goodall, J. 2008. ‘Problems Faced by Wild and Captive Chimpanzees: Finding Solutions.’ in Armstrong, S.B. and Botzler, R.G. (eds.) *The Animal Ethics Reader* Oxford: Routledge.

Goodpaster, K. 1978. ‘On Being Morally Considerable’ *The Journal of Philosophy* 75(6): 308-325.

Grant P.R. and Grant B.R. 1992. ‘Hybridization of Bird Species.’ *Science* 256(5054): 193-197.

Greek, R., Shanks, N. and Rice, M.J. 2011. ‘The History and Implications of Testing Thalidomide on Animals’ *The Journal of Philosophy, Science & Law* 11: 1-32.

Green, A. and Hughes, B. 2015. ‘Action Plan for the White-headed Duck (Oxyura leucocephala) in Europe.’ *Wildfowl and Wetlands Trust Report*.

<http://centrostudinatura.it/public2/documenti/139-2152.pdf> accessed 26/03/2015.

Gruen, L. 2011. ‘The Ethics of Captivity’ <http://onthehuman.org/2011/06/the-ethics-of-captivity/> accessed 20/06/2014.

* 2014 ‘The Moral Status of Animals’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy* (2014 edition), <http://plato.stanford.edu/archives/fall2014/entries/moral-animal> accessed 20/01/2015.

Gruen, L, [Fultz](http://ilarjournal.oxfordjournals.org/search?author1=Amy+Fultz&sortspec=date&submit=Submit), A. and  [Pruetz](http://ilarjournal.oxfordjournals.org/search?author1=Jill+Pruetz&sortspec=date&submit=Submit), J. 2013. ‘Ethical Issues in African Great Ape Field Studies’ *Institute for Laboratory Animal Research Journal* 54(1): 24-32.

The Guardian*.* May 31 2010. ‘Malaysian Minister says God made Animals for Testing’ <http://www.theguardian.com/world/2010/may/31/malaysia-minister-animal-testing> accessed 16/01/2013.

Guerrini, A. 1989. ‘The Ethics of Animal Experimentation in Seventeenth-Century England’ *Journal of the History of Ideas* 50(3): 391-407.

Gwin, P. 2012. ‘Rhino Wars’ *National Geographic*

<http://ngm.nationalgeographic.com/2012/03/rhino-wars/gwin-text> accessed 01/04/2016.

Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S.A., Tyukavina, A., Thau, D., Stehman, S.V., Goetz, S.J., Loveland, T.R. and Kommareddy, A., 2013. ‘High-Resolution Global Maps of 21st-Century Forest Cover Change’ *Science* 342(6160): 850-853.

Hare, R.M. 1973. ‘Rawls’ Theory of Justice: A Review’ *The Philosophical Quarterly* 23(91): 144-155.

Harrison, N.V. 2001. ‘Women, Human Identity, and the Image of God: Antiochene Interpretations’ *Journal of Early Christian Studies* 9(2): 205-49.

Harrison, P. 1992. *‘*Descartes on Animals’ *The Philosophical Quarterly* 42(167): 219-227.

The Harvard University Gazette. 2000. ‘Why Onions Have More DNA Than You Do’ <http://news.harvard.edu/gazette/2000/02.10/onion.html> accessed 06/01/2015.

Harvard Women’s Health Watch. 2009. ‘Becoming a Vegetarian’

<http://www.health.harvard.edu/staying-healthy/becoming-a-vegetarian>

accessed 03/02/2016.

Henderson, I.S. 2006. ‘Recent Measures to Control Ruddy Ducks Oxyura Jamaicensis in the United Kingdom’ in Boere, G.C., Galbraith, C.A and Stroud, D.S(eds.) *Waterbirds Around the World* Edinburgh: The Stationery Office. pp. 822-825.

Herman, L.M. 1986. *‘*Cognition and Language Competencies of Bottlenosed Dolphins’ in  [Schusterman](https://www.amazon.co.uk/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Ronald%20J.%20Schusterman), R.J. and [Thomas](https://www.amazon.co.uk/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Jeanette%20A.%20Thomas), J.A. (eds.) *Dolphin Cognition and Behavior: A Comparative Approach* Hove: Psychology Press. pp. 221-252.

Herman, L.M. and Samuels, P.M. 1996. *‘*Knowledge Acquisition and Asymmetry Between Language Comprehension and Production: Dolphins and Apes as General Models for Animals.’ in Bekoff, M. and Jamieson, D. (eds.) *Readings in Animal Cognition* Cambridge MA: MIT Press. pp. 289-306.

Herriges, J.D., Thorne, T. and Anderson, S.L. 2012. ‘Vaccination to Control Brucellosis in Free-Ranging Elk’ in Brown, R. (ed.) *The Biology of Deer* New York: Springer Science & Business Media. pp. 106-112.

The Hindu American Foundation for The Humane Society of the United States:2014. ‘Hinduism and the Ethical Treatment of Animals’

<http://www.humanesociety.org/assets/pdfs/faith/hinduism_and_the_ethical.pdf>

accessed 05/01/2014.

Holmes, E.C. 2011. What Does Virus Evolution Tell Us about Virus Origins? *Journal of Virology* 85(11): 5247-5251.

Horsley, S.B., Stout, S.L. and deCalesta, D.S. 2003. ‘White-tailed Deer Impact on the Vegetation Dynamics of a Northern Hardwood Forest’. *Ecological Applications* 13(1): 98-118.

Howard, B.C. 2013. ‘Rhino Hunt Permit Auction Sets Off Conservation Debate’ *National Geographic*

<http://news.nationalgeographic.com/news/2013/10/131028-dallas-safari-club-black-rhino-hunt-auction-conservation/> accessed 04/06/2015.

Howard, B.C. 2015. ‘U.S. Will Allow Hunters to Bring Home Rhino Trophies’ *National Geographic*:

<http://news.nationalgeographic.com/2015/03/150326-black-rhino-trophy-hunting-namibia-approval-conservation/> accessed 04/06/2015.

Hughes, B.J., Martin, G.R. and Reynolds, S.J. 2008. ‘Cats and Seabirds: Effects of Feral Domestic Cat *Felis silvestris catus* Eradication on the Population of Sooty Terns *Onychoprion fuscata* on Ascension Island, South Atlantic.’ *Ibis* 150(1): 122–131.

The Humane Society of the United States. 2016. ‘Farm Animal Statistics: Slaughter Totals’ <http://www.humanesociety.org/news/resources/research/stats_slaughter_totals.html?referrer=https://www.google.co.uk/> accessed 04/02/2016.

The Humane Society Webpage: 2016. ‘Myths and Truths About Spay/Neuter’: <http://humanesocietyofcharlotte.org/clinic-services/clinic-srvicesmyths-and-truths-about-spayneuter/> accessed 13/04/2016.

Hung-Lee, F. and Fen-Hauh, J. 2015. ‘The Effects of Recreation Experience, Environmental Attitude, and Biospheric Value on the Environmentally Responsible Behavior of Nature-Based Tourists’ [*Environmental Management*](http://link.springer.com/journal/267) 56(1): 193-208.

International Institute for Sustainable Development Webpage: 2016. ‘Natural and Social Capital’ <http://www.iisd.org/topic/natural-and-social-capital> accessed 25/01/2016

IUCN Redlist. 2008. ‘Oxyura leucocephala’

<http://www.iucnredlist.org/details/22679814/0%C2%A04> accessed 22/03/2015.

IUCN Webpage: 2001. ‘2001 IUCN Red List Categories and Criteria version 3.1’ <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#critical> accessed 01/06/2015.

James, S.P. 2006. ‘Buddhism and the Ethics of Species Conservation’ *Environmental Values* 15(1): 85-97.

Jamieson, D. 1985. ‘Against Zoos’ in Singer, P. (ed.) *In Defense of Animals* New York: Basil Blackwell. pp. 108-117.

* 1998. ‘Animal Liberation is an Environmental Ethic’ *Environmental Ethics* 7(1): 41-57.
* 1994. Global Environmental Justice. *Royal Institute of Philosophy Supplement* 36: 199-210.
* 2008. ‘The Rights of Animals and the Demands of Nature’ *Environmental Values* 17: 181-199.

Johnston, I. 23 January 2013. ‘Natural Born Killers: Campaign Demands Eradication of Cats from New Zealand’ *NBC News*

<http://worldnews.nbcnews.com/_news/2013/01/23/16657915-natural-born-killer-campaign-demands-eradication-of-cats-from-new-zealand?lite> accessed 01/11/2015.

[Jørgensen](http://www.sciencedirect.com/science/article/pii/S0016718514002504), D. 2015. ‘Rethinking Rewilding’ *Geoforum* 65: 482–488.

Judicial Studies Board for Northern Ireland. 2014. ‘Self-Defence’

<http://www.jsbni.com/Publications/BenchBook/Pages/5-8-Self-defence.aspx>

accessed 10/10/2014

Kannan, R., Shackleton, C.M. and Shaanker, R.U. 2013. ‘Reconstructing the History of Introduction and Spread of the Invasive Species, Lantana, at Three Spatial Scales in India’ *Biological Invasions* 15(6): 1287-1302.

Kath, J., Reardon-Smith, K., Le Brocque, A.F., Dyer, F.J., Dafny, E., Fritz, L. and Batterham, M. 2014. ‘Groundwater Decline and Tree Change in Floodplain Landscapes: Identifying Non-Linear Threshold Responses in Canopy Condition’ [*Global Ecology and Conservation*](http://www.sciencedirect.com/science/journal/23519894) 2: 148–160.

Kerth, G., Perony, N., Schweitzer, F. 2015. ‘Bats are Able to Maintain Long-term Social Relationships Despite the High Fission–fusion Dynamics of Their Groups’ The Royal Society Online: <http://rspb.royalsocietypublishing.org/content/278/1719/2761> accessed 06/01/2015.

King, R.H. 1991. ‘Environmental Ethics and the Case for Hunting’ *Environmental Ethics* 13(1): 59-85.

Kleindorfer, S., Peters, K.J., Custance, G., Dudaniec, R.Y. and O'Connor, J.A. 2014. ‘Changes in Philornis Infestation Behavior Threaten Darwin’s Finch Survival.’ *Current Zoology* 60(4): 542–550.

[Kollmuss](http://www.tandfonline.com/author/Kollmuss%2C+Anja), A. and [Agyeman](http://www.tandfonline.com/author/Agyeman%2C+Julian), J. 2002. ‘Mind the Gap: Why do People Act Environmentally and What are the Barriers to Pro-Environmental Behavior? *Environmental Education Research* 8(3): 239-260.

Köndgen, S., Kühl, H., N'Goran, P.K., Walsh, P.D., Schenk, S., Ernst, N., Biek, R., Formenty, P., Mätz-Rensing, K., Schweiger, B. and Junglen, S. 2008. ‘Pandemic Human Viruses Cause Decline of Endangered Great Apes’ *Current Biology* 18(4): 260-4.

Larson, B.M.H., Nerlich, B. and Wallis, P. 2005. ‘Metaphors and Biorisks: The War on Infectious Diseases and Invasive Species.’ *Science Communication* 26(3): 243-268.

Lash, R.R., Brunsell, N.A. and Peterson, A.T. 2008. ‘Spatiotemporal Environmental Triggers of Ebola and Marburg Virus Transmission’ *Geocarto International* 23(6): 451-466.

Leader-Williams, N., Milledge, S., Adcock, K., Brooks, M., Conway, A., Knight, M., Mainka, S., Martin, E.B. and Teferi, T. 2005. ‘Trophy Hunting of Black Rhino Diceros bicornis: Proposals to Ensure Its Future Sustainability’ *Journal of International Wildlife Law & Policy* 8(1): 1-11.

Lemons, J. 1991. ‘Ecological Stress Phenomena and Holistic Environmental Ethics: A Viewpoint’ in Rose, J. (ed.) *Environmental Concepts, Policies, and Strategies:* [*Volume 2 of Current Topics in Remote Sensing*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Current+Topics+in+Remote+Sensing%22&source=gbs_metadata_r&cad=7) [*Environmental Topics*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Environmental+topics%22&source=gbs_metadata_r&cad=7) Boca Raton, FL: CRC Press. p.121.

Leopold, A. 1968. *A Sand County Almanac and Sketches Here and There* New York: Oxford University Press.

Lichtenberg, J. 2010. ‘Negative Duties, Positive Duties, and the “New Harms”’ *Ethics* 120(3): 557-578.

Lieberman, P. 1994. *‘*Human Language and Human Uniqueness’ *Language & Communication* 14(1): 87-95.

Liebsch, M., Grune, B., Seiler, A., Butzke, D., Oelgeschläger, M., Pirow, R., Adler, S., Riebeling, C. and Luch, A. 2011.‘Alternatives to Animal Testing: Current Status and Future Perspectives’ *Archives of Toxicology* 85(8): 841-858.

[Lindse](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)y, [P.A., Roule](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)t, P.A. and [Romaña](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)ch, S.S. 2007. ‘Economic and Conservation Significance of the Trophy Hunting Industry in sub-Saharan Africa’ *Biological Conservation* 134(4): 455–469.

Loss, S.R., Will, T., Marra, P.P. 2013. ‘The Impact of Free-Ranging Domestic Cats on Wildlife of the United States’ *Nature Communications* 4(1396): 1-8.

Lynch, T. and Wells, D. 1998.‘Non-Anthropocentrism? A Killing Objection’ [*Environmental Values*](http://www.jstor.org.eresources.shef.ac.uk/action/showPublication?journalCode=envivalu) 7(2): 151-163.

Lynx UK Trust Webpage: 2015. ‘Bringing the Lynx Back to the British Isles’ <http://www.lynxuk.org/> accessed 01/08/2015.

Lyons, D. 2004. ‘Corrective Justice, Equal Opportunity and the Legacy of Slavery and Jim Crow’ *Boston University Law Review* 84: 1375-1402.

MacCleery, D.W. 1993. *American Forests: A History of Resiliency and Recovery* Durham NC: United States Department of Agriculture Forest Service.

Malm, H. M. 2000. ‘Bad Samaritan Laws: Harm, Help, or Hype?’ *Law and Philosophy* 19(6): 707-750.

Marder, M. and Francione, G. 2013. *In Conversation* Columbia University Webpage:<http://www.cup.columbia.edu/static/marder-francione-debate> accessed 15/04/2013.

Marshall, C. 23 July 2015. ‘Ban Lifted on Controversial ‘Neonic’ Pesticide’ *BBC News*  <http://www.bbc.co.uk/news/science-environment-33641646> accessed 03/05/2016.

Martin, T.G., Arcese, P., Kuhnert, P.M., Gaston, A.J. and Martin, J.L. 2013. ‘Prior Information Reduces Uncertainty About the Consequences of Deer Overabundance on Forest Birds’ *Biological Conservation* 165: 10–17.

Martins do Vale, F. 2014. ‘Response to: Is Animal Research Sufficiently Evidence Based to be a Cornerstone of Biomedical Research?’ *British Medical Journal* 348: 20.

Mateo, R., Green, A.J., Jeske, C.W., Urios, V. and Gerique, C. 2001. ‘Lead poisoning in the Globally Threatened Marbled Teal and White-Headed Duck in Spain’ *Environmental Toxicology and Chemistry* 20(12): 2860–2868.

Mathiesen, K. 20 May 2015. ‘The Idea That Hunting Saves African Wildlife Doesn’t Bear Scrutiny’ *The Guardian* <http://www.theguardian.com/environment/2015/may/20/the-idea-that-hunting-saves-african-wildlife-doesnt-withstand-scrutiny> accessed 04/06/2015.

Max Planck Institute News.6 December 2006. ‘Ebola Outbreak Kills 5000 Gorillas’ <http://www.mpg.de/530935/pressRelease20061206> accessed 21/09/2014.

McClelland, N.C. 2010. *Encyclopedia of Reincarnation and Karma* Jefferson, North Carolina: McFarland & Company.

McCloskey, H.J. 1965. ‘Rights’ *Philosophical Quarterly* 15(5): 115-127.

* 1979. ‘Moral Rights and Animals’ *Inquiry* 22(1): 23-54.

McDermott, J.P. 1989. ‘Animals and Humans in Early Buddhism’. *Indo-Iranian Journal* 32(4): 269-280.

McIntyre, A. 2014. ‘Doctrine of Double Effect’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy*<http://plato.stanford.edu/archives/win2014/entries/double-effect> accessed 30/01/2015.

McMahan, J. 2002. *The Ethics of Killing: Problems at the Margins of Life* Oxford: Oxford University Press.

* 2014. ‘The Moral Problem of Predation.’ <http://jeffersonmcmahan.com/wp-content/uploads/2012/11/The-Moral-Problem-of-Predation.pdf> accessed 18/05/2015.

McNeill, J. R. 2006. ‘Population and the Natural Environment: Trends and Challenges’ *Population and Development Review*: *The Political Economy of Global Population Change, 1950-2050* 32: 183-201.

Medina, F.M., Bonnaud, E., Vidal, E., Tershy, B.R., Zavaleta, E.S., Josh Donlan, C., Keitt, B.S., Corre, M., Horwath, S.V. and Nogales, M. 2011. ‘A Global Review of the Impacts of Invasive Cats on Island Endangered Vertebrates’ *Global Change Biology* 17(11): 3503–3510.

Merckx, T. 2015. ‘Rewilding: Pitfalls and Opportunities for Moths and Butterflies’ in  [Pereira](http://link.springer.com/search?facet-creator=%22Henrique+M.+Pereira%22), H.P. and [Navarro](http://link.springer.com/search?facet-creator=%22Laetitia+M.+Navarro%22), L.M. (eds.) *Rewilding European Landscapes* New York: Springer.

Miller, L.A. and Killian, G.J. 2000. ‘Seven Years of White-Tailed Deer Immunocontraceptive Research at Penn State University: A Comparison of Two Vaccines.’ *Wildlife Damage Management Conference. Paper 14.*

<http://digitalcommons.unl.edu/icwdm_wdmconfproc/14> accessed 28/07/2015.

Monbiot, G. 2013. *Feral: Rewilding the Land, Sea and Human Life* London: Penguin Books.

Moore, M.S. 2013. ‘Further Thoughts on Causation (and Related Topics) Prompted by 15 Critics’ in Kahmen, B. and Stepanians, M. (eds.) *Critical Essays on Causation and Responsibility* Berlin: Walter de Gruyter.

* 1997. *Placing Blame: A General Theory of the Criminal Law* Oxford: Oxford University Press.

Minteer, B.A. and Collins, J.P. 2013. ‘Ecological Ethics in Captivity: Balancing Values and Responsibilities in Zoo and Aquarium Research under Rapid Global Change’ *ILAR* 54(1): 41-51.

Moreira, D. and López-García, P. 2009. ‘Ten Reasons to Exclude Viruses from the Tree of Life.’ *Nature Reviews Microbiology* 7: 306-311.

Müller, T., Bätza, H.J., Freuling, C., Kliemt, A., Kliemt, J., Heuser, R., Schlüter, H., Selhorst, T., Vos, A. and Mettenleiter, T.C. 2012. ‘Elimination of Terrestrial Rabies in Germany Using Oral Vaccination of Foxes.’ *Berliner und Munchener Tierarztliche Wochenschrift* 125(5-6): 178-190.

[Muñoz-Fuentes](http://link.springer.com/search?facet-author=%22Violeta+Mu%C3%B1oz-Fuentes%22), V., [Green](http://link.springer.com/search?facet-author=%22Andy+J.+Green%22), A.J., [Negro](http://link.springer.com/search?facet-author=%22Juan+Jos%C3%A9+Negro%22), J.J.,  [Sorenson, M.D. 2005. ‘Population Structure and Loss of Genetic Diversity in the Endangered White-Headed Duck, Oxyura leucocephala’](http://link.springer.com/search?facet-author=%22Michael+D.+Sorenson%22) [*Conservation Genetics*](http://link.springer.com/journal/10592) [6(6): 999-1015](http://link.springer.com/search?facet-author=%22Michael+D.+Sorenson%22).

Murphy, L.B. 1993. ‘The Demands of Beneficence’ *Philosophy and Public Affairs* 22(4): 267-292.

Næss, A. 1978. ‘The Shallow and the Deep, Long-range Ecology Movement: A Summary’ *Inquiry: An Interdisciplinary Journal of Philosophy* 16(1-4): 95-100.

* 1998. ‘The Deep Ecological Movement: Some Philosophical Aspects’ in Zimmerman, M. (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* Upper Saddle River NJ: Prentice Hall. p. 196.
* 1979. ‘Self-realization in mixed communities of Humans, Bears, Sheep, and Wolves’ *Inquiry: An Interdisciplinary Journal of Philosophy* 22(1-4): 231-241.

National Aeronautics and Space Administration (NASA) Webpage: 2014.

<http://map.gsfc.nasa.gov/universe/uni_life.html> accessed 01/12/2014.

National Geographic Online. 2013. ‘Chimpanzee: Pan Troglodytes’

<http://animals.nationalgeographic.co.uk/animals/mammals/chimpanzee/>accessed 26/02/2013.

* 2013. ‘Galápagos Tortoise: Geochelone elephantophus’

[http://animals.nationalgeographic.co.uk/animals/reptiles/galapagos-tortoise](http://animals.nationalgeographic.co.uk/animals/reptiles/galapagos-tortoise accessed 26/02/2013)

[accessed 26/02/2013](http://animals.nationalgeographic.co.uk/animals/reptiles/galapagos-tortoise accessed 26/02/2013).

Native Songbird Care and Conservation Webpage: 2015. ‘Help Songbirds’

<http://www.nativesongbirdcare.org/Help_Songbirds.html> accessed 05/06/2015.

[Neubauer](http://www.sciencemag.org/search?author1=Philipp+Neubauer&sortspec=date&submit=Submit), P., [Jensen](http://www.sciencemag.org/search?author1=Olaf+P.+Jensen&sortspec=date&submit=Submit), O.P., [Hutchings](http://www.sciencemag.org/search?author1=Jeffrey+A.+Hutchings&sortspec=date&submit=Submit), J.A. and [Baum](http://www.sciencemag.org/search?author1=Julia+K.+Baum&sortspec=date&submit=Submit), J.K. 2013. ‘Resilience and Recovery of Overexploited Marine Populations’ *Science* 340(6130): 347-349.

National Health Service Choices. 2016. ‘Eating Meat and Staying Healthy’ <http://www.nhs.uk/Livewell/Goodfood/Pages/meat.aspx> accessed 03/02/2016.

Norcross, A. 2004. ‘Puppies, Pigs and People: Eating Meat and Marginal Cases’ *Philosophical Perspectives* 18: 229-245.

Neumann, R.P. 2001. ‘Africa's 'Last Wilderness': Reordering Space for Political and Economic Control in Colonial Tanzania’ *Africa: Journal of the International African Institute* 71(4): 641-665.

New South Wales GovernmentWebpage: 2016. ‘Lantana’

<http://weeds.dpi.nsw.gov.au/Weeds/Details/78> accessed 10/04/2016.

Nogales, M., Martín, A., Tershy, B.R., Donlan, C., Veitch, D., Puerta, N., Wood, B. and Alonso, J. 2004. ‘A Review of Feral Cat Eradication on Islands’ *Conservation Biology* 18(2): 310–319.

The Non-Native Species Secretariat Webpage: 2015. ‘Definition of Terms’

<http://www.nonnativespecies.org/index.cfm?pageid=64> accessed 04/03/2015.

* 2015. ‘Ruddy Duck Project’

<http://www.nonnativespecies.org/index.cfm?pageid=244> accessed 22/03/2015.

The Non-Native Species Secretariat Webpage: 2015. ‘White-Headed Duck Task Force’ <http://www.nonnativespecies.org/index.cfm?pageid=245> accessed 22/03/2015.

Nuechterlein, G.L. and Storer, R.W. 1982. ‘The Pair-Formation Displays of the Western Grebe’ *The Condor* 84(4): 351-369.

Oates, J.F., Tutin, C.E.G., Humle, T., Wilson, M.L., Baillie, J.E.M., Balmforth, Z., Blom, A., Boesch, C., Cox, D., Davenport, T., Dunn, A., Dupain, J., Duvall, C., Ellis, C.M., Farmer, K.H., Gatti, S., Greengrass, E., Hart, J., Herbinger, I., Hicks, C., Hunt, K.D., Kamenya, S., Maisels, F., Mitani, J.C., Moore, J., Morgan, B.J., Morgan, D.B., Nakamura, M., Nixon, S., Plumptre, A.J., Reynolds, V., Stokes, E.J. & Walsh, P.D. 2008.‘Pan troglodytes’ *The IUCN Redlist* <http://www.iucnredlist.org/details/15933/0> accessed 31/10/2015.

Ozoga, J.J. 1972. ‘Aggressive Behavior of White-Tailed Deer at Winter Cuttings’ *The Journal of Wildlife Management* 36(3): 861-868.

The Oxford Index. 2014. ‘Self-Defence’

<http://oxfordindex.oup.com/view/10.1093/oi/authority.20110803100453218> accessed 11/10/2014.

Palmer, C. 2010. *Animal Ethics in Context* New York: Columbia University Press.

Passmore, J. 1975. *‘*The Treatment of Animals*’ Journal of the History of Ideas* 36(2): 195-218.

Pearce, F. 2015. *The New Wild: Why Invasive Species Will Be Nature’s Salvation* London: Icon Books.

* 2015. ‘Why Africa’s National Parks Are Failing to Save Wildlife’ *Environment 360* <http://e360.yale.edu/feature/why_africas_national_parks_are_failing_to_save_wildlife/2231/> accessed 04/06/2015.

Peretti, J.H. 1998. ‘Nativism and Nature: Rethinking Biological Invasion’ *Environmental Values* 7(2): 183-192.

Perlo, K.W. 2009. *Kinship and Killing: The Animal in World Religions* New York: Columbia University Press.

Pew Research Centre’s Forum on Religion & Public Life. 2012. ‘The Global Religious Landscape: A Report on the Size and Distribution of the World’s Major Religious Groups as of 2010’ <http://www.pewforum.org/2012/12/18/global-religious-landscape-exec/> accessed 15/05/2015.

Phillips, M.T. 1993. ‘Savages, Drunks, and Lab Animals: The Researcher's Perception of Pain’ [*Society and Animals*](http://www.ingentaconnect.com/content/brill/saa;jsessionid=11k1g3v0ok0ku.alexandra) 1(1): 61-81.

Piazza, J., Ruby, M.B., Loughnan, S., Luong, M., Kulik, J., Watkins, H.M. and Seigerman, M. 2015. ‘Rationalizing Meat Consumption. The 4Ns’[*Appetite*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663) 91: 114–128.

Piesing, M. 23 August 2014. ‘How Tech Could Spell the End of Animals in Drug Testing’ *The Guardian* <https://www.theguardian.com/science/2014/aug/23/tech-end-animals-drugs-testing> accessed 20/04/2016.

Pimentel, D. 2006. ‘Soil Erosion: A Food and Environmental Threat’ *Environment, Development and Sustainability* 8: 119-137.

Popkin, G. 2016. ‘Satellite Alerts Track Deforestation in Real Time’ *Nature* 530(7591): 392-393.

Pound, P. and Bracken, M.B. 2014. ‘Is Animal Research Sufficiently Evidence Based to be a Cornerstone of Biomedical Research?’ *British Medical Journal* 348: 18.

Powers, J.G., Monello, R.J., Wild, M.A., Spraker, T.R., Gionfriddo, J.P., Nett, T.M. and Baker, D.L. 2014.  ‘Effects of GonaCon Immunocontraceptive Vaccine in Free-Ranging Female Rocky Mountain Elk (Cervus elaphus nelsoni)’ *Wildlife Society Bulletin* 38(3): 650–656.

Preston, J.L., Ritter, R.S. and Hernandez, J.I. 2010. ‘Principles of Religious Prosociality: A Review and Reformulation’ *Social and Personality Psychology Compass* 4(8): 574–590.

Rachels, J. 1976. ‘A Reply to VanDeVeer’ in Regan, T. and Singer, P. (eds.) *Animal Rights and Human Obligations* Englewood Cliffs: Prentice-Hall, 1976.

* 1991. *Created from Animals: The Moral Implications of Darwinism* Oxford: Oxford University Press.

Railton, P. 2015. ‘On Richard Brandt’s The Science of Man and Wide Reflective Equilibrium’ *Ethics* 125(4): 1135-1141.

Rawinski, T.J. 2008. ‘Impacts of White-Tailed Deer Overabundance in Forest Ecosystems: An Overview’ Newtown Square PA: Northeastern AreaState and Private Forestry Service <http://www.na.fs.fed.us/fhp/special_interests/white_tailed_deer.pdf> accessed 05/06/2015.

Rawls, J. 1951. ‘Outline for a Decision Procedure for Ethics’ *The Philosophical Review* 60(2): 177-197.

Reed, D.H. and Frankham, R. 2003. ‘Correlation between Fitness and Genetic Diversity’. *Conservation Biology* 17(1): 230–237.

Regan, T. 1998. ‘Animal Rights, Human Wrongs’in Zimmerman, M. (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* Upper Saddle River NJ: Prentice Hall. pp. 43-44.

* 2001. *Defending Animal Rights* Champaign: University of Illinois Press.
* 2004. *The Case for Animal Rights* Oakland: University of California Press.
* 1983. *The Case for Animal Rights* London: Routledge and Kegan Paul.

Reiss, D. 2011. *The Dolphin in the Mirror: Exploring Dolphin Minds and Saving Dolphin Lives* Boston: Houghton Mifflin Harcourt.

Reuters. 21 January 2014. ‘Empiriko Brings Game-Changing Technology to Drug Discovery and Clinical Research Industry’

<http://www.reuters.com/article/idUSnMKW0j182a+1c0+MKW20140121>accessed 20/04/2016.

[Reuveny, R. 2007. ‘Climate Change-Induced Migration and Violent Conflict’](http://www.sciencedirect.com/science/article/pii/S0962629807000601) [*Political Geography*](http://www.sciencedirect.com/science/journal/09626298)  [26(6](http://www.sciencedirect.com/science/journal/09626298/26/6)[): 656–673.](http://www.sciencedirect.com/science/article/pii/S0962629807000601)

Rewilding Europe Webpage: 2015. ‘Wildlife Comeback’

<http://www.rewildingeurope.com/about/background-and-goals/wildlife-comeback/> accessed 28/07/2015.

Rhymer J.M. and Simberloff, D. 1996. ‘Extinction by Hybridization and Introgression’ *Annual Review of Ecology and Systematics*. 27: 83-109.

Rich, T.C.G. 2014. ‘Hieracium attenboroughianum (Asteraceae), a New Species of Hawkweed’ *New Journal of Botany* 4(3): 172-175.

[Ringle](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S000632071400487X)r, D., Russell, J.C. and [Le Corr](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S000632071400487X)e, M. 2015. ‘Trophic Roles of Black Rats and Seabird Impacts on Tropical Islands: Mesopredator Release or Hyperpredation?’ [*Biological Conservation*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00063207) 185: 75–84.

Ripstein, A. 2000. ‘Three Duties to Rescue: Moral, Civil, and Criminal’ *Law and Philosophy* 19(6): 751-779.

[Rizkalla](http://link.springer.com/search?facet-author=%22Carol+Rizkalla%22), C.,  [Blanco-Silva](http://link.springer.com/search?facet-author=%22Francisco+Blanco-Silva%22), F. and  [Gruver, S. 2007. ‘Modeling the Impact of Ebola and Bushmeat Hunting on Western Lowland Gorillas’ *EcoHealth*](http://link.springer.com/search?facet-author=%22Stephanie+Gruver%22)  [4(2): 151-155](http://link.springer.com/search?facet-author=%22Stephanie+Gruver%22).

Robbins, M and Williamson, L. 2008. ‘Gorilla Beringei’ *IUCN Redlist*

<http://www.iucnredlist.org/details/39994/0> accessed 21/09/2014.

Robinson, R. 2001. *The Debt: What America Owes to Blacks* London: Penguin Publishing.

Rodríguez, A. and Calzada, J. 2015. ‘Lynx pardinus’ *IUCN Redlist*

<http://www.iucnredlist.org/details/12520/0> accessed 01/08/2015.

Rohwer, F., Prangishvili, D. and Lindell, D. 2009. ‘Roles of Viruses in the Environment’ *Environmental Microbiology* 11(11): 2771–2774.

Rollins, W.H. 1999. ‘Imperial Shades of Green: Conservation and Environmental Chauvinism in the German Colonial Project’ *German Studies Review* 22(2): 187-213.

Rolston III, H. 1998. ‘Challenges in Environmental Ethics’ in Zimmerman, M. (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* Upper Saddle River NJ: Prentice Hall. pp. 124-144.

* 2000. 'The Land Ethic at the Turn of the Millennium' *Biodiversity and Conservation* 9(8): 1045–1058.

Romohr, P.W. 2006. ‘A Right/Duty Perspective on the Legal and Philosophical Foundations of the No-Duty-to-Rescue Rule’ *Duke Law Journal* 55(5): 1025-1057.

Rowan, A.N. 2015. ‘Ending the Use of Animals in Toxicity Testing and Risk Evaluation’[*Cambridge Quarterly of Healthcare Ethics*](http://journals.cambridge.org.eresources.shef.ac.uk/action/displayFulltext?type=1&fid=9949951&jid=CQH&volumeId=24&issueId=04&aid=9949947&bodyId=&membershipNumber=&societyETOCSession=) 24(4): 448-458.

Rowlands, M. 2002. *Animals Like Us* London: Verso.

Royal Society for the Prevention of Cruelty to Animals. 2015. ‘Medicines and Vaccines’ <https://www.rspca.org.uk/adviceandwelfare/laboratory/medicinesandvaccines> accessed 30/10/2015.

* 2016. ‘Our History’ <https://www.rspca.org.uk/utilities/aboutus/history> accessed 01/02/2016.

Royal Society for the Protection of Birds News. 2015. ‘Ascension Seabirds on the Ascent’ <http://www.rspb.org.uk/news/details.aspx?id=336398> accessed 16/05/2015.

Royle, S.A. 2004. ‘Human Interference on Ascension Island.’ *Environmental Archaeology* 9: 127-134.

Rubenstein, D.R., Rubenstein, D.I., Sherman, P.W. and Gavin, T.A. 2006*.* ‘Pleistocene Park: Does Re-Wilding North America Represent Sound Conservation for the 21st Century?’ *Biological Conservation* 132: 232-238.

Rudolph, B.A., Porter, W.F. and Underwood, H.B. 2000. ‘Evaluating Immunocontraception for Managing Suburban White-Tailed Deer in Irondequoit, New York’ *The Journal of Wildlife Management* 64(2): 463-473.

Rumbaugh, D.M. and Savage-Rumbaugh, E.S. 2001. *‘*Language and Animal Competencies*’* inSmelser, N.J. and Baltes, P.B. (eds.) [*International Encyclopedia of the Social & Behavioral Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/referenceworks/9780080430768) pp. 8281–8285.

Russell, F.L., Zippin, D.B. and Fowler, N.L. 2001. ‘Effects of White-Tailed Deer (Odocoileus Virginianus) on Plants, Plant Populations and Communities: A Review’ *American Midland Naturalist* 146(1): 1-26.

Rutberg, A.T., Naugle, R.E. and Verret, F. 2013. ‘Single Treatment Porcine Zona Pellucida Immunocontraception Associated with Reduction of a Population of White-Tailed Deer (Odocoileus virginianus)’ *Journal of Zoo and Wildlife Medicine* 44(4): 75-83.

Ruxton, G.D., Thomas, S. and Wright, J. 2002. ‘Bells Reduce Predation of Wildlife by Domestic Cats (Felis catus)’ *Journal of Zoology* 256(1): 81–83.

Ryder, R.D. 2000. *Animal Revolution: Changing Attitudes Towards Speciesism* Oxford: Berg Publishing.

Sandler, R.L. 2012. *The Ethics of Species* Cambridge: Cambridge University Press.

Sankaran, K.V. 2016. ‘Lantana camara’ *FAO* Factsheet: <http://www.fao.org/forestry/13375-06ba52ce294a4e15f8264c42027052db0.pdf> accessed 01/04/2016.

Sankararaman, S., Mallick, S., Dannemann, M., Prüfer, K., Kelso, J., Pääbo, S., Patterson, N. and Reich, D. 2014. ‘The Genomic Landscape of Neanderthal Ancestry in Present-day Humans’ *Nature* 507: 354–357.

Santmire, P. 2006. ‘Partnership with Nature According to the Scriptures: Beyond the Theology of Stewardship’ in Berry, R.J. (ed.) *Environmental Stewardship: Critical Perspectives Past and Present* London: T&T Clark International*.* pp. 253-273.

Save The Rhino Webpage. 2015. ‘Threats to Rhino’

<https://www.savetherhino.org/rhino_info/threats_to_rhino> accessed 04/06/2015.

* 2015. ‘Sustainable Utilisation’

<https://www.savetherhino.org/rhino_info/thorny_issues/sustainable_utilisation>

accessed 04/06/2015.

Scanlon, T.M. 1998. ‘Rawls on Justification’ in Freeman, S. (ed.) *The Cambridge Companion to Rawls* Cambridge: Cambridge University Press. pp. 139-167.

[Schielzeth](https://scholar.google.co.uk/citations?user=4m3g26gAAAAJ&hl=en&oi=sra), H., Lachmann, L., Eichhorn, G. and Heinicke, T. 2013. ‘The White-Headed Duck Oxyura leucocephala in the Tengiz-Korgalzhyn Region, Central Kazakhstan’ *Wildfowl* 54: 115-129.

Schroeder, M. 2012. ‘Value Theory’ in Zalta, E.N. (ed.) *The Stanford Encyclopedia of Philosophy* <http://plato.stanford.edu/entries/value-theory/> accessed 16/08/2015.

Scruton, R. 2000. *Animal Rights and Wrongs* London: Metro Books.

Selier, S.A.J., Page, B.R., Vanak, A.T. and Slotow, R. 2014. ‘Sustainability of Elephant Hunting Across International Borders in Southern Africa: A Case Study of the Greater Mapungubwe Transfrontier Conservation Area’ *The Journal of Wildlife Management* 78(1): 122–132.

Sessions, G. 1998. 'Deep Ecology: Introduction' in Michael E. Zimmerman (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* New Jersey: Prentice Hall. pp. 165-183.

Shah, S. 2009. ‘The Spread of New Diseases: The Climate Connection’ *Yale 360*. <http://e360.yale.edu/feature/the_spread_of_new_diseases_the_climate_connection/2199/> accessed 01/10/2013.

Shapcott, R. 2013. *International Ethics: A Critical Introduction* Hoboken NJ: John Wiley & Sons.

Simpson, S.V. and Cain, K.D. 2000. ‘Recreation's Role in the Environmental Ethics Dialogue: The Case of Aldo Leopold and the Morality of Hunting’ *Leisure* 25(3-4): 181-197.

Singer, M.G. 1965. ‘Positive and Negative Duties’ *The Philosophical Quarterly* 15(59): 97-103.

Singer, P. 1986. ‘All Animals Are Equal’ in Singer, P. (ed.) *Applied Ethics* New York: Oxford University Press.

* 2002. *Animal Liberation* New York: HarperCollins Publishers.
* 1972. ‘Famine, Affluence and Morality’: *Philosophy & Public Affairs* 1(3): 229-243.
* 1993. *Practical Ethics* Cambridge: Cambridge University Press.

Smith, C.I. 2005. ‘Rewilding: Introductions Could Reduce Biodiversity’ *Nature* 437(318): 318.

Smith, L. 22 March 2015. ‘Scientists Raid Mangrove Finch Nests as they Battle to Save Birds Discovered by Charles Darwin from Extinction’ *The Independent*

<http://www.independent.co.uk/news/science/scientists-raid-mangrove-finch-nests-as-they-battle-to-save-birds-discovered-by-charles-darwin-from-extinction-10125363.html> accessed 22/03/2015.

Sorrell, R.D. 1988. *Saint Francis of Assisi and Nature: Tradition and Innovation in Western Christian Attitudes Towards the Environment* New York: Oxford University Press.

Špinka, M. 2012. *‘*Social Dimension of Emotions and its Implication for Animal Welfare*’ Applied Animal Behaviour Science* 138: 170-181.

Steiner, A: 2010. ‘Counting the Costs of Alien Invasions’ *BBC News* <http://news.bbc.co.uk/1/hi/sci/tech/8615398.stm> accessed 04/03/2015.

Subramaniam, B. 2001. ‘The Aliens Have Landed! Reflections of the Rhetoric of Biological Invasions’ *Meridians* 2(1): 26-40.

Svanberg, F., Mateo, R., Hillström, L., Green, A.J., Taggart, M.A., Raab, A. and Meharg, A.A. 2006. ‘Lead Isotopes and Lead Shot Ingestion in the Globally Threatened Marbled Teal (Marmaronetta angustirostris) and White-Headed Duck (Oxyura leucocephala)’ [*Science of The Total Environment*](http://www.sciencedirect.com/science/journal/00489697) 370(2-3): 416–424.

Swanton, C. 1992. *Freedom: A Coherent Theory* Indianapolis: Hackett Publishing.

Swift, A. and White, S. 2008. *‘*Political Theory, Social Science and Real Politics’in Leopold, D. and Stears, M (eds.) *Political Theory: Methods and Approaches*. Oxford: Oxford University Press. pp. 49-69.

Taylor, A. 2009. *Animals and Ethics* Peterborough, Ontario: Broadview Press.

* 1996. ‘Animal Rights and Human Needs’ [*Environmental Ethics*](https://www.pdcnet.org/collection-anonymous/browse?fp=enviroethics) 18(3): 249-264.

Taylor, P.W. 2011. *Respect for Nature: A Theory of Environmental Ethics* Woodstock UK: Princeton University Press.

Teixeira, C.P., De Azevedo, C.S., Mendl, M., Cipreste, C.F. and Young, R.J. 2007. ‘Revisiting Translocation and Reintroduction Programmes: The Importance of Considering Stress’ [*Animal Behaviour*](http://www.sciencedirect.com/science/journal/00033472) 73(1): 1–13.

The Telegraph.5 January 2015. ‘Fruit and Veg Dumped After Illegal Immigrants Sneak into Lorries’ <http://www.telegraph.co.uk/news/uknews/immigration/11326433/Fruit-and-veg-dumped-after-illegal-immigrants-sneak-into-lorries.html> accessed 06/03/2015.

Thompson, J.A. and Sharpe, W.E. 2005. ‘Soil Fertility, White-Tailed Deer, and Three Trillium Species: A Field Study’ *Northeastern Naturalist* 12(4): 379-390.

Thompson, K. 2014. *Where do Camels Belong? The Story and Science of Invasive Species.* London: Profile Books.

Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R. and Polasky, S. 2002. ‘Agricultural Sustainability and Intensive Production Practices’ *Nature* 418: 671-677.

TissUse Webpage: <http://www.tissuse.com/> accessed 20/04/2016.

Trajçe, A., Melovski, D., Ivanov, G., Stojanov, A., Avukatov, V., Hoxha, B., von Arx, M., Breitenmoser-Würsten, C., Hristovski, S., Shumka, S. and Breitenmoser, U. 2012. ‘Distribution and Conservation Status of the Balkan Lynx’ *Proceedings of the 4th Congress of Ecologists of Macedonia with International Participation* Ohrid: Macedonian Ecological Society.

Trewavas, A. 2003. *‘*Aspects of Plant Intelligence*’* *Annals of Botany* 92(1): 1-20.

Tuck, S.L., Winqvist, C., Mota, F., Ahnström, J., Turnbull, L.A. and Bengtsson, J. 2014. ‘Land-use Intensity and the Effects of Organic Farming on Biodiversity: A Hierarchical Meta-analysis’ *Journal of Applied Ecology* 51(3): 746–755.

Tucker, C.J., Wilson, J.M., Mahoney, R., Anyamba, A., Linthicum, K. and Myers, M.F. 2002. ‘Climatic and Ecological Context of the 1994-1996 Ebola Outbreaks’ *Photogrammetric Engineering & Remote Sensing* 68(2): 147-152.

Turner, P. and Downey, P.O. 2010. Ensuring Invasive Alien Plant Management Delivers Biodiversity Conservation: Insights from an Assessment of Lantana Camara in Australia’ *Plant Protection Quarterly* 25(3): 102-110.

Ullrey, D.U. 2004. ‘Nutrient Requirements: Carnivores’ in Wilson G. Pond (ed.) *Encyclopedia of Animal Science* Boca Raton FL: CRC Press.

United Kingdom Crown Prosecution Service Guidelines. 2014. ‘Self-Defence and the Prevention of Crime’ <http://www.cps.gov.uk/legal/s_to_u/self_defence/#Principle> accessed 10/10/2014.

United Kingdom Government Archives. 2015. ‘Protection of Animals Act 1911’ <http://www.legislation.gov.uk/ukpga/Geo5/1-2/27> accessed 04/09/2015.

United Kingdom Government Guidelines. 2014. ‘Environmental Impact Assessment’ <http://planningguidance.planningportal.gov.uk/blog/guidance/environmental-impact-assessment/the-purpose-of-environmental-impact-assessment/> accessed 18/06/2014.

United Kingdom Government Webpage. 2015. ‘Wildlife and Countryside Act 1981’ <http://www.legislation.gov.uk/ukpga/1981/69/contents> accessed 14/03/2015.

United Nations Framework Convention on Climate Change, 21st Session, Paris. November 30December 11 2015. ‘Adoption of the Paris Agreement’

United Nations News Centre. 7 November 2013. ‘UN Works to Protect Great Apes, Habitat, Amid Ongoing Instability in DR Congo’

<http://www.un.org/apps/news/story.asp?NewsID=46446> accessed 30/10/2015.

United Nations Office on Drugs and Crime Press Release. 3 March 2015. ‘Organized Crime Threat to Wild Species on the Increase, Says UN on Wildlife Day’

<https://www.unodc.org/unodc/en/press/releases/2015/March/organized-crime-threat-to-wild-species-on-the-increase--says-un-on-wildlife-day.html> accessed 03/05/2016.

The United Nations Universal Declaration of Human Rights.

<http://www.un.org/en/documents/udhr/> accessed 15/06/2014.

United States Fish and Wildlife Service Webpage: 2012. ‘All Trick, No Treat’

<http://www.fws.gov/pacific/fisheries/aquaticnus/AIS_outreach.cfm> accessed 06/03/2015.

University of Berkley Webpage: 2015. ‘Biogeography: Wallace and Wegner’

<http://evolution.berkeley.edu/evolibrary/article/history_16> accessed 05/03/2015.

University of California Museum of Paleontology. 22 August 2008. ‘Understanding Evolution’

<http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php> accessed 02/01/2014.

University of Michigan Webpage: 2013. ‘Animal Diversity Web’

<http://animaldiversity.ummz.umich.edu/accounts/Psittacus_erithacus/>accessed 26/02/2013.

University of Illinois Webpage: 2015. ‘Living with White-Tailed Deer in Illinois’

<http://web.extension.illinois.edu/deer/damage.cfm?SubCat=8890> accessed 15/06/2015.

University of Utah, Genetic Science Learning Centre. 2014. ‘Cell Size and Scale’ <http://learn.genetics.utah.edu/content/cells/scale/> accessed 04/10/2014.

Van den Stock, J., Righart, R. and de Gelder, B. 2007. ‘Body Expressions Influence Recognition of Emotions in the Face and Voice’ *Emotion* 7(3): 487–494.

VanDeVeer, D. 1979. ‘Interspecific Justice’ *Inquiry, An Interdisciplinary Journal of Philosophy* 22(1-4): 55-79.

Van Doornen, T. 2011. ‘Invasive Species in Penguin Worlds: An Ethical Taxonomy of Killing for Conservation’ *Conservation and Society* 9(4): 286-298.

Varden, H. 2011. ‘Charity’ in Chatterjee, D.K. (ed.) *Encyclopedia of Global Justice: A - I* [*Volume 2 of Encyclopedia of Global Justice*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Encyclopedia+of+Global+Justice%22&source=gbs_metadata_r&cad=8)New York: Springer Science & Business Media. pp. 117-118.

Varner, G.E. 1998. *In Nature’s Interests? Interests, Animal Rights and Environmental Ethics* New York: Oxford University Press.

Vernot, B. and Akey, J.M. 2014. ‘Resurrecting Surviving Neandertal Lineages from Modern Human Genomes’ *Science* 343(6174): 1017-1021.

Virkki, D., Tran, C. and Castley, J.G. 2012. ‘Reptile Responses to Lantana Management in a Wet Sclerophyll Forest Australia’ *Journal of Herpetology* 46(2): 177-185.

Vogel, D. 2001. ‘How Green is Judaism? Exploring Jewish Environmental Ethics’ *Business Ethics Quarterly* 11(2): 349-363.

Wäber, K., Spencer, J.and Dolman, P.M. 2013. ‘Achieving Landscape-scale Deer Management for Biodiversity Conservation: The Need to Consider Sources and Sinks’, *Journal of Wildlife Management* 77(4): 726–736.

Walker, P., Rhubart-Berg, P., McKenzie, S., Kelling, K. and Lawrence, R.S. 2005. *Public Health Nutrition* 8(4): 348-356.

Walpole, M. 2003. ‘Factors Affecting the Recovery of the Masai Mara Black Rhino Population’ *Wildlife and People: Conflict and Conservation in Masai Mara, Kenya: Proceedings of a Workshop Series, 13-16 August* *2001*. London: International Institute for Environment and Development Publishing. pp. 17-25.

Walsh, P.D., [Warfield, K.L](https://www.ncbi.nlm.nih.gov/pubmed/?term=Warfield%20KL%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Goetzmann, J.E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Goetzmann%20JE%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Biggins, J.E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Biggins%20JE%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Kasda, M.B](https://www.ncbi.nlm.nih.gov/pubmed/?term=Kasda%20MB%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Unfer, R.C](https://www.ncbi.nlm.nih.gov/pubmed/?term=Unfer%20RC%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Vu, H](https://www.ncbi.nlm.nih.gov/pubmed/?term=Vu%20H%5BAuthor%5D&cauthor=true&cauthor_uid=24912183)., [Aman, M.J](https://www.ncbi.nlm.nih.gov/pubmed/?term=Aman%20MJ%5BAuthor%5D&cauthor=true&cauthor_uid=24912183). and [Olinger G.G.](https://www.ncbi.nlm.nih.gov/pubmed/?term=Olinger%20GG%20Jr%5BAuthor%5D&cauthor=true&cauthor_uid=24912183) ‘Vaccinating Captive Chimpanzees to Save Wild Chimpanzees’ *PNAS* 111(24): 8873-8876.

Warren, K. 1987. ‘Feminism and ecology: making connections’ *Environmental Ethics* 9(1): 3-20.

Webster, C.R., Jenkins, M.A. and Rock, J.H. 2005. ‘Long-Term Response of Spring Flora to Chronic Herbivory and Deer Exclusion in Great Smoky Mountains National Park, USA’ *Biological Conservation* 12(3): 297–307.

Weikart, R. 2002. ‘Darwinism and Death: Devaluing Human Life in Germany 1859-1920’ *Journal of the History of Ideas* 63(2): 323-344.

Weitz, J.S. and Wilhelm, S.W. 2013. ‘An Ocean of Viruses’ *The Scientist Magazine* <http://www.the-scientist.com/?articles.view/articleNo/36120/title/An-Ocean-of-Viruses/> accessed 10/10/2014.

Wilson, E.O. 2016. *Half-Earth: Our Planet’s Fight for Life* New York: Liveright Publishing.

Wilson, S.K., Okunlola, I.A. and Novak, J.A. 2015. ‘Birds be Safe: Can a Novel Cat Collar Reduce Avian Mortality by Domestic Cats (Felis catus)?’ [*Global Ecology and Conservation*](http://www.sciencedirect.com/science/journal/23519894)3: 359–366.

World Bank Database. 2013.[http://data.worldbank.org/indicator/SP.DYN.LE00.IN accessed 26/02/2013](http://data.worldbank.org/indicator/SP.DYN.LE00.IN%20accessed%2026/02/2013).

World Health Organisation Factsheet No. 103. 2014. ‘Ebola Virus Disease’

<http://www.who.int/mediacentre/factsheets/fs103/en/> accessed 21/09/2014.

Young, R.A. 1999. *Is God a Vegetarian?* Peru Illinois: Open Court Publishing.

1. Rosaleen Duffy: *Killing for Conservation: Wildlife Policy in Zimbabwe* (Bloomington: Indiana University Press, 2001). [↑](#footnote-ref-1)
2. ‘Animals Taken by Wildlife Services’ United States Department of Agriculture (USDA): <https://www.aphis.usda.gov/wildlife_damage/prog_data/2014/G/Tables/Table%20G_ShortReport.pdf> accessed 10/11/2015. [↑](#footnote-ref-2)
3. ‘New Data: 2.7 Million Animals Killed by Rogue Federal Wildlife Program in 2014'Centre for Biological Diversity: <http://www.biologicaldiversity.org/news/press_releases/2015/wildlife-services-04-13-2015.html> accessed 10/11/2015. [↑](#footnote-ref-3)
4. Kristin Wäber, Jonathan Spencerand Paul M. Dolman: ‘Achieving Landscape-scale Deer Management for Biodiversity Conservation: The Need to Consider Sources and Sinks’ *Journal of Wildlife Management* [Vol. 77, Issue 4](http://onlinelibrary.wiley.com/doi/10.1002/jwmg.v77.4/issuetoc) (May 2013) pp. 726–736. [↑](#footnote-ref-4)
5. Michael Moore: *Placing Blame: A General Theory of the Criminal Law* (Oxford: Oxford University Press, 1997) ch.17. [↑](#footnote-ref-5)
6. Larry Alexander: ‘Deontology at the Threshold’ *San Diego Law Review* Vol. 37 (2000) pp. 893-912. [↑](#footnote-ref-6)
7. Tom Regan: *The Case for Animal Rights* (Oakland: University of California Press, 2004) p. 235. [↑](#footnote-ref-7)
8. *Ibid*. p 237. [↑](#footnote-ref-8)
9. Paul W. Taylor: *Respect for Nature: A Theory of Environmental Ethics* (Woodstock, UK: Princeton University Press, 2011 edition) p. 75. [↑](#footnote-ref-9)
10. Kenneth Goodpaster: ‘On Being Morally Considerable’ *The Journal of Philosophy,* Vol. 75, Issue 6 (1978) pp. 308-325. [↑](#footnote-ref-10)
11. *Ibid* pp. 314-316. [↑](#footnote-ref-11)
12. Taylor: *Respect for Nature* pp. 119-129.

    Gary E. Varner: *In Nature’s Interests? Interests, Animal Rights and Environmental Ethics* (New York: Oxford University Press, 1998).

    James Rachels: *Created from Animals: The Moral Implications of Darwinism* (Oxford: Oxford University Press, 1991). [↑](#footnote-ref-12)
13. Aldo Leopold: *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1968 edition).

    J. Baird Callicott: *In Defence of the Land Ethic: Essays in Environmental Philosophy* (New York: SUNY Press, 1989).

    Holmes Rolston III: 'The Land Ethic at the Turn of the Millennium' *Biodiversity and Conservation* Vol. 9, Issue 8 (2000) pp. 1045–1058. [↑](#footnote-ref-13)
14. Leopold: *A Sand County Almanac* pp. 224-225. [↑](#footnote-ref-14)
15. Joseph R. Des Jardins: *Environmental Ethics: An Introduction to Environmental Philosophy* (Belmont California: Wadsworth Inc., 1993) p.214. [↑](#footnote-ref-15)
16. George Sessions: 'Deep Ecology: Introduction' in Michael E. Zimmerman (ed.) *Environmental Philosophy: From Animal Rights to Radical Ecology* (New Jersey: Prentice Hall, 1998 edition) p. 173. [↑](#footnote-ref-16)
17. Tom Regan: *The Case for Animal Rights* (London: Routledge and Kegan Paul, 1983) p. 362. [↑](#footnote-ref-17)
18. Peter Singer: *Practical Ethics* (Cambridge: Cambridge University Press 1993 edition.) ch. 10. [↑](#footnote-ref-18)
19. Varner: *In Nature’s Interests?* p. 9. [↑](#footnote-ref-19)
20. Mark Schroeder: ‘Value Theory’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Summer 2012 Edition).<http://plato.stanford.edu/entries/value-theory/> accessed 16/08/2015. [↑](#footnote-ref-20)
21. Adam Swift and Stuart White*:* *‘*Political Theory, Social Science and Real Politics’in David Leopold and Marc Stears (eds.) *Political Theory: Methods and Approaches*. (Oxford: Oxford University Press, 2008). pp. 49-69. [↑](#footnote-ref-21)
22. *Ibid* p. 54. [↑](#footnote-ref-22)
23. John Rawls: ‘Outline for a Decision Procedure for Ethics’ *The Philosophical Review* Vol. 60, No. 2 (Apr. 1951) pp. 177-197. See p. 178. [↑](#footnote-ref-23)
24. Norman Daniels: ‘Reflective Equilibrium’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Winter 2013 Edition) <http://plato.stanford.edu/archives/win2013/entries/reflective-equilibrium> accessed 17/08/2015. [↑](#footnote-ref-24)
25. *Ibid.* [↑](#footnote-ref-25)
26. Richmond Campbell: ‘Reflective Equilibrium and Moral Consistency Reasoning’ *Australasian Journal of Philosophy* Vol. 92, No. 3 (2014) pp. 433-451. See p. 434. [↑](#footnote-ref-26)
27. T.M. Scanlon: ‘Rawls on Justification’ in Samuel Freeman (ed.) *The Cambridge Companion to Rawls* (Cambridge: Cambridge University Press, 1998). pp. 139-167. See p. 141. [↑](#footnote-ref-27)
28. Richard M. Hare: ‘Rawls’ Theory of Justice: A Review’ *The Philosophical Quarterly* Vol. 23, No. 91 (Apr. 1973) pp. 144-155. [↑](#footnote-ref-28)
29. Richard Brandt: ‘The Science of Man and Wide Reflective Equilibrium’ *Ethics* Vol. 100, No. 2 (Jan. 1990) pp. 259-278. [↑](#footnote-ref-29)
30. Peter Railton: ‘On Richard Brandt’s The Science of Man and Wide Reflective Equilibrium’ *Ethics* Vol. 125, No. 4 (2015) pp. 1135-1141. [↑](#footnote-ref-30)
31. ‘The Global Religious Landscape: A Report on the Size and Distribution of the World’s Major Religious Groups as of 2010’ *Pew Research Center’s Forum on Religion & Public Life* (2012) p. 9 <http://www.pewforum.org/2012/12/18/global-religious-landscape-exec/> accessed 15/05/2015. [↑](#footnote-ref-31)
32. Jesse Lee Preston, Ryan S. Ritter and J. Ivan Hernandez: ‘Principles of Religious Prosociality: A Review and Reformulation’ *Social and Personality Psychology Compass* [Vol. 4, Issue 8 (Aug. 2010)](http://onlinelibrary.wiley.com/doi/10.1111/spco.2010.4.issue-8/issuetoc) pp. 574–590. [↑](#footnote-ref-32)
33. ‘Our History’ Royal Society for the Prevention of Cruelty to Animals: <https://www.rspca.org.uk/utilities/aboutus/history> accessed 01/02/2016. [↑](#footnote-ref-33)
34. David Vogel: ‘How Green is Judaism? Exploring Jewish Environmental Ethics’ *Business Ethics Quarterly* Vol. 11, No. 2 (Apr. 2001), pp. 349-363.

    Martin Forward and Mohamed Alam: ‘Islam’, in Susan B. Armstrong and Richard G. Botzler (eds.) *The Animal Ethics Reader* (London: Routledge, 2003) pp. 235-237. [↑](#footnote-ref-34)
35. Peter Singer*:* *Animal Liberation* (New York: HarperCollins Publishers, 2002 Edition) p. 191. [↑](#footnote-ref-35)
36. ‘Malaysian Minister says God made Animals for Testing’ *The Guardian* (May 31st 2010): <http://www.theguardian.com/world/2010/may/31/malaysia-minister-animal-testing> accessed 16/01/2013. [↑](#footnote-ref-36)
37. René Dubos: ‘Franciscan Conservation versus Benedictine Stewardship’ in Robert J. Berry (ed.) *Environmental Stewardship: Critical Perspectives Past and Present* (London: T&T Clark, 2006). pp. 56-59. [↑](#footnote-ref-37)
38. Roger D. Sorrell: *Saint Francis of Assisi and Nature: Tradition and Innovation in Western Christian Attitudes Towards the Environment* (New York: Oxford University Press, 1988). [↑](#footnote-ref-38)
39. Katherine Wills Perlo: *Kinship and Killing: The Animal in World Religions* (New York: Columbia University Press, 2009) pp. 102-103. [↑](#footnote-ref-39)
40. John Passmore: *‘*The Treatment of Animals*’ Journal of the History of Ideas* Vol. 36, No. 2 (Apr.-Jun. 1975) pp. 195-218. [↑](#footnote-ref-40)
41. Paul Santmire: ‘Partnership with Nature According to the Scriptures: Beyond the Theology of Stewardship’ in Robert J. Berry (ed.) *Environmental Stewardship.* p. 258. [↑](#footnote-ref-41)
42. Russell W. Dalton: *Children’s Bibles in America: A Reception History of the Story of Noah’s Ark in US Children’s Bibles* (Bloomsbury: T&T Clark, 2015) ch. 4 [↑](#footnote-ref-42)
43. Wills Perlo: *Kinship and Killing.* pp. 30-31.

    For an example of this kind of justification being used see Bible Study Online at: <http://www.biblestudy.org/question/does-bible-forbid-eating-meat.html> accessed 02/02/2016 [↑](#footnote-ref-43)
44. Wills Perlo: *Kinship and Killing.* p. 31. [↑](#footnote-ref-44)
45. Nonna Verna Harrison: ‘Women, Human Identity, and the Image of God: Antiochene Interpretations’ *Journal of Early Christian Studies* Vol. 9, Issue 2 (2001) pp.205-49. [↑](#footnote-ref-45)
46. Richard A. Young: *Is God a Vegetarian?* (Peru, Illinois: Open Court Publishing, 1999) [↑](#footnote-ref-46)
47. Wills Perlo: *Kinship and Killing* pp. 48-51. [↑](#footnote-ref-47)
48. Jeffrey Bilbro: ‘Helping People Love the World: An Interview with Gary Snyder’ *Interdisciplinary Studies in Literature and Environment* Vol. 18, Issue 2 (2011) pp. 431-441. [↑](#footnote-ref-48)
49. James P. McDermott: ‘Animals and Humans in Early Buddhism’ *Indo-Iranian Journal* Vol. 32, Issue 4 (1989) pp. 269-280. [↑](#footnote-ref-49)
50. ‘Hinduism and the Ethical Treatment of Animals’. *The Hindu American Foundation for The Humane Society of the United States*:<http://www.humanesociety.org/assets/pdfs/faith/hinduism_and_the_ethical.pdf> accessed 05/01/2014. [↑](#footnote-ref-50)
51. Norman C. McClelland: *Encyclopedia of Reincarnation and Karma* (Jefferson, North Carolina: McFarland & Company, 2010) p. 137. [↑](#footnote-ref-51)
52. Simon P. James: ‘Buddhism and the Ethics of Species Conservation’ *Environmental Values*. Vol. 15. No 1 (2006) pp. 85-97. [↑](#footnote-ref-52)
53. *Ibid* p. 92. [↑](#footnote-ref-53)
54. Anita Guerrini: ‘The Ethics of Animal Experimentation in Seventeenth-Century England’ *Journal of the History of Ideas* Vol. 50, No. 3 (1989) pp. 391-407. [↑](#footnote-ref-54)
55. ‘Facts and Figures on Animal Testing’ Cruelty Free International: <https://www.crueltyfreeinternational.org/why-we-do-it/facts-and-figures-animal-testing> accessed 15/02/2015. [↑](#footnote-ref-55)
56. Robert Boakes: *From Darwin to Behaviourism: Psychology and the Minds of Animals* (Cambridge: Cambridge University Press, 1984). [↑](#footnote-ref-56)
57. Aristotle: *The Nicomachean Ethics.* (London: Penguin Books, 2004 Edition) p. 76. [↑](#footnote-ref-57)
58. *Ibid.* p. 77. [↑](#footnote-ref-58)
59. Peter Harrison: *‘*Descartes on Animals’ *The Philosophical Quarterly* Vol. 42, No. 167 (Apr. 1992) pp. 219-227. See p. 221 [↑](#footnote-ref-59)
60. Boakes: *From Darwin to Behaviourism* pp. 85-86. [↑](#footnote-ref-60)
61. *Ibid.* [↑](#footnote-ref-61)
62. Tom Regan: *Defending Animal Rights* (Champaign: University of Illinois Press, 2001) p. 3. [↑](#footnote-ref-62)
63. Lori Gruen: ‘The Moral Status of Animals’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (2014 edition) <http://plato.stanford.edu/archives/fall2014/entries/moral-animal> accessed 20/01/2015. [↑](#footnote-ref-63)
64. *Ibid.* [↑](#footnote-ref-64)
65. Auguste M.P. von Bayern, Robert J.P. Heathcote, Christian Rutz and Alex Kacelnik: ‘The Role of Experience in Problem Solving and Innovative Tool Use in Crows’ *Current Biology* [Vol. 19, Issue 22](http://www.cell.com/current-biology/issue?pii=S0960-9822%2809%29X0023-0), (12 Nov. 2009) pp. 1965-1968. [↑](#footnote-ref-65)
66. ‘Aesop’s Fable Unlocks how we Think’ *Cambridge University News*:<http://www.cam.ac.uk/research/news/aesops-fable-unlocks-how-we-think/> accessed 25/01/2013. [↑](#footnote-ref-66)
67. Gordon G. Gallup: *‘*Self Awareness in Primates*’ American Scientist* Vol 67, Issue 4. (Jul-Aug 1979) pp. 417-421. [↑](#footnote-ref-67)
68. Marc Bekoff: ‘Animal Emotions: Exploring Passionate Natures’ *Bioscience* Vol 50, No. 10, (Oct. 2000) pp. 861-870. [↑](#footnote-ref-68)
69. Philip Lieberman: *‘*Human Language and Human Uniqueness*’* *Language & Communication* Vol. 14, No. 1 (1994) pp. 87-95. [↑](#footnote-ref-69)
70. Gary L. Nuechterlein and Robert W. Storer: ‘The Pair-Formation Displays of the Western Grebe’ *The Condor* Vol. 84, No. 4 (Nov. 1982) pp. 351-369. [↑](#footnote-ref-70)
71. *Ibid*. p. 367. [↑](#footnote-ref-71)
72. Jan Van den Stock, Ruthger Righart and Beatrice de Gelder: ‘Body Expressions Influence Recognition of Emotions in the Face and Voice’ *Emotion* Vol. 7, Issue 3 (Aug. 2007) p 487–494. [↑](#footnote-ref-72)
73. W. Tecumseh Fitch: ‘Kin Selection and “Mother Tongues”: A Neglected Component in Language Evolution’ in D Kimrough Oller and Ulrike Griebel (eds.) *Evolution of Communication Systems: A Comparative Approach* (Cambridge MA: MIT Press, 2004) p. 282. [↑](#footnote-ref-73)
74. Louise M. Herman: *‘*Cognition and Language Competencies of Bottlenosed Dolphins’ in [Ronald J. Schusterman](https://www.amazon.co.uk/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Ronald%20J.%20Schusterman) and [Jeanette A. Thomas](https://www.amazon.co.uk/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Jeanette%20A.%20Thomas) (eds.) *Dolphin Cognition and Behavior: A Comparative Approach* (Hove: Psychology Press, 1986) pp. 221-252. [↑](#footnote-ref-74)
75. *Ibid.* page 232. [↑](#footnote-ref-75)
76. Roger S. Fouts, Bill Chown and Larry Goodin: ‘Transfer of Signed Responses in American Sign Language from Vocal English Stimuli to Physical Object Stimuli by a Chimpanzee’ *Learning and Motivation* Vol. 7, Issue 3 (Aug. 1976) pp. 458–475.

    D.M. Rumbaugh and E.S. Savage-Rumbaugh: *‘*Language and Animal Competencies*’* inNeil J. Smelser and Paul B. Baltes (eds.) [*International Encyclopedia of the Social & Behavioral Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/referenceworks/9780080430768) (2001) pp. 8281–8285. <http://www.sciencedirect.com.eresources.shef.ac.uk/science/referenceworks/9780080430768> accessed 15/05/2013. [↑](#footnote-ref-76)
77. Louise M. Herman and Palmer Morrel Samuels*:* *‘*Knowledge Acquisition and Asymmetry Between Language Comprehension and Production: Dolphins and Apes as General Models for Animals.’ in Marc Bekoff and Dale Jamieson (eds.) *Readings in Animal Cognition* (Cambridge MA: MIT Press, 1996) pp. 289-306. [↑](#footnote-ref-77)
78. Diana Reiss: *The Dolphin in the Mirror: Exploring Dolphin Minds and Saving Dolphin Lives* (Boston: Houghton Mifflin Harcourt, 2011) p. 122. [↑](#footnote-ref-78)
79. *Ibid.* p. 87. [↑](#footnote-ref-79)
80. Patrick S. Bordnick, Bruce A. Thyer and Branson W. Richie: *‘*Feather Picking Disorder and Trichotillomania: An Avian Model of Human Psychopathology’ *Journal of Behaviour Therapy and Experimental Psychiatry* Vol. 25, Issue 3 (Sept. 1994) pp. 189-196.

    Or, Marek Špinka: *‘*Social Dimension of Emotions and its Implication for Animal Welfare*’ Applied Animal Behaviour Science* Vol. 138 (2012) pp. 170-181. [↑](#footnote-ref-80)
81. Tom Regan: ‘Animal Rights, Human Wrongs’in Zimmerman (ed.) *Environmental Philosophy* pp. 41-55. See pp. 43-44. [↑](#footnote-ref-81)
82. Peter Singer: ‘All Animals Are Equal’ in Peter Singer (ed.) *Applied Ethics* (New York: Oxford University Press, 1986) pp. 215-228. [↑](#footnote-ref-82)
83. Richard D. Ryder: *Animal Revolution: Changing Attitudes Towards Speciesism* (Oxford: Berg Publishing, 2000 edition). p.8. [↑](#footnote-ref-83)
84. Singer: *‘All Animals Are Equal’* p. 221. [↑](#footnote-ref-84)
85. [Khadije Daneshjou](http://www.ncbi.nlm.nih.gov/pubmed/?term=Daneshjou%20K%5Bauth%5D), [Hanieh Jafarieh](http://www.ncbi.nlm.nih.gov/pubmed/?term=Jafarieh%20H%5Bauth%5D) and [Seyed-Reza Raaeskarami](http://www.ncbi.nlm.nih.gov/pubmed/?term=Raaeskarami%20SR%5Bauth%5D): ‘Congenital Insensitivity to Pain and Anhydrosis (CIPA) Syndrome; A Report of 4 Cases’ *Iranian Journal of Pediatrics* Vol. 22, Issue 3 (2012) pp. 412–416. [↑](#footnote-ref-85)
86. Mary T. Phillips: ‘Savages, Drunks, and Lab Animals: The Researcher's Perception of Pain’ [*Society and Animals*](http://www.ingentaconnect.com/content/brill/saa;jsessionid=11k1g3v0ok0ku.alexandra) Vol. 1, No. 1 (1993) pp. 61-81. [↑](#footnote-ref-86)
87. Jeff McMahan: *The Ethics of Killing: Problems at the Margins of Life* (Oxford: Oxford University Press, 2002). p. 196 [↑](#footnote-ref-87)
88. *Ibid.* pp. 196-198. [↑](#footnote-ref-88)
89. *Ibid.* p. 196. [↑](#footnote-ref-89)
90. ‘Chimpanzee: Pan Troglodytes’ National Geographic Online:<http://animals.nationalgeographic.co.uk/animals/mammals/chimpanzee/> accessed 26/02/2013. [↑](#footnote-ref-90)
91. ‘Galápagos Tortoise: Geochelone elephantophus’ National Geographic Online:<http://animals.nationalgeographic.co.uk/animals/reptiles/galapagos-tortoise/> accessed 26/02/2013.

    ‘Animal Diversity Web’ University of Michigan webpage:<http://animaldiversity.ummz.umich.edu/accounts/Psittacus_erithacus/> accessed 26/02/2013. [↑](#footnote-ref-91)
92. Joseph H. Engbeck Jr: *The Enduring Giants* California State Parks: <http://www.parks.ca.gov/?page_id=1151> accessed 04/09/2015 [↑](#footnote-ref-92)
93. World Bank Database:<http://data.worldbank.org/indicator/SP.DYN.LE00.IN> accessed 26/02/2013. [↑](#footnote-ref-93)
94. ‘Protection of Animals Act 1911’ UK Government Archives: <http://www.legislation.gov.uk/ukpga/Geo5/1-2/27> accessed 04/09/2015. [↑](#footnote-ref-94)
95. Gillian Beer: ‘Introduction’ in Charles Darwin: *The Origin of Species*. (New York: Oxford University Press, 1996). p. ix. [↑](#footnote-ref-95)
96. Daniel Becquemont: ‘Social Darwinism: from Reality to Myth and from Myth to Reality’ [*Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486) [Vol. 42, Issue 1](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486/42/1) (March 2011) pp. 12–19. [↑](#footnote-ref-96)
97. Beer: *‘*Introduction*’* p. ix. [↑](#footnote-ref-97)
98. National Aeronautics and Space Administration (NASA) website: <http://map.gsfc.nasa.gov/universe/uni_life.html> accessed 01/12/2014. [↑](#footnote-ref-98)
99. Richard Weikart: ‘Darwinism and Death: Devaluing Human Life in Germany 1859-1920’ *Journal of the History of Ideas* Vol 63, No. 2 (April 2002) pp. 323-344. [↑](#footnote-ref-99)
100. Tony Lynch and David Wells*:* ‘Non-Anthropocentrism? A Killing Objection’ [*Environmental Values*](http://www.jstor.org.eresources.shef.ac.uk/action/showPublication?journalCode=envivalu) Vol. 7, No. 2 (May 1998) pp.151-163. See p. 151. [↑](#footnote-ref-100)
101. Singer: ‘All Animals Are Equal’ pp. 215-228. [↑](#footnote-ref-101)
102. Rachels: *Created from Animals* p. 93. [↑](#footnote-ref-102)
103. Bryson Brown: ‘Ethics in Darwin’s Melancholy Vision’ [*Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486), [Vol. 42, Issue 1](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/13698486/42/1) (March 2011) pp. 20-29. [↑](#footnote-ref-103)
104. ‘Understanding Evolution’. University of California Museum of Paleontology (22 Aug. 2008) <http://evolution.berkeley.edu/evolibrary/misconceptions_faq.php> accessed 02/01/2014. [↑](#footnote-ref-104)
105. Michael Benton: ‘Why Haven’t Crocodiles Changed?’ *The Naked Scientists* (2010):<http://www.thenakedscientists.com/HTML/questions/question/2624/> accessed 02/01/2014. [↑](#footnote-ref-105)
106. Charles Darwin: *The Descent of Man, and Selection in Relation to Sex* (Princeton, NJ: Princeton University Press, 1981 edition) pp. 70 - 107. [↑](#footnote-ref-106)
107. Marc Bekoff: ‘Wild Justice and Fair Play: Cooperation, Forgiveness, and Morality in Animals’ *Biology and Philosophy* Vol.19 (2004) pp. 489-520. [↑](#footnote-ref-107)
108. ‘Why Onions Have More DNA Than You Do’ *The Harvard University Gazette*: <http://news.harvard.edu/gazette/2000/02.10/onion.html> accessed 06/01/2015. [↑](#footnote-ref-108)
109. David Brett *et al*: ‘Alternative Splicing and Genome Complexity’ *Nature Genetics* Vol. 30 (Jan. 2002). [↑](#footnote-ref-109)
110. Gerald Kerth, Nicolas Perony, Frank Schweitzer: ‘Bats are Able to Maintain Long-term Social Relationships Despite the High Fission–Fusion Dynamics of Their Groups’ The Royal Society Online: <http://rspb.royalsocietypublishing.org/content/278/1719/2761> accessed 06/01/2015. [↑](#footnote-ref-110)
111. Websites for Earth First! and The Aldo Leopold Foundation:

     <http://www.earthfirst.org/about.htm> and <http://www.aldoleopold.org/AldoLeopold/teachingtools.shtml> respectively. Both accessed 03/02/2014. [↑](#footnote-ref-111)
112. Arne Næss: ‘The Shallow and the Deep, Long-range Ecology Movement: A Summary’ *Inquiry: An Interdisciplinary Journal of Philosophy* Vol. 16, Issue 1-4 (1978) pp. 95-100. [↑](#footnote-ref-112)
113. Arne Næss: ‘The Deep Ecological Movement: Some Philosophical Aspects’in Michael Zimmerman (ed.) *Environmental philosophy* p. 196. [↑](#footnote-ref-113)
114. Andrew Brennan, and Yeuk-Sze Lo: ‘Environmental Ethics’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Winter 2015 Edition)<http://plato.stanford.edu/entries/ethics-environmental/#FemEnv> accessed 03/01/2016. [↑](#footnote-ref-114)
115. Arne Naess: ‘Self-realization in mixed communities of Humans, Bears, Sheep, and Wolves’ *Inquiry: An Interdisciplinary Journal of Philosophy* Vol. 22, Issue 1-4 (1979) pp. 231-241. [↑](#footnote-ref-115)
116. Næss: ‘The Shallow and the Deep’ p. 95 [↑](#footnote-ref-116)
117. Lynch and Wells: ‘Non-Anthropocentrism?’ p. 151. [↑](#footnote-ref-117)
118. *Ibid.* [↑](#footnote-ref-118)
119. Naess: ‘The Deep Ecological Movement’ pp. 193-211. [↑](#footnote-ref-119)
120. *Ibid.* p. 197 [↑](#footnote-ref-120)
121. Warwick Fox: *Towards a Transpersonal Ecology: Developing New Foundations for Environmentalism* (New York: SUNY Press, 1990) p. xiii [↑](#footnote-ref-121)
122. Ben A. Minteer and James P Collins: ‘Ecological Ethics in Captivity: Balancing Values and Responsibilities in Zoo and Aquarium Research under Rapid Global Change’ *ILAR* Vol. 54 Issue 1 (2013) pp.41-51. [↑](#footnote-ref-122)
123. Leopold: *A Sand County Almanac* p. 204. [↑](#footnote-ref-123)
124. Bill Devall and George Sessions: *Deep Ecology: Living as if Nature Mattered*  (Layton, Utah: Gibbs Smith, 1985). [↑](#footnote-ref-124)
125. Leopold: *A Sand County Almanac* pp. 207-210. [↑](#footnote-ref-125)
126. Robin Attfield: ‘Value in the Wilderness’ *Metaphilosophy* Vol.15 (1984) pp. 289-304. [↑](#footnote-ref-126)
127. Leopold: *A Sand County Almanac* pp. 224-225. [↑](#footnote-ref-127)
128. J.B. Callicott: ‘The Conceptual Foundations of the Land Ethic’ in Zimmerman (ed.) *Environmental Philosophy* pp. 101-123. See p. 109. [↑](#footnote-ref-128)
129. Holmes Rolston III: ‘Challenges in Environmental Ethics’ in Zimmerman (ed.) *Environmental Philosophy* pp. 124-144. See p. 134. [↑](#footnote-ref-129)
130. *Ibid.* p. 141. [↑](#footnote-ref-130)
131. John Lemons: ‘Ecological Stress Phenomena and Holistic Environmental Ethics: A Viewpoint’ in John Rose (ed.) *Environmental Concepts, Policies, and Strategies:* [*Volume 2 of Current Topics in Remote Sensing*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Current+Topics+in+Remote+Sensing%22&source=gbs_metadata_r&cad=7) [*Environmental Topics*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Environmental+topics%22&source=gbs_metadata_r&cad=7) (Boca Raton, FL: CRC Press, 1991) p.121. [↑](#footnote-ref-131)
132. Taylor: *Respect for Nature* (1986) pp. 99-100. [↑](#footnote-ref-132)
133. *Ibid*. p. 119. [↑](#footnote-ref-133)
134. *Ibid.* p. 120. [↑](#footnote-ref-134)
135. Taylor: *Respect for Nature* p. 271 [↑](#footnote-ref-135)
136. Brian Barry, as quoted in Christine Swanton: *Freedom: A Coherent Theory* (Indianapolis: Hackett Publishing, 1992). p. 165. [↑](#footnote-ref-136)
137. Joel Feinberg: *The Moral Limits of the Criminal Law: Vol 1 Harm to Others* (Oxford: Oxford University Press, 1984), p. 33-34. [↑](#footnote-ref-137)
138. Varner: *In Nature’s Interests?* p.77. [↑](#footnote-ref-138)
139. J.B. Callicott: *Thinking Like a Planet: The Land Ethic and the Earth Ethic* (Oxford: Oxford University Press, 2014) p. 216. [↑](#footnote-ref-139)
140. H.J. McCloskey: ‘Rights’ *Philosophical Quarterly* Vol. 15, No. 5 (April 1965) pp. 115-127. [↑](#footnote-ref-140)
141. It should be noted that in a later article McCloskey retracts his definition of interests and concedes that there are clearly senses in which both animals and plants can be said to have interests insofar as good or bad things can be done to them. See H.J. McCloskey: ‘Moral Rights and Animals’ *Inquiry* Vol. 22, Issue 1 (1979) p.23-54. [↑](#footnote-ref-141)
142. Alasdair Cochrane: *Animal Rights Without Liberation* (New York: Columbia University Press, 2012) p.25 [↑](#footnote-ref-142)
143. Cochrane: *Animal Rights Without Liberation* pp. 37-38 [↑](#footnote-ref-143)
144. Ronald L. Sandler: *The Ethics of Species* (Cambridge: Cambridge University Press, 2012) p.35. [↑](#footnote-ref-144)
145. Dan Cossins: ‘Plant Talk’ *The Scientist* (Jan. 2014) <http://www.the-scientist.com/?articles.view/articleNo/38727/title/Plant-Talk/> accessed 23/09/2015. [↑](#footnote-ref-145)
146. Taylor: *Respect for Nature* p.271 [↑](#footnote-ref-146)
147. *Ibid.* [↑](#footnote-ref-147)
148. The United Nations Universal Declaration of Human Rights:<http://www.un.org/en/documents/udhr/> accessed 15/06/2014. [↑](#footnote-ref-148)
149. Donald Van De Veer: ‘Interspecific Justice’. *Inquiry, An Interdisciplinary Journal of Philosophy* Vol. 22, Issue 1-4 (1979) pp 55-79. p. 61 [↑](#footnote-ref-149)
150. S.M. Cinini *et al*: ‘Social Isolation Disrupts Hippocampal Neurogenesis in Young Non-Human Primates’ *Frontiers in Neuroscience* Vol. 8, Article 45 (Mar 2014) pp. 1-9. [↑](#footnote-ref-150)
151. Mark V. Flinn, David C. Geary and Carol V. Ward: ‘Ecological Dominance, Social Competition and Coalitionary Arms Races: Why Humans Evolved Extraordinary Intelligence*’* *Evolution and Human Behavior* Vol. 26, Issue 1 (2005) pp. 10–46. [↑](#footnote-ref-151)
152. Marcus G. Singer: ‘Positive and Negative Duties’ *The Philosophical Quarterly* Vol. 15, No. 59 (April 1965) pp. 97-103. [↑](#footnote-ref-152)
153. Judith Lichtenberg: ‘Negative Duties, Positive Duties, and the “New Harms”’ *Ethics* Vol. 120, No. 3 (April 2010) pp 557-578. [↑](#footnote-ref-153)
154. Liam B. Murphy: ‘The Demands of Beneficence’ *Philosophy and Public Affairs* Vol. 22, No. 4 (Autumn 1993) pp 267-292. [↑](#footnote-ref-154)
155. Lichtenberg: ‘Negative Duties’ pp. 558-559. [↑](#footnote-ref-155)
156. Helga Varden: ‘Charity’ in Deen k. Chatterjee (ed.) *Encyclopedia of Global Justice: A - I* [*Volume 2 of Encyclopedia of Global Justice*](https://www.google.co.uk/search?tbo=p&tbm=bks&q=bibliogroup:%22Encyclopedia+of+Global+Justice%22&source=gbs_metadata_r&cad=8)(New York: Springer Science & Business Media, 2011) pp. 117-118. [↑](#footnote-ref-156)
157. Pablo Gilabert: ‘The Duty to Eradicate Global Poverty: Positive or Negative?’ *Ethical Theory and Moral Practice* Vol. 7, No. 5 (Jan. 2005) pp. 537-550. [↑](#footnote-ref-157)
158. Simon Caney: ‘Global Poverty and Human Rights: The Case for Positive Duties’ in Thomas Pogge (ed.) *Freedom from Poverty as a Human Right: Who Owes what to the Very Poor?* (New York: Oxford University Press, 2007) pp. 275-302. [↑](#footnote-ref-158)
159. There are also arguments for making the duty to rescue a legal requirement, but it is not within the remit of this thesis to cover these as my focus is on moral requirements. See H. M. Malm: ‘Bad Samaritan Laws: Harm, Help, or Hype?’ *Law and Philosophy* Vol. 19, No. 6 (Nov. 2000) pp. 707-750.

     Philip W. Romohr: ‘A Right/Duty Perspective on the Legal and Philosophical Foundations of the No-Duty-to-Rescue Rule’ *Duke Law Journal* Vol. 55, No. 5 (Mar. 2006) pp. 1025-1057. [↑](#footnote-ref-159)
160. Peter Singer: ‘Famine, Affluence and Morality’: *Philosophy & Public Affairs* Vol. 1, No. 3 (1972) pp. 229-243. See p. 231. [↑](#footnote-ref-160)
161. *Ibid.* [↑](#footnote-ref-161)
162. Per Bauhn: ‘The Duty to Rescue and the Duty to Aid the Starving’ *ID: International Dialogue, A Multidisciplinary Journal of World Affairs* Vol. 3 (2013) pp. 4-37. [↑](#footnote-ref-162)
163. Per Bauhn: ‘The Extension and Limits of the Duty to Rescue’ *Public Reason* Vol. 3, Issue 1 (2011) pp. 39-49. See p. 40. [↑](#footnote-ref-163)
164. Andrew Eshleman: ‘Moral Responsibility’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Summer 2014 Edition): <http://plato.stanford.edu/archives/sum2014/entries/moral-responsibility/> accessed 20/03/2016. [↑](#footnote-ref-164)
165. Arthur Ripstein: ‘Three Duties to Rescue: Moral, Civil, and Criminal’ *Law and Philosophy* Vol. 19, No. 6 (Nov. 2000) pp. 751-779. [↑](#footnote-ref-165)
166. Martin Gansberg: ‘37 Who Saw Murder Didn’t Call the Police’ *New York Times* (March 27th 1964): <http://www.nytimes.com/1964/03/27/37-who-saw-murder-didnt-call-the-police.html?_r=0> accessed 24/03/2016 [↑](#footnote-ref-166)
167. Michael S. Moore: ‘Further Thoughts on Causation (and Related Topics) Prompted by 15 Critics’ in Benedikt Kahmen and Markus Stepanians (eds.) *Critical Essays on Causation and Responsibility* (Berlin: Walter de Gruyter, 2013) p. 360. [↑](#footnote-ref-167)
168. Richard Shapcott: *International Ethics: A Critical Introduction* (Hoboken, NJ: John Wiley & Sons, 2013) pp. 5-6. [↑](#footnote-ref-168)
169. Dale Jamieson: Global Environmental Justice. *Royal Institute of Philosophy Supplement* Vol. 36 (1994) pp. 199-210.

     Clare Palmer: *Animal Ethics in Context.* (New York: Columbia University Press, 2010) p. 89. [↑](#footnote-ref-169)
170. *Ibid*. p. 104. [↑](#footnote-ref-170)
171. Randall Robinson: *The Debt: What America Owes to Blacks* (London: Penguin Publishing, 2001). [↑](#footnote-ref-171)
172. Daniel A. Farber: ‘Basic Compensation for Victims of Climate Change’ *University of Pennsylvania Law Review* Vol. 155, No. 6 (Jun. 2007) pp. 1605-1656. [↑](#footnote-ref-172)
173. David Lyons: ‘Corrective Justice, Equal Opportunity and the Legacy of Slavery and Jim Crow’ *Boston University Law Review* Issue 84 (Dec. 2004) pp. 1375-1402. See pp. 1376-1377. [↑](#footnote-ref-173)
174. Bernard Boxill: ‘Black Reparations’ in Edward Zalta (ed.) *The Stanford Encyclopedia of Philosophy* (Spring 2011 Edition) <http://plato.stanford.edu/archives/spr2011/entries/black-reparations/> accessed 24/03/2016. [↑](#footnote-ref-174)
175. Mark Rowlands: *Animals Like Us*. (London: Verso, 2002). See p. 35. [↑](#footnote-ref-175)
176. James Rachels: ‘A Reply to VanDeVeer’ in Tom Regan and Peter Singer (eds.) *Animal Rights and Human Obligations* (Englewood Cliffs: Prentice-Hall, 1976) pp. 230-232. [↑](#footnote-ref-176)
177. *Ibid*. p. 37. [↑](#footnote-ref-177)
178. Rachels: *Created from Animals* p. 197. [↑](#footnote-ref-178)
179. C. M. De Moraes, W. J. Lewis, P. W. Pare, H. T. Alborn, and J. H. Tumlinson: ‘Herbivore-Infested Plants Selectively Attract Parasitoids’ *Nature* Issue 393 (11 June 1998) pp. 570-573.

     Guy L. de Bruxelles and Michael R. Roberts: ‘Signals Regulating Multiple Responses to Wounding and Herbivores’ *Critical Reviews in Plant Sciences* Vol 20, Issue 5 (2001) pp. 487-521. [↑](#footnote-ref-179)
180. ‘Michael Marder in debate with Gary Francione’ Columbia University Webpage:<http://www.cup.columbia.edu/static/marder-francione-debate> accessed 15/04/2013. [↑](#footnote-ref-180)
181. Anthony Trewavas: *‘*Aspects of Plant Intelligence*’* *Annals of Botany* Vol 92, Issue 1 (May 2003) pp. 1-20. [↑](#footnote-ref-181)
182. [Thompson E. Davis III, Amie E. Grills-Taquechel and Thomas H. Ollendick](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0005789410000328): ‘The Psychological Impact From Hurricane Katrina: Effects of Displacement and Trauma Exposure on University Students’ [*Behavior Therapy*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00057894) [Vol. 41, Issue 3](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00057894/41/3) (Sept. 2010) pp. 340–349. [↑](#footnote-ref-182)
183. Ros Clubb *et al*: ‘Compromised Survivorship in Zoo Elephants’ *Science* Vol. 322 No. 5908 (12 Dec. 2008) p. 1649. [↑](#footnote-ref-183)
184. ‘Environmental Impact Assessment’ UK Government Guidelines: <http://planningguidance.planningportal.gov.uk/blog/guidance/environmental-impact-assessment/the-purpose-of-environmental-impact-assessment/> accessed 18/06/2014 [↑](#footnote-ref-184)
185. Sean L. Tuck *et al*: ‘Land-use Intensity and the Effects of Organic Farming on Biodiversity: A Hierarchical Meta-analysis’ *Journal of Applied Ecology* Vol. 51, Issue 3 (2014) pp. 746–755. [↑](#footnote-ref-185)
186. David Tilman, Kenneth G. Cassman, Pamela A. Matson, Rosamond Naylor and Stephen Polasky: ‘Agricultural Sustainability and Intensive Production Practices’ *Nature* Issue 418 (8 Aug. 2002) pp. 671-677. [↑](#footnote-ref-186)
187. Duane E. Ullrey: ‘Nutrient Requirements: Carnivores’ in Wilson G. Pond (ed.) *Encyclopedia of Animal Science* (Boca Raton, FL: CRC Press, 2004). See p. 670. [↑](#footnote-ref-187)
188. Lori Gruen: ‘The Ethics of Captivity’ <http://onthehuman.org/2011/06/the-ethics-of-captivity/> (bold type by author) accessed 20/06/2014. [↑](#footnote-ref-188)
189. Cochrane: *Animal Rights Without Liberation* p. 11. [↑](#footnote-ref-189)
190. Gruen: ‘Ethics of Captivity’ [↑](#footnote-ref-190)
191. Caroline Fraser: ‘The Crucial Role of Predators: A New Perspective on Ecology’.  [*Environment 360* http://e360.yale.edu/feature/the\_crucial\_role\_of\_predators\_a\_new\_perspective\_on\_ecology/2442/](file:///C:\Users\Think\Documents\Environment%20360%20%20http:\e360.yale.edu\feature\the_crucial_role_of_predators_a_new_perspective_on_ecology\2442\) accessed 03/05/2014. [↑](#footnote-ref-191)
192. [João Graç](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0195666315003189)a [Maria Manuela Calheiro](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0195666315003189)s and [Abílio Oliveir](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0195666315003189)a: ‘Attached to Meat? (Un)Willingness and Intentions to Adopt a More Plant-Based Diet’ [*Appetite*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663) [Vol. 95](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663/95/supp/C) (1 Dec. 2015) pp. 113–125. [↑](#footnote-ref-192)
193. Jared Piazza *et al*: ‘Rationalizing Meat Consumption. The 4Ns’[*Appetite*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663) [Vol. 91](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/01956663/91/supp/C) (1 Aug. 2015) pp. 114–128. [↑](#footnote-ref-193)
194. ‘Becoming a Vegetarian’: *Harvard Women’s Health Watch* (Oct. 2009). <http://www.health.harvard.edu/staying-healthy/becoming-a-vegetarian> accessed 03/02/2016. [↑](#footnote-ref-194)
195. ‘Eating Meat and Staying Healthy: *NHS Choices*: <http://www.nhs.uk/Livewell/Goodfood/Pages/meat.aspx> accessed 03/02/2016. [↑](#footnote-ref-195)
196. Polly Walker *et al*: ‘Public Health Implications of Meat Production and Consumption’ *Public Health Nutrition* Vol.8, Issue 4 (2005) pp. 348-356. [↑](#footnote-ref-196)
197. Alastair Norcross: ‘Puppies, Pigs and People: Eating Meat and Marginal Cases’ *Philosophical Perspectives* Vol. 18 (2004) pp. 229-245. [↑](#footnote-ref-197)
198. ‘Farm Animal Statistics: Slaughter Totals’ The Humane Society of the United States: <http://www.humanesociety.org/news/resources/research/stats_slaughter_totals.html?referrer=https://www.google.co.uk/> accessed 04/02/2016. [↑](#footnote-ref-198)
199. Norcross: ‘Puppies, Pigs and People’ p .236. [↑](#footnote-ref-199)
200. J. R. McNeill: ‘Population and the Natural Environment: Trends and Challenges’ *Population and Development Review*: *The Political Economy of Global Population Change, 1950-2050* Vol. 32 (2006) pp. 183-201. [↑](#footnote-ref-200)
201. [Philipp Neubauer](http://www.sciencemag.org/search?author1=Philipp+Neubauer&sortspec=date&submit=Submit), Olaf [P. Jensen](http://www.sciencemag.org/search?author1=Olaf+P.+Jensen&sortspec=date&submit=Submit), [Jeffrey A. Hutchings](http://www.sciencemag.org/search?author1=Jeffrey+A.+Hutchings&sortspec=date&submit=Submit) and [Julia K. Baum](http://www.sciencemag.org/search?author1=Julia+K.+Baum&sortspec=date&submit=Submit): ‘Resilience and Recovery of Overexploited Marine Populations’ *Science* Vol. 340, No. 6130 (Apr. 2013) pp. 347-349. [↑](#footnote-ref-201)
202. Virginia Deane Abernethy: ‘Carrying Capacity: The Tradition and Policy Implications of Limits’ *Ethics in Science and Environmental Politics* Vol. 1, Issue 1 (2001). pp. 9-18. [↑](#footnote-ref-202)
203. Ian Angus and Simon Butler: *Too Many People?* (Chicago: Haymarket Books, 2011) pp. 59-61. [↑](#footnote-ref-203)
204. *Ibid.* p. 62. [↑](#footnote-ref-204)
205. Kath Jarrod *et al*: ‘Groundwater Decline and Tree Change in Floodplain Landscapes: Identifying Non-Linear Threshold Responses in Canopy Condition’ [*Global Ecology and Conservation*](http://www.sciencedirect.com/science/journal/23519894) [Vol. 2](http://www.sciencedirect.com/science/journal/23519894/2/supp/C) (Dec. 2014) pp. 148–160. [↑](#footnote-ref-205)
206. Robin Gill: ‘The Impact of Deer on Woodland Biodiversity’ *Forestry Commission Report* (Aug. 2000) <http://www.forestry.gov.uk/pdf/fcin36.pdf/$FILE/fcin36.pdf> accessed 01/02/2015. [↑](#footnote-ref-206)
207. David Pimentel: ‘Soil Erosion: A Food and Environmental Threat’ *Environment, Development and Sustainability* Vol. 8 (2006) pp. 119-137. [↑](#footnote-ref-207)
208. John J. Ozoga: ‘Aggressive Behavior of White-Tailed Deer at Winter Cuttings’ *The Journal of Wildlife Management* Vol. 36, No. 3 (Jul. 1972) pp. 861-868. [↑](#footnote-ref-208)
209. [Rafael Reuveny: ‘Climate Change-Induced Migration and Violent Conflict’](http://www.sciencedirect.com/science/article/pii/S0962629807000601) [*Political Geography*](http://www.sciencedirect.com/science/journal/09626298)

     [Vol. 26, Issue 6](http://www.sciencedirect.com/science/journal/09626298/26/6) [(Aug. 2007) pp. 656–673.](http://www.sciencedirect.com/science/article/pii/S0962629807000601) [↑](#footnote-ref-209)
210. ‘2001 IUCN Red List Categories and Criteria version 3.1’ IUCN Webpage: <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria#critical> accessed 01/06/2015. [↑](#footnote-ref-210)
211. Matt Walpole: ‘Factors Affecting the Recovery of the Masai Mara Black Rhino Population’ *Wildlife and People: Conflict and Conservation in Masai Mara, Kenya: Proceedings of a Workshop Series, 13-16 August* *2001* (London: International Institute for Environment and Development Publishing, 2003) pp. 17-25. [↑](#footnote-ref-211)
212. Richard H. Emslie: ‘Diceros bicornis’ *The IUCN Red List of Threatened Species* (2012). <http://www.iucnredlist.org/details/6557/0> accessed 04/06/2015. [↑](#footnote-ref-212)
213. *Ibid.* [↑](#footnote-ref-213)
214. Richard H. Emslie and Michael H. Knight: ‘Update on African Rhino Status and Poaching Trends from IUCN SSC African Rhino Specialist Group’ Rhino Resource Centre: <http://www.rhinoresourcecenter.com/pdf_files/140/1406156621.pdf> accessed 04/06/2015. [↑](#footnote-ref-214)
215. *Ibid.* [↑](#footnote-ref-215)
216. ‘Threats to Rhino’ Save the RhinoWebpage: <https://www.savetherhino.org/rhino_info/threats_to_rhino> accessed 04/06/2015. [↑](#footnote-ref-216)
217. ‘Conservation Force Mission Statement’ Conservation Force webpage: <http://www.conservationforce.org/roletwo.html> accessed 04/06/2015. [↑](#footnote-ref-217)
218. Brian Clark Howard: ‘U.S. Will Allow Hunters to Bring Home Rhino Trophies’ *National Geographic*:

     <http://news.nationalgeographic.com/2015/03/150326-black-rhino-trophy-hunting-namibia-approval-conservation/> accessed 04/06/2015. [↑](#footnote-ref-218)
219. Nigel Leader-Williams *et al*: ‘Trophy Hunting of Black Rhino Diceros bicornis: Proposals to Ensure Its Future Sustainability’ *Journal of International Wildlife Law & Policy* [Vol. 8](http://www.tandfonline.com/loi/uwlp20?open=8#vol_8), [Issue 1](http://www.tandfonline.com/toc/uwlp20/8/1) (2005) pp. 1-11. [↑](#footnote-ref-219)
220. [P.A. Lindse](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)y, [P.A. Roule](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)t and [S.S. Romaña](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)ch: ‘Economic and Conservation Significance of the Trophy Hunting Industry in Sub-Saharan Africa’ *Biological Conservation* [Vol. 134, Issue 4](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00063207/134/4) (Feb. 2007) pp. 455–469. See p. 464. [↑](#footnote-ref-220)
221. ‘Sustainable Utilisation’ Save the Rhino Webpage: <https://www.savetherhino.org/rhino_info/thorny_issues/sustainable_utilisation> accessed 04/06/2015. [↑](#footnote-ref-221)
222. Fred Pearce: ‘Why Africa’s National Parks are Failing to Save Wildlife’ *Environment 360* <http://e360.yale.edu/feature/why_africas_national_parks_are_failing_to_save_wildlife/2231/> accessed 04/06/2015. [↑](#footnote-ref-222)
223. Roderick P. Neumann: ‘Africa's 'Last Wilderness': Reordering Space for Political and Economic Control in Colonial Tanzania’ *Africa: Journal of the International African Institute* Vol. 71, No. 4 (2001) pp. 641-665. [↑](#footnote-ref-223)
224. William H. Rollins: ‘Imperial Shades of Green: Conservation and Environmental Chauvinism in the German Colonial Project’ *German Studies Review* Vol. 22, No. 2 (May, 1999) pp. 187-213. [↑](#footnote-ref-224)
225. [Lindse](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S0006320706003831?np=y)y *et al*: ‘Economic and Conservation Significance’ p. 466. [↑](#footnote-ref-225)
226. Karl Mathiesen: ‘The Idea That Hunting Saves African Wildlife Doesn’t Bear Scrutiny’ *The Guardian* (20th May 2015): <http://www.theguardian.com/environment/2015/may/20/the-idea-that-hunting-saves-african-wildlife-doesnt-withstand-scrutiny> accessed 04/06/2015. [↑](#footnote-ref-226)
227. Mahita Gajanan: ‘Cecil the Lion’s Death Prompts Calls to Ban Trophy Hunt Imports to U.S.’ *The Guardian* (28th July 2015): <http://www.theguardian.com/world/2015/jul/28/cecil-african-lion-import-ban-trophy-hunting> accessed 28/07/2015. [↑](#footnote-ref-227)
228. Steven V. Simpson and Kelly D. Cain: ‘Recreation's Role in the Environmental Ethics Dialogue: The Case of Aldo Leopold and the Morality of Hunting’ *Leisure* [Vol. 25](http://www.tandfonline.com/loi/rloi20?open=25#vol_25), [Issue 3-4](http://www.tandfonline.com/toc/rloi20/25/3-4) (2000) pp. 181-197. [↑](#footnote-ref-228)
229. Randall L. Eaton: *Why We Hunt* University of Calgary Webpage: <http://people.ucalgary.ca/~powlesla/personal/hunting/eaton.txt> accessed 01/11/2015. [↑](#footnote-ref-229)
230. Roger Scruton: *Animal Rights and Wrongs* (London: Metro Books, 2000). See p. 100. [↑](#footnote-ref-230)
231. Roger H. King: ‘Environmental Ethics and the Case for Hunting’ *Environmental Ethics* Vol.13, Issue 1 (Apr. 1991) pp. 59-85. See p. 73. [↑](#footnote-ref-231)
232. Scruton: *Animal Rights and Wrongs* p. 99. [↑](#footnote-ref-232)
233. *Ibid.* p. 101. [↑](#footnote-ref-233)
234. Angus Taylor: *Animal and Ethics* (Peterborough, Ontario: Broadview Press, 2009) p. 110. [↑](#footnote-ref-234)
235. *Ibid.* [↑](#footnote-ref-235)
236. Karen Warren: ‘Feminism and ecology: making connections’ *Environmental Ethics* Vol.9 Issue 1 (Apr. 1987) pp.3-20. See pp 6-7. [↑](#footnote-ref-236)
237. Brian Clark Howard: ‘Rhino Hunt Permit Auction Sets Off Conservation Debate’ *National Geographic*

     <http://news.nationalgeographic.com/news/2013/10/131028-dallas-safari-club-black-rhino-hunt-auction-conservation/> accessed 04/06/2015. [↑](#footnote-ref-237)
238. Marc Bekoff: ‘Killing Mountain Lions to Grow Mule Deer: Colorado’s Planned Cull Is Ill-Conceived and Unscientific’ *Huffington Post* (15th Sept. 2015): <http://www.huffingtonpost.com/marc-bekoff/killing-mountain-lions-to_b_8128072.html> accessed 02/04/2016.

     Sarah-Anne Jeanetta Selier, Bruce R. Page, Abi Tamim Vanak and Rob Slotow: ‘Sustainability of Elephant Hunting Across International Borders in Southern Africa: A Case Study of the Greater Mapungubwe Transfrontier Conservation Area’ *The Journal of Wildlife Management* [Vol. 78, Issue 1 (Jan. 2014)](http://onlinelibrary.wiley.com/doi/10.1002/jwmg.v78.1/issuetoc) pp. 122–132. [↑](#footnote-ref-238)
239. Peter Gwin: ‘Rhino Wars’ *National Geographic* (Mar. 2012) <http://ngm.nationalgeographic.com/2012/03/rhino-wars/gwin-text> accessed 01/04/2016. [↑](#footnote-ref-239)
240. Robert D. Fyumagwa and Julius W. Nyahongo: ‘Black Rhino Conservation in Tanzania: Translocation Efforts and Further Challenges’ *Pachyderm* Vol. 47 (2010) pp. 59-65. [↑](#footnote-ref-240)
241. ‘Lantana’ New South Wales GovernmentWebpage*:* <http://weeds.dpi.nsw.gov.au/Weeds/Details/78> accessed 10/04/2016. [↑](#footnote-ref-241)
242. Ramesh Kannan, Charlie M. Shackleton and R. Uma Shaanker: ‘Reconstructing the History of Introduction and Spread of the Invasive Species, Lantana, at Three Spatial Scales in India’ *Biological Invasions* Vol. 15, [Issue 6](http://link.springer.com/journal/10530/15/6/page/1) (June 2013) pp. 1287-1302. [↑](#footnote-ref-242)
243. K.V. Sankaran: ‘Lantana camara’ FAOFactsheet: <http://www.fao.org/forestry/13375-06ba52ce294a4e15f8264c42027052db0.pdf> accessed 01/04/2016. [↑](#footnote-ref-243)
244. Diana Virkki, Cuong Tran and J. Guy Castley: ‘Reptile Responses to Lantana Management in a Wet Sclerophyll Forest Australia’ *Journal of Herpetology* Vol. 46, Issue 2 (2012) pp. 177-185. [↑](#footnote-ref-244)
245. ‘Lantana: Lantana camera’ Department of Agriculture, Fisheries and Forestry Biosecurity Queensland Factsheet: <https://www.daf.qld.gov.au/__data/assets/pdf_file/0009/62010/IPA-Lantana-PP34.pdf> accessed 01/04/2016. [↑](#footnote-ref-245)
246. Peter Turner and Paul O. Downey: Ensuring Invasive Alien Plant Management Delivers Biodiversity Conservation: Insights from an Assessment of Lantana Camara in Australia’ *Plant Protection Quarterly* Vol. 25, Issue 3 (2010) pp. 102-110. [↑](#footnote-ref-246)
247. ‘Lantana’ New South Wales GovernmentWebpage. [↑](#footnote-ref-247)
248. ‘Lantana: Lantana camara’ Department of Agriculture Factsheet. [↑](#footnote-ref-248)
249. *Ibid*. [↑](#footnote-ref-249)
250. Corey J.A. Bradshaw: Little Left to Lose: Deforestation and Forest Degradation in Australia Since European Colonization’ *Journal of Plant Ecology* Vol. 5, No. 1 (Mar. 2012) pp. 109–120. [↑](#footnote-ref-250)
251. Peter Turner and Paul O. Downey: ‘Ensuring Invasive Alien Plant Management Delivers Biodiversity’ p. 106. [↑](#footnote-ref-251)
252. Michael D. Breed and Janice Moore: *Animal Behaviour* (Cambridge MA: Academic Press, 2015) p. 516. [↑](#footnote-ref-252)
253. [Ross A. Bradstock](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Ross+A.+Bradstock%22&source=gbs_metadata_r&cad=9), [Jann E. Williams](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Jann+E.+Williams%22&source=gbs_metadata_r&cad=9) and [Malcolm A. Gil](https://www.google.co.uk/search?tbo=p&tbm=bks&q=inauthor:%22Malcolm+A.+Gill%22&source=gbs_metadata_r&cad=9)l: *Flammable Australia: The Fire Regimes and Biodiversity of a Continent* (Cambridge: Cambridge University Press, 2002). [↑](#footnote-ref-253)
254. K.V. Sankaran: ‘Lantana camara’ p. 2. [↑](#footnote-ref-254)
255. F. Leland Russell, David B. Zippin and Norma L. Fowler: ‘Effects of White-Tailed Deer (Odocoileus Virginianus) on Plants, Plant Populations and Communities: A Review’ *American Midland Naturalist* Vol. 146, No. 1 (Jul. 2001) pp. 1-26. See p. 2. [↑](#footnote-ref-255)
256. Douglas W. MacCleery: *American Forests: A History of Resiliency and Recovery* (Durham NC: United States Department of Agriculture Forest Service, 1993). See p. 49. [↑](#footnote-ref-256)
257. Thomas J. Rawinski: ‘Impacts of White-Tailed Deer Overabundance in Forest Ecosystems: An Overview’ (Newtown Square PA: Northeastern AreaState and Private Forestry Service, 2008) <http://www.na.fs.fed.us/fhp/special_interests/white_tailed_deer.pdf> accessed 05/06/2015. [↑](#footnote-ref-257)
258. Paul D. Curtis and Kristi L. Sullivan ‘White-Tailed Deer’ *Wildlife Damage Management Fact Sheet Series* (Ithaca NY: Cornell University, 2001). <http://wildlifecontrol.info/pubs/Documents/Deer/Deer_factsheet.pdf> accessed 01/04/2016. [↑](#footnote-ref-258)
259. David Drake *et al*: ‘Assessment of Negative Economic Impacts from Deer in the Northeastern United States’ *Journal of Extension* Vol. 43, No. 1 (Feb. 2005):<http://www.joe.org/joe/2005february/rb5.php> accessed 05/06/2015. [↑](#footnote-ref-259)
260. Stephen B. Horsley, Susan L. Stout, and David S. deCalesta: ‘White-tailed Deer Impact on the Vegetation Dynamics of a Northern Hardwood Forest’. *Ecological Applications* Vol. 13, Issue 1 (Feb. 2003) pp. 98-118. [↑](#footnote-ref-260)
261. Simon Chollet and Jean-Louis Martin: ‘Declining Woodland Birds in North America: Should we Blame Bambi?’ *Diversity and Distributions*  [Vol. 19, Issue 4 (Apr. 2013) pp.](http://onlinelibrary.wiley.com/doi/10.1111/ddi.2013.19.issue-4/issuetoc) 481–483.

     Tara G. Martin *et al*: ‘Prior Information Reduces Uncertainty About the Consequences of Deer Overabundance on Forest Birds’ *Biological Conservation*. [Vol. 165](http://www.sciencedirect.com/science/journal/00063207/165/supp/C) (Sept. 2013) pp. 10–17. [↑](#footnote-ref-261)
262. Varner: *In Nature’s Interests?* ch. 5. [↑](#footnote-ref-262)
263. *Ibid*. p. 100 [↑](#footnote-ref-263)
264. Dale Jamieson: ‘The Rights of Animals and the Demands of Nature’ *Environmental Values* Vol.17 (2008) pp. 181-199. Quote p. 189 [↑](#footnote-ref-264)
265. Paul R. Ehrlich, David S. Dobkin, and Darryl Wheye: ‘The Decline of Eastern Songbirds’ (1988) Stanford University Webpage: <https://web.stanford.edu/group/stanfordbirds/text/essays/Eastern_Songbirds.html> accessed 05/06/2015 [↑](#footnote-ref-265)
266. *Ibid.* [↑](#footnote-ref-266)
267. ‘Help Songbirds’ Native Songbird Care and Conservation Webpage: <http://www.nativesongbirdcare.org/Help_Songbirds.html> accessed 05/06/2015. [↑](#footnote-ref-267)
268. Christopher R. Webster, Michael A. Jenkins and Janet H. Rock:’ Long-Term Response of Spring Flora to Chronic Herbivory and Deer Exclusion in Great Smoky Mountains National Park, USA’ *Biological Conservation* [Vol. 125, Issue 3](http://www.sciencedirect.com/science/journal/00063207/125/3) (Oct. 2005) pp. 297–307. [↑](#footnote-ref-268)
269. Jacob A. Thompson and William E. Sharpe: ‘Soil Fertility, White-Tailed Deer, and Three Trillium Species: A Field Study’ *Northeastern Naturalist* Vol. 12, No. 4 (2005) pp. 379-390. [↑](#footnote-ref-269)
270. ‘Living with White-Tailed Deer in Illinois’ University of Illinois Webpage: <http://web.extension.illinois.edu/deer/damage.cfm?SubCat=8890> accessed 15/06/2015. [↑](#footnote-ref-270)
271. ‘Deer Culls are not Effective for Forest Protection’ *European Commission* *DG Environment News Alert Service* Issue 275 (Mar. 2012) <http://ec.europa.eu/environment/integration/research/newsalert/pdf/275na4_en.pdf> accessed 15/06/2015. [↑](#footnote-ref-271)
272. Brent A. Rudolph, William F. Porter and H. Brian Underwood: ‘Evaluating Immunocontraception for Managing Suburban White-Tailed Deer in Irondequoit, New York’ *The Journal of Wildlife Management* Vol. 64, No. 2 (Apr. 2000) pp. 463-473. [↑](#footnote-ref-272)
273. Lowell A. Miller and Gary J. Killian: ‘Seven Years of White-Tailed Deer Immunocontraceptive Research at Penn State University: A Comparison of Two Vaccines.’ *Wildlife Damage Management Conferences - Proceedings.* Paper 14. (2000). <http://digitalcommons.unl.edu/icwdm_wdmconfproc/14> accessed 28/07/2015. [↑](#footnote-ref-273)
274. Allen T. Rutberg, Ricky E. Naugle and Frank Verret: Single Treatment Porcine Zona Pellucida Immunocontraception Associated with Reduction of a Population of White-Tailed Deer *(Odocoileus virginianus)*’ *Journal of Zoo and Wildlife Medicine* Vol. 44, No. 4s (Dec. 2013) pp. 75-83. [↑](#footnote-ref-274)
275. James P. Gionfriddo *et al*: ‘Health Effects of GnRH Immunocontraception of Wild White-Tailed Deer in New Jersey’ *Wildlife Society Bulletin Special Issue: Ecology and Management of Deer in Developed Landscapes* [Vol. 35, Issue 3 (Sept. 2011)](http://onlinelibrary.wiley.com/doi/10.1002/wsb.v35.3/issuetoc) pp. 149–160. [↑](#footnote-ref-275)
276. Jenny G. Powers *et al*: ‘Effects of GonaCon Immunocontraceptive Vaccine in Free-Ranging Female Rocky Mountain Elk (*Cervus elaphus nelsoni*)’ *Wildlife Society Bulletin* [Vol. 38, Issue 3](http://onlinelibrary.wiley.com/doi/10.1002/wsb.v38.3/issuetoc) (Sept. 2014) pp. 650–656. [↑](#footnote-ref-276)
277. Thomas Merckx: ‘Rewilding: Pitfalls and Opportunities for Moths and Butterflies’ in [Henrique M. Pereira](http://link.springer.com/search?facet-creator=%22Henrique+M.+Pereira%22) and [Laetitia M. Navarro](http://link.springer.com/search?facet-creator=%22Laetitia+M.+Navarro%22) (eds.) *Rewilding European Landscapes* (New York: Springer, 2015) pp. 107-125. [↑](#footnote-ref-277)
278. ‘Wildlife Comeback’ Rewilding Europe Webpage: <http://www.rewildingeurope.com/about/background-and-goals/wildlife-comeback/> accessed 28/07/2015 [↑](#footnote-ref-278)
279. [Dolly Jørgensen](http://www.sciencedirect.com/science/article/pii/S0016718514002504): ‘Rethinking Rewilding’ *Geoforum* [Vol. 65](http://www.sciencedirect.com/science/journal/00167185/65/supp/C) (Oct. 2015) pp. 482–488. [↑](#footnote-ref-279)
280. C.J. Donlan *et al*: ‘Pleistocene Rewilding: An Optimistic Agenda for Twenty-First Century Conservation’ [*The American Naturalist*](http://www.jstor.org/action/showPublication?journalCode=amernatu) [Vol. 168, No. 5 (Nov. 2006) pp.](http://www.jstor.org/stable/10.1086/an.2006.168.issue-5) 660-681. [↑](#footnote-ref-280)
281. *Ibid*. p. 660. [↑](#footnote-ref-281)
282. *Ibid* p. 664. [↑](#footnote-ref-282)
283. Christopher Irwin Smith: ‘Rewilding: Introductions Could Reduce Biodiversity’ *Nature* Vol. 437, Issue 318 (15 Sept. 2005) p. 318. [↑](#footnote-ref-283)
284. *Ibid.* [↑](#footnote-ref-284)
285. Dustin R. Rubenstein *et al*:‘Pleistocene Park: Does Re-Wilding North America Represent Sound Conservation for the 21st Century?’ *Biological Conservation* Vol. 132 (2006) pp. 232-238. [↑](#footnote-ref-285)
286. William Cronon: ‘The Trouble with Wilderness; or, Getting Back to the Wrong Nature’ in William Cronon (ed.) *Uncommon Ground: Rethinking the Human Place in Nature* (New York: W.W. Norton and Company Inc., 1995). pp. 69-91. [↑](#footnote-ref-286)
287. George Monbiot: *Feral: Rewilding the Land, Sea and Human Life* (London: Penguin Books, 2013). p. 9. [↑](#footnote-ref-287)
288. Rodríguez, A. and Calzada, J: ‘Lynx pardinus’ The *IUCN Redlist of Threatened Species* (2015). <http://www.iucnredlist.org/details/12520/0> accessed 01/08/2015. [↑](#footnote-ref-288)
289. Pablo Ferreras, Alejandro Rodríguez, Francisco Palomares, and Miguel Delibes: ‘Iberian Lynx: the Uncertain Future of a Critically Endangered Cat’ in David MacDonald and Andrew Loveridge (eds.) *The Biology and Conservation of Wild Felids* (Oxford: Oxford University Press, 2010) ch. 24. [↑](#footnote-ref-289)
290. U. Breitenmoser *et al*: ‘Lynx lynx’ *The IUCN Redlist of Threatened Species* (2015). <http://www.iucnredlist.org/details/12519/0> accessed 01/08/2015. [↑](#footnote-ref-290)
291. Aleksander Trajce *et al*: ‘Distribution and Conservation Status of the Balkan Lynx’ *Proceedings of the 4th Congress of Ecologists of Macedonia with International Participation* (Ohrid, 12-15 Oct. 2012). [↑](#footnote-ref-291)
292. ‘Bringing the Lynx Back to the British Isles’ Lynx UK Trust Webpage: <http://www.lynxuk.org/> accessed 01/08/2015. [↑](#footnote-ref-292)
293. [Camila P. Teixeira](http://www.sciencedirect.com/science/article/pii/S0003347206003460) *et al*: ‘Revisiting Translocation and Reintroduction Programmes: The Importance of Considering Stress’ [*Animal Behaviour*](http://www.sciencedirect.com/science/journal/00033472) [Vol. 73, Issue 1](http://www.sciencedirect.com/science/journal/00033472/73/1) (Jan. 2007) pp. 1–13. [↑](#footnote-ref-293)
294. Ken Thompson: *Where do Camels Belong? The Story and Science of Invasive Species.* (London: Profile Books, 2014). p. 32. [↑](#footnote-ref-294)
295. *Ibid.* [↑](#footnote-ref-295)
296. ‘Definition of Terms’ The Non-Native Species Secretariat Webpage: <http://www.nonnativespecies.org/index.cfm?pageid=64> accessed 04/03/2015. [↑](#footnote-ref-296)
297. Charles Sutherland Elton: *The Ecology of Invasions by Animals and Plants.* (London: Methuen & Co. Ltd., 1958) p. 109. [↑](#footnote-ref-297)
298. Brendon M. H. Larson, Brigitte Nerlich and Patrick Wallis: ‘Metaphors and Biorisks: The War on Infectious Diseases and Invasive Species.’ *Science Communication* Vol. 26, No. 3 (Mar. 2005) pp. 243-268. See pp. 247-253. [↑](#footnote-ref-298)
299. [Matthew K. Chew](http://www.sciencemag.org/search?author1=Matthew+K.+Chew&sortspec=date&submit=Submit) and Manfred D. Laubichler: ‘Natural Enemies: Metaphor or Misconception?’ *Science*.

     Vol. 301, No. 5629 (4 July 2003) pp. 52-53. [↑](#footnote-ref-299)
300. Thompson: *Where do Camels Belong?* p. 121. [↑](#footnote-ref-300)
301. Banu Subramaniam: ‘The Aliens Have Landed! Reflections of the Rhetoric of Biological Invasions’ *Meridians* Vol. 2, No. 1 (2001) pp. 26-40. See pp. 29-32. [↑](#footnote-ref-301)
302. ‘All Trick, No Treat’ US Fish and Wildlife Service Webpage: <http://www.fws.gov/pacific/fisheries/aquaticnus/AIS_outreach.cfm> accessed 06/03/2015. [↑](#footnote-ref-302)
303. ‘Fruit and Veg Dumped After Illegal Immigrants Sneak into Lorries’ *The Telegraph* (5th Jan. 2015)

     <http://www.telegraph.co.uk/news/uknews/immigration/11326433/Fruit-and-veg-dumped-after-illegal-immigrants-sneak-into-lorries.html> accessed 06/03/2015. [↑](#footnote-ref-303)
304. Jonah H. Peretti: ‘Nativism and Nature: Rethinking Biological Invasion’ *Environmental Values*

     Vol. 7, No. 2 (May 1998) pp. 183-192. See p. 188. [↑](#footnote-ref-304)
305. Achim Steiner: ‘Counting the Costs of Alien Invasions’ *BBC News* <http://news.bbc.co.uk/1/hi/sci/tech/8615398.stm> accessed 04/03/2015. [↑](#footnote-ref-305)
306. Thompson: *Where do Camels Belong?* pp. 4-6. [↑](#footnote-ref-306)
307. Thom van Doornen: ‘Invasive Species in Penguin Worlds: An Ethical Taxonomy of Killing for Conservation’ *Conservation and Society* Vol. 9, Issue 4 (2011) pp. 286-298. See p. 290. [↑](#footnote-ref-307)
308. *Ibid.* [↑](#footnote-ref-308)
309. ‘Biogeography: Wallace and Wegner’ University of Berkley Webpage: <http://evolution.berkeley.edu/evolibrary/article/history_16> accessed 05/03/2015. [↑](#footnote-ref-309)
310. I. Ching Chen, [Jane K. Hil](http://www.sciencemag.org/search?author1=Jane+K.+Hill&sortspec=date&submit=Submit)l, [Ralf Ohlemülle](http://www.sciencemag.org/search?author1=Ralf+Ohlem%C3%BCller&sortspec=date&submit=Submit)r, [David B. Ro](http://www.sciencemag.org/search?author1=David+B.+Roy&sortspec=date&submit=Submit)y and [Chris D. Thoma](http://www.sciencemag.org/search?author1=Chris+D.+Thomas&sortspec=date&submit=Submit)s: ‘Rapid Range Shifts of Species Associated with High Levels of Climate Warming’. *Science* Vol. 333, No. 6045 (19 Aug. 2011) pp. 1024-1026. [↑](#footnote-ref-310)
311. Timothy C.G. Rich: ‘Hieracium attenboroughianum (Asteraceae), a New Species of Hawkweed’ *New Journal of Botany* Vol. 4, Issue 3 (Dec. 2014), pp. 172-175. [↑](#footnote-ref-311)
312. ‘Wildlife and Countryside Act 1981’ UK government website: <http://www.legislation.gov.uk/ukpga/1981/69/contents> accessed 14/03/2015. [↑](#footnote-ref-312)
313. Elena Ares and Jess Montgomery: *Full Report on Infrastructure Bill: Invasive Species* (London: Commons Briefings Papers, 2015) <http://www.parliament.uk/business/publications/research/briefing-papers/SN07086/infrastructure-bill-invasive-species> accessed 14/03/2015. See pages 5-6. [↑](#footnote-ref-313)
314. Jessica Aldred: ‘Wild Beavers Seen in England for First Time in Centuries’ *The Guardian* (27th Feb. 2014) <http://www.theguardian.com/environment/2014/feb/27/wild-beavers-england-devon-river> accessed 15/03/2015. [↑](#footnote-ref-314)
315. Sonia Kleindorfer *et al*: ‘Changes in Philornis Infestation Behavior Threaten Darwin’s Finch Survival.’ *Current Zoology* Vol. 60, Issue 4 (2014) pp. 542–550.

     Rachael Y Dudaniec *et al*: ‘Genetic Variation in the Invasive Avian Parasite, Philornis downsi (Diptera, Muscidae) on the Galápagos Archipelago’ *BioMed Central Ecology* Vol. 8, Issue 13 (Dec. 2008) p. 1. [↑](#footnote-ref-315)
316. Lewis Smith: ‘Scientists Raid Mangrove Finch Nests as they Battle to Save Birds Discovered by Charles Darwin from Extinction’ *The Independent* (22nd Mar. 2015)

     <http://www.independent.co.uk/news/science/scientists-raid-mangrove-finch-nests-as-they-battle-to-save-birds-discovered-by-charles-darwin-from-extinction-10125363.html> accessed 22/03/2015. [↑](#footnote-ref-316)
317. Ian S. Henderson: ‘Recent Measures to Control Ruddy Ducks Oxyura Jamaicensis in the United Kingdom’ in G.C. Boere, C.A. Galbraith & D.A. Stroud(eds.) *Waterbirds Around the World* (Edinburgh: The Stationery Office, 2006) pp. 822-825. [↑](#footnote-ref-317)
318. ‘Ruddy Duck Project’ NNSS Webpage: <http://www.nonnativespecies.org/index.cfm?pageid=244> accessed 22/03/2015 [↑](#footnote-ref-318)
319. George W. Cox: *Alien Species and Evolution: The Evolutionary Ecology of Exotic Plants, Animals, Microbes, and Interacting Native Species* (Washington: Island Press, 2004) p. 229. [↑](#footnote-ref-319)
320. ‘Oxyura leucocephala’ *The IUCN Redlist of Threatened Species* (2008). <http://www.iucnredlist.org/details/22679814/0%C2%A04> accessed 22/03/2015. [↑](#footnote-ref-320)
321. Damian Carrington: ‘Shooters Set Their Sights on UK’s Last Remaining Ruddy Ducks’ *The Guardian* (8th Aug. 2014) <http://www.theguardian.com/environment/2014/aug/08/ruddy-ducks-cull-invasive-species> accessed 22/03/2015. [↑](#footnote-ref-321)
322. ‘White-Headed Duck Task Force’ NNSS Webpage: <http://www.nonnativespecies.org/index.cfm?pageid=245> accessed 22/03/2015. [↑](#footnote-ref-322)
323. ‘Recommendation No. 61 on the Conservation of the White-Headed Duck (*Oxyura leucocephala*)’ (1997) Council of Europe Webpage: <https://wcd.coe.int/ViewDoc.jsp?Ref=Rec(1997)61&Language=lanEnglish&Ver=original&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864> accessed 26/03/2015. [↑](#footnote-ref-323)
324. A. Green and B. Hughes: ‘Action Plan for the White-headed Duck (*Oxyura leucocephala*) in Europe.’ Wildfowl and Wetlands Trust Report: <http://centrostudinatura.it/public2/documenti/139-2152.pdf> accessed 26/03/2015. See p. 17. [↑](#footnote-ref-324)
325. *Ibid*. pp. 10-11. [↑](#footnote-ref-325)
326. [H Schielzeth](https://scholar.google.co.uk/citations?user=4m3g26gAAAAJ&hl=en&oi=sra), L Lachmann, G Eichhorn, T Heinicke: ‘The White-headed Duck Oxyura leucocephala in the Tengiz-Korgalzhyn Region, Central Kazakhstan’ *Wildfowl* Issue 54 (2013) pp. 115-129.

     Behrouz Behrouzi-Rad and, Ramazanali Ghaeimi: ‘Changes in the Population of Wintering Waterbirds in Gomishan Wetland at Caspian Sea Coast, Iran’ *International Journal of Marine Science* Vol. 5, No. 12 (2015) pp. 1-7. [↑](#footnote-ref-326)
327. Jonathan Balcombe: *Second Nature: The Inner Lives of Animals* (London: Palgrave MacMillan, 2010) p. 57. [↑](#footnote-ref-327)
328. Benjamin Vernot and Joshua M. Akey: ‘Resurrecting Surviving Neandertal Lineages from Modern Human Genomes’ *Science* Vol. 343. No. 6174 (28 Feb. 2014) pp. 1017-1021. [↑](#footnote-ref-328)
329. Meritxell Genovart: ‘Natural Hybridization and Conservation’ [*Biodiversity and Conservation*](http://link.springer.com.eresources.shef.ac.uk/journal/10531)

     Vol. 18, [Issue 6](http://link.springer.com.eresources.shef.ac.uk/journal/10531/18/6/page/1) (June 2009) pp. 1435-1439. [↑](#footnote-ref-329)
330. Judith M. Rhymer and Daniel Simberloff: ‘Extinction by Hybridization and Introgression’ *Annual Review of Ecology and Systematics* Vol. 27 (1996) pp. 83-109. See p. 86. [↑](#footnote-ref-330)
331. [Fred W. Allendorf](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X), [Robb F. Leary](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X), [Paul Spruell and John K. Wenburg: ‘The Problems with Hybrids: Setting Conservation Guidelines’ *Trends in Ecology & Evolution* Vol.16, No.11 (Nov. 2001) pp. 613-622. See p 619](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S016953470102290X). [↑](#footnote-ref-331)
332. [Sriram Sankararaman](http://www.nature.com/nature/journal/v507/n7492/full/nature12961.html#auth-1) *et al*: ‘The Genomic Landscape of Neanderthal Ancestry in Present-day Humans’ *Nature* Issue 507 (20 Mar. 2014) pp. 354–357. [↑](#footnote-ref-332)
333. Thomas E. Dowling and Carol L. Secor: ‘The Role of Hybridization and Introgression in the Diversification of Animals.’ *Annual Review of Ecology and Systematics* Vol. 28 (1997) pp. 593-619. See p. 598. [↑](#footnote-ref-333)
334. E. Balharry, B.W. Staines, M. Marquiss and H. Kruuk: ‘Hybridisation in British Mammals’. *JNCC Report* No. 154. (Peterborough: Joint Nature Conservation Committee, 1994). p. 21. [↑](#footnote-ref-334)
335. Peter R. Grant and B. Rosemary Grant: ‘Hybridization of Bird Species’ *Science* Vol. 256, No. 5054 (10th Apr. 1992) pp. 193-197. See p. 194. [↑](#footnote-ref-335)
336. van Doornen: ‘Invasive Species in Penguin Worlds’. p. 298. [↑](#footnote-ref-336)
337. Fredrik Svanberg et al: ‘Lead Isotopes and Lead Shot Ingestion in the Globally Threatened Marbled Teal (Marmaronetta angustirostris) and White-Headed Duck (Oxyura leucocephala)’ [*Science of The Total Environment*](http://www.sciencedirect.com/science/journal/00489697) [Vol. 370, Issues 2–3](http://www.sciencedirect.com/science/journal/00489697/370/2) (1 Nov. 2006) pp. 416–424. [↑](#footnote-ref-337)
338. *Ibid.* pp.417-418. [↑](#footnote-ref-338)
339. Rafael Mateo *et al*: ‘Lead poisoning in the Globally Threatened Marbled Teal and White-Headed Duck in Spain’ *Environmental Toxicology and Chemistry* Vol. 20, No. 12 (2001) pp. 2860–2868. See p. 2865. [↑](#footnote-ref-339)
340. *Ibid*. p. 2860. [↑](#footnote-ref-340)
341. [Violeta Muñoz-Fuentes](http://link.springer.com/search?facet-author=%22Violeta+Mu%C3%B1oz-Fuentes%22), [Andy J. Green](http://link.springer.com/search?facet-author=%22Andy+J.+Green%22), [Juan José Negro](http://link.springer.com/search?facet-author=%22Juan+Jos%C3%A9+Negro%22) and [Michael D. Sorenson: ‘Population Structure and Loss of Genetic Diversity in the Endangered White-Headed Duck, Oxyura leucocephala’](http://link.springer.com/search?facet-author=%22Michael+D.+Sorenson%22) [*Conservation Genetics*](http://link.springer.com/journal/10592)[Vol. 6,](http://link.springer.com/search?facet-author=%22Michael+D.+Sorenson%22) [Issue 6](http://link.springer.com/journal/10592/6/6/page/1) ([Dec. 2005) pp. 999-1015](http://link.springer.com/search?facet-author=%22Michael+D.+Sorenson%22). [↑](#footnote-ref-341)
342. David H. Reed and Richard Frankham: ‘Correlation between Fitness and Genetic Diversity’. *Conservation Biology* [Vol. 17, Issue 1 (](http://onlinelibrary.wiley.com/doi/10.1111/cbi.2003.17.issue-1/issuetoc)Feb. 2003)pp. 230–237. [↑](#footnote-ref-342)
343. Carlos A. Driscoll *et al*: ‘The Near Eastern Origin of Cat Domestication’ *Science* Vol. 317 no. 5837 (27th July 2007) pp. 519-523. [↑](#footnote-ref-343)
344. Scott R. Loss, Tom Will, Peter P. Marra: ‘The Impact of Free-Ranging Domestic Cats on Wildlife of the United States’ *Nature Communications* Vol. 4, No. 1396 (Dec. 2013) pp. 1-8. [↑](#footnote-ref-344)
345. Manuel Nogales *et al*: ‘A Review of Feral Cat Eradication on Islands’ *Conservation Biology* [Vol. 18, Issue 2](http://onlinelibrary.wiley.com/doi/10.1111/cbi.2004.18.issue-2/issuetoc) (Apr. 2004) pp 310–319.

     Felix M. Medina *et al*: ‘A Global Review of the Impacts of Invasive Cats on Island Endangered Vertebrates’ *Global Change Biology* [Vol. 17, Issue 11](http://onlinelibrary.wiley.com/doi/10.1111/gcb.2011.17.issue-11/issuetoc) (Nov. 2011) pp. 3503–3510. [↑](#footnote-ref-345)
346. Medina *et al*: ‘A Global Review’. pp. 3506-3508. [↑](#footnote-ref-346)
347. Fred Pearce: *The New Wild: Why Invasive Species Will Be Nature’s Salvation* (London: Icon Books, 2015) p. 13. [↑](#footnote-ref-347)
348. *Ibid*. p 17. [↑](#footnote-ref-348)
349. B. John Hughes, Graham R. Martin and S. James Reynolds: ‘Cats and Seabirds: Effects of Feral Domestic Cat *Felis silvestris catus* Eradication on the Population of Sooty Terns *Onychoprion fuscata* on Ascension Island, South Atlantic’ *Ibis* [Vol. 150, Issue Supplement s1](http://onlinelibrary.wiley.com/doi/10.1111/ibi.2008.150.issue-s1/issuetoc) (Aug. 2008) pp. 122–131. See p. 123. [↑](#footnote-ref-349)
350. ‘Guadalupe Storm-Petrel *Hydrobates macrodactylus’* BirdLife International Species Factsheet: <http://www.birdlife.org/datazone/speciesfactsheet.php?id=3982> accessed 16/05/2015. [↑](#footnote-ref-350)
351. ‘Ascension Seabirds on the Ascent’ *RSPB* *News*: <http://www.rspb.org.uk/news/details.aspx?id=336398> accessed 16/05/2015. [↑](#footnote-ref-351)
352. Stephen A. Royle: ‘Human Interference on Ascension Island.’ *Environmental Archaeology* Vol. 9 (2004) pp. 127-134. See p. 130. [↑](#footnote-ref-352)
353. Graph taken from, B. John Hughes *et al*: ‘Cats and Seabirds’. p. 128. [↑](#footnote-ref-353)
354. Diane Frank and Joel Dehasse: ‘Differential Diagnosis and Management of Human-directed Aggression in Cats’ [*Clinical Techniques in Small Animal Practice*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/10962867) [Vol. 19, Issue 4](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/10962867/19/4) (Nov. 2004) pp. 225–232. See p 226. [↑](#footnote-ref-354)
355. Royle: ‘Human Interference’. p.132. [↑](#footnote-ref-355)
356. Graeme D. Ruxton, Sarah Thomas and Jessica Wright: ‘Bells Reduce Predation of Wildlife by Domestic Cats (Felis catus)’ *Journal of Zoology* [Vol. 256, Issue 1](http://onlinelibrary.wiley.com/doi/10.1111/jzo.2002.256.issue-1/issuetoc) (Jan. 2002) pp. 81–83. [↑](#footnote-ref-356)
357. M.J. Fettman *et al*: ‘Effects of Neutering on Bodyweight, Metabolic Rate and Glucose Tolerance of Domestic Cats’ [*Research in Veterinary Science*](http://www.sciencedirect.com/science/journal/00345288) [Vol. 62, Issue 2](http://www.sciencedirect.com/science/journal/00345288/62/2) (1997) pp. 131–136. [↑](#footnote-ref-357)
358. ‘Myths and Truths About Spay/Neuter’ The Humane Society Webpage: <http://humanesocietyofcharlotte.org/clinic-services/clinic-srvicesmyths-and-truths-about-spayneuter/> accessed 13/04/2016. [↑](#footnote-ref-358)
359. ‘Frigate Birds on Ascension Island’ Ascension Island Government Webpage: <http://www.ascension-island.gov.ac/wp-content/uploads/2012/12/FRIGATE-BIRD-SAP-draft.pdf> accessed 18/05/2015. [↑](#footnote-ref-359)
360. Ian Johnston: ‘Natural Born Killers: Campaign Demands Eradication of Cats from New Zealand’ *NBC News* (23rd Jan. 2013) <http://worldnews.nbcnews.com/_news/2013/01/23/16657915-natural-born-killer-campaign-demands-eradication-of-cats-from-new-zealand?lite> accessed 01/11/2015. [↑](#footnote-ref-360)
361. B. M. Fitzgerald & C. R. Veitch: ‘The Cats of Herekopare Island, New Zealand; Their History, Ecology and Affects (sic) on Birdlife’ *New Zealand Journal of Zoology* Vol. 12, No. 3 (1985) pp. 319-330. [↑](#footnote-ref-361)
362. S.K Wilson, I.A. Okunlola and J.A. Novak: ‘Birds be Safe: Can a Novel Cat Collar Reduce Avian Mortality by Domestic Cats (*Felis catus*)?’ [*Global Ecology and Conservation*](http://www.sciencedirect.com/science/journal/23519894) [Vol. 3](http://www.sciencedirect.com/science/journal/23519894/3/supp/C) (Jan. 2015) pp. 359–366. [↑](#footnote-ref-362)
363. [David Ringle](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S000632071400487X)r, [James C. Russel](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S000632071400487X)l and [Matthieu Le Corr](http://www.sciencedirect.com.eresources.shef.ac.uk/science/article/pii/S000632071400487X)e: ‘Trophic Roles of Black Rats and Seabird Impacts on Tropical Islands: Mesopredator Release or Hyperpredation?’ [*Biological Conservation*](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00063207) [Vol. 185](http://www.sciencedirect.com.eresources.shef.ac.uk/science/journal/00063207/185/supp/C) (May 2015) pp. 75–84. [↑](#footnote-ref-363)
364. Jeff McMahan: ‘The Moral Problem of Predation’ (2014) Published online at <http://jeffersonmcmahan.com/wp-content/uploads/2012/11/The-Moral-Problem-of-Predation.pdf> accessed 18/05/2015. [↑](#footnote-ref-364)
365. *Ibid.* p. 17. [↑](#footnote-ref-365)
366. Patrick Forterre: ‘Defining Life: The Virus Viewpoint’ [*Origins of Life and Evolution of Biospheres*](http://link.springer.com/journal/11084) Vol. 40, [Issue 2](http://link.springer.com/journal/11084/40/2/page/1), (Apr. 2010) pp 151-160. Quote from p. 159. [↑](#footnote-ref-366)
367. ‘Why Can’t We Beat Viruses?’ *BBC Science* (24th Jan 2013) <http://www.bbc.co.uk/science/0/21143412> accessed 04/10/2014. [↑](#footnote-ref-367)
368. Edward C. Holmes: What Does Virus Evolution Tell Us about Virus Origins? *Journal of Virology* Vol. 85, No. 11 (June 2011) pp. 5247-5251. [↑](#footnote-ref-368)
369. David Moreira and Purificación López-García: ‘Ten Reasons to Exclude Viruses from the Tree of Life’ *Nature Reviews Microbiology* Issue 7 (Apr. 2009) pp. 306-311. [↑](#footnote-ref-369)
370. *Ibid*. pp. 306-7. [↑](#footnote-ref-370)
371. ‘Cell Size and Scale’ Genetic Science Learning Centre, University of Utah Webpage: <http://learn.genetics.utah.edu/content/cells/scale/> accessed 04/10/2014. [↑](#footnote-ref-371)
372. Moreira and López-García: ‘Ten Reasons to Exclude Viruses’ p. 307. [↑](#footnote-ref-372)
373. ‘Self-Defence and the Prevention of Crime’ UK Crown Prosecution Service Guidelines: <http://www.cps.gov.uk/legal/s_to_u/self_defence/#Principle> accessed 10/10/2014. [↑](#footnote-ref-373)
374. Alison McIntyre: ‘Doctrine of Double Effect’ in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*(Winter 2014 Edition) <http://plato.stanford.edu/archives/win2014/entries/double-effect> accessed 30/01/2015. [↑](#footnote-ref-374)
375. Taylor: *Respect for Nature* pp 264-269. [↑](#footnote-ref-375)
376. *Ibid.* p. 268. [↑](#footnote-ref-376)
377. *Ibid.* [↑](#footnote-ref-377)
378. Forest Rohwer, David Prangishvili and Debbie Lindell: ‘Roles of Viruses in the Environment’ *Environmental Microbiology* Vol 11, Issue 11 (2009) pp. 2771–2774. [↑](#footnote-ref-378)
379. Joshua S. Weitz and Steven W. Wilhelm: ‘An Ocean of Viruses’ *The Scientist Magazine* (1st July 2013) <http://www.the-scientist.com/?articles.view/articleNo/36120/title/An-Ocean-of-Viruses/> accessed 10/10/2014. [↑](#footnote-ref-379)
380. Taylor: *Respect for Nature* p. 268. [↑](#footnote-ref-380)
381. ‘Self-Defence’ Judicial Studies Board for Northern Ireland <http://www.jsbni.com/Publications/BenchBook/Pages/5-8-Self-defence.aspx> accessed 10/10/2014. [↑](#footnote-ref-381)
382. ‘Self-Defence’ Oxford Index (Oxford: Oxford University Press Online) <http://oxfordindex.oup.com/view/10.1093/oi/authority.20110803100453218> accessed 11/10/2014. [↑](#footnote-ref-382)
383. ‘Ebola Outbreak Kills 5000 Gorillas’ *Max Planck Institute News* (6th Dec. 2006) <http://www.mpg.de/530935/pressRelease20061206> accessed 21/09/2014 [↑](#footnote-ref-383)
384. Magdalena Bermejo *et al*: ‘Ebola Outbreak Killed 5000 Gorillas’ *Science* Vol. 314, No. 5805 (Dec. 2006) p. 1564. [↑](#footnote-ref-384)
385. David Beaune: ‘What Would Happen to the Trees and Lianas if Apes Disappeared? [*Oryx*](http://journals.cambridge.org.eresources.shef.ac.uk/action/displayJournal?jid=ORX) Vol. 43, Issue 3 (July 2015) pp. 442-446. [↑](#footnote-ref-385)
386. *Ibid.* [↑](#footnote-ref-386)
387. Ria Ghia: ‘Ebola: Outbreak Causes Crisis for Great Apes and Humans’ *Jane Goodall Institute of Canada News* (16th Apr. 2014): <http://janegoodall.ca/get-involved/ebola-outbreaks-cause-crisis-great-apes-humans/> accessed 21/09/2014. [↑](#footnote-ref-387)
388. M. Robbins and L. Williamson ‘Gorilla Beringei’ *The IUCN Redlist of Threatened Species* (2008). <http://www.iucnredlist.org/details/39994/0> accessed 21/09/2014 [↑](#footnote-ref-388)
389. ‘Ebola Virus Disease’ *World Health Organisation Factsheet No. 103* <http://www.who.int/mediacentre/factsheets/fs103/en/> accessed 21/09/2014. [↑](#footnote-ref-389)
390. Jane Goodall. ‘Problems Faced by Wild and Captive Chimpanzees: Finding Solutions.’ in Susan B Armstrong, and Richard G. Botzler (eds.) *The Animal Ethics Reader* (Oxford: Routledge, 2008) pp. 175-180. [↑](#footnote-ref-390)
391. ‘UN Works to Protect Great Apes, Habitat, Amid Ongoing Instability in DR Congo’ *UN News Centre* (7th Nov. 2013) <http://www.un.org/apps/news/story.asp?NewsID=46446> accessed 30/10/2015. [↑](#footnote-ref-391)
392. J.F. Oates *et al*: ‘Pan troglodytes’ *The IUCN Redlist of Threatened Species* (2008). <http://www.iucnredlist.org/details/15933/0> accessed 31/10/2015. [↑](#footnote-ref-392)
393. Sonia Shah: ‘The Spread of New Diseases: The Climate Connection’ *Yale 360 Magazine*. <http://e360.yale.edu/feature/the_spread_of_new_diseases_the_climate_connection/2199/> (Oct. 2009) accessed 01/10/2013. [↑](#footnote-ref-393)
394. R. Ryan Lash, Nathaniel A. Brunsell and A. Townsend Peterson: ‘Spatiotemporal Environmental Triggers of Ebola and Marburg Virus Transmission’ *Geocarto International* Vol. 23, Issue 6 (2008) pp. 451-466. [↑](#footnote-ref-394)
395. Compton J. Tucker *et al*: ‘Climatic and Ecological Context of the 1994-1996 Ebola Outbreaks’ *Photogrammetric Engineering & Remote Sensing* Vol. 68, No. 2 (Feb. 2002) pp. 147-152. [↑](#footnote-ref-395)
396. Ghai: ‘Ebola: Outbreaks Cause Crisis’accessed 13/10/2014. [↑](#footnote-ref-396)
397. Sophie K[öndgen](http://www.ncbi.nlm.nih.gov/pubmed?term=K%C3%B6ndgen%20S%5BAuthor%5D&cauthor=true&cauthor_uid=18222690) *et al*: ‘Pandemic Human Viruses Cause Decline of Endangered Great Apes’ *Current Biology* Vol. 18, Issue 4 (Feb. 2008) pp. 260-4. [↑](#footnote-ref-397)
398. Palmer: *Animal Ethics* p.104. [↑](#footnote-ref-398)
399. Joan Dunayer: *Speciesism* (Derwood: Ryce Publishing, 2004).

     Dale Jamieson: ‘Animal Liberation is an Environmental Ethic’ *Environmental Ethics* Vol 7. No. 1 (Feb. 1998) pp. 41-57. [↑](#footnote-ref-399)
400. Sue Donaldson and Will Kymlicka: *Zoopolis: A Political Theory of Animal Rights* (Oxford: Oxford University Press, 2011) p. 180. [↑](#footnote-ref-400)
401. Edward O. Wilson: *Half-Earth: Our Planet’s Fight for Life* (New York: Liveright Publishing, 2016). [↑](#footnote-ref-401)
402. *Ibid* p. 192. [↑](#footnote-ref-402)
403. M.C. Hansen *et al*: ‘High-Resolution Global Maps of 21st-Century Forest Cover Change’ *Science* Vol. 342, Issue 6160 (15th Nov 2013) pp. 850-853. [↑](#footnote-ref-403)
404. Gabriel Popkin: ‘Satellite Alerts Track Deforestation in Real Time’ *Nature* Vol. 530, Issue 7591 (23rd Feb 2016) pp. 392-393. [↑](#footnote-ref-404)
405. Tom Bawden: ‘UK Government Urged to Follow US Example and Ban Plastic Microbeads’ *The Independent* (20th Feb. 2016) accessible via: <http://www.independent.co.uk/environment/uk-government-urged-to-follow-us-example-and-ban-plastic-microbeads-a6886351.html> accessed 20/04/2016. [↑](#footnote-ref-405)
406. [Carol Rizkalla](http://link.springer.com/search?facet-author=%22Carol+Rizkalla%22), [Francisco Blanco-Silva](http://link.springer.com/search?facet-author=%22Francisco+Blanco-Silva%22) and [Stephanie Gruver: ‘Modeling the Impact of Ebola and Bushmeat Hunting on Western Lowland Gorillas’ *EcoHealth*](http://link.springer.com/search?facet-author=%22Stephanie+Gruver%22) [Vol. 4,](http://link.springer.com/search?facet-author=%22Stephanie+Gruver%22) [Issue 2](http://link.springer.com/journal/10393/4/2/page/1) ([June 2007) pp 151-155](http://link.springer.com/search?facet-author=%22Stephanie+Gruver%22). [↑](#footnote-ref-406)
407. Peter D. Walsh *et al*: ‘Vaccinating Captive Chimpanzees to Save Wild Chimpanzees’ *PNAS* Vol. 111, No. 24 (June 2014) pp. 8873-8876.  [↑](#footnote-ref-407)
408. ‘Medicines and Vaccines’ RSPCA Webpage: <https://www.rspca.org.uk/adviceandwelfare/laboratory/medicinesandvaccines> accessed 30/10/2015. [↑](#footnote-ref-408)
409. Manfred Liebsch *et al*:‘Alternatives to Animal Testing: Current Status and Future Perspectives’ *Archives Of Toxicology* Vol.85, Issue 8 (2011) pp. 841-858. [↑](#footnote-ref-409)
410. ‘Empiriko Brings Game-Changing Technology to Drug Discovery and Clinical Research Industry’ *Reuters* (21st Jan.2014) <http://www.reuters.com/article/idUSnMKW0j182a+1c0+MKW20140121> accessed 20/04/2016. [↑](#footnote-ref-410)
411. Oliver J. Britton *et al*: ‘Experimentally Calibrated Population of Models Predicts and Explains Intersubject Variability in Cardiac Cellular Electrophysiology’ *PNAS* Vol. 110, No. 23 (June 2013) pp. 2098-2105. [↑](#footnote-ref-411)
412. TissUse Webpage: <http://www.tissuse.com/> accessed 20/04/2016. [↑](#footnote-ref-412)
413. Mark Piesing: ‘How Tech Could Spell the End of Animals in Drug Testing’ *The Guardian* (23rd Aug. 2014) <https://www.theguardian.com/science/2014/aug/23/tech-end-animals-drugs-testing> accessed 20/04/2016. [↑](#footnote-ref-413)
414. Hope Ferdowsian and Nancy Beck: ‘Ethical and Scientific Considerations Regarding Animal Testing and Research’ *PLoS ONE* Vol. 6, Issue 9 (Sept. 2011) pp. 1-4. [↑](#footnote-ref-414)
415. Pandora Pound and Michael B. Bracken: ‘Is Animal Research Sufficiently Evidence Based to be a Cornerstone of Biomedical Research?’ *British Medical Journal* Vol. 348 (May 2014) p.18. [↑](#footnote-ref-415)
416. Andrew N. Rowan: ‘Ending the Use of Animals in Toxicity Testing and Risk Evaluation’[*Cambridge Quarterly of Healthcare Ethics*](http://journals.cambridge.org.eresources.shef.ac.uk/action/displayFulltext?type=1&fid=9949951&jid=CQH&volumeId=24&issueId=04&aid=9949947&bodyId=&membershipNumber=&societyETOCSession=) Vol. 24, Issue 4 (Oct. 2015) pp. 448-458. [↑](#footnote-ref-416)
417. Fernando Martins do Vale: ‘Response to: Is Animal Research Sufficiently Evidence Based to be a Cornerstone of Biomedical Research?’ *British Medical Journal* Vol. 348 (May 2014) p.20. [↑](#footnote-ref-417)
418. Ray Greek, Niall Shanks and Mark J. Rice: ‘The History and Implications of Testing Thalidomide on Animals’ *The Journal of Philosophy, Science & Law* Vol. 11 (Oct. 2011) pp. 1-32. [↑](#footnote-ref-418)
419. [Martin Brüne](http://www.sciencemag.org.eresources.shef.ac.uk/search?author1=Martin+Br%C3%BCne&sortspec=date&submit=Submit), [Ute Brüne-Cohrs and William C. McGrew](http://www.sciencemag.org.eresources.shef.ac.uk/search?author1=Ute+Br%C3%BCne-Cohrs&sortspec=date&submit=Submit): ‘Psychiatric Treatment for Great Apes?’ *Science.* Vol. 306. No. 5704 (Dec. 2004) p. 2039. [↑](#footnote-ref-419)
420. Dale Jamieson: ‘Against Zoos’ in Peter Singer (ed.) *In Defense of Animals* (New York: Basil Blackwell, 1985) pp. 108-117. [↑](#footnote-ref-420)
421. Victoria Gill: ‘Is Animal Ethics Killing Wild Apes?’ *BBC News* (27th June 2014) <http://www.bbc.co.uk/news/science-environment-27896589> accessed 15/10/2014. [↑](#footnote-ref-421)
422. T. Muller *et al*: ‘Elimination of Terrestrial Rabies in Germany Using Oral Vaccination of Foxes.’ *Berliner und Munchener Tierarztliche Wochenschrift* Vol. 125, No. 5-6 (2012) pp. 178-190. [↑](#footnote-ref-422)
423. [Lori Gruen](http://ilarjournal.oxfordjournals.org/search?author1=Lori+Gruen&sortspec=date&submit=Submit), [Amy Fultz](http://ilarjournal.oxfordjournals.org/search?author1=Amy+Fultz&sortspec=date&submit=Submit) and [Jill Pruetz](http://ilarjournal.oxfordjournals.org/search?author1=Jill+Pruetz&sortspec=date&submit=Submit): ‘Ethical Issues in African Great Ape Field Studies’ *Institute for Laboratory Animal Research Journal* [Vol. 54, Issue 1](http://ilarjournal.oxfordjournals.org/content/54/1.toc) (2013) pp. 24-32. [↑](#footnote-ref-423)
424. James D. Herriges, Thom Thorne and Sandra L. Anderson: ‘Vaccination to Control Brucellosis in Free-Ranging Elk’ in Robert Brown (ed.) *The Biology of Deer* (New York: Springer Science & Business Media, 2012) pp. 106-112. [↑](#footnote-ref-424)
425. [Hugues Fausther-Bovendo](http://www.sciencedirect.com/science/article/pii/S1879625712000703), [Sabue Mulangu](http://www.sciencedirect.com/science/article/pii/S1879625712000703), [Nancy J Sullivan: ‘Ebola Virus Vaccines for Humans and Apes’ *Current Opinion in Virology* Vol.2, Issue 3 (2012) pp. 324-329](http://www.sciencedirect.com/science/article/pii/S1879625712000703). [↑](#footnote-ref-425)
426. [Gruen](http://ilarjournal.oxfordjournals.org/search?author1=Lori+Gruen&sortspec=date&submit=Submit) *et al*: ‘Ethical Issues in African Great Ape Field Studies’ p. 27. [↑](#footnote-ref-426)
427. ‘Animals Taken by Wildlife Services’ *USDA Datasheet*: <https://www.aphis.usda.gov/wildlife_damage/prog_data/2014/G/Tables/Table%20G_ShortReport.pdf> accessed 01/05/2016. [↑](#footnote-ref-427)
428. Derek Bell: ‘Environmental Citizenship: Global, Local and Individual’ in Paul G. Harris (ed.) *Routledge Handbook of Global Environmental Politics* (London: Routledge, 2013) pp. 347-58. See p. 348. [↑](#footnote-ref-428)
429. Varner: *In Nature’s Interests?’* p. 143. [↑](#footnote-ref-429)
430. Angus Taylor: ‘Animal Rights and Human Needs’ [*Environmental Ethics*](https://www.pdcnet.org/collection-anonymous/browse?fp=enviroethics) Vol. 18, Issue 3 (1996) pp. 249-264. [↑](#footnote-ref-430)
431. Claire Marshall: ‘Ban Lifted on Controversial ‘Neonic’ Pesticide’ *BBC News* (23rd July 2015): <http://www.bbc.co.uk/news/science-environment-33641646> accessed 03/05/2016. [↑](#footnote-ref-431)
432. [Anja Kollmuss](http://www.tandfonline.com/author/Kollmuss%2C+Anja) and [Julian Agyeman](http://www.tandfonline.com/author/Agyeman%2C+Julian): ‘Mind the Gap: Why do People Act Environmentally and What are the Barriers to Pro-Environmental Behavior? *Environmental Education Research* V[ol. 8](http://www.tandfonline.com/loi/ceer20?open=8&repitition=0#vol_8), [Issue 3](http://www.tandfonline.com/toc/ceer20/8/3) (2002) pp. 239-260. [↑](#footnote-ref-432)
433. Caren Cooper *et al:* ‘Are Wildlife Recreationists Conservationists? Linking Hunting, Birdwatching, and Pro-Environmental Behavior’ *The Journal of Wildlife Management* [Vol. 79, Issue 3](http://onlinelibrary.wiley.com/doi/10.1002/jwmg.v79.3/issuetoc) (April 2015) pp. 446–457.

     Tsung Hung Lee and Fen-Hauh Jan: ‘The Effects of Recreation Experience, Environmental Attitude, and Biospheric Value on the Environmentally Responsible Behavior of Nature-Based Tourists’ [*Environmental Management*](http://link.springer.com/journal/267) Vol. 56, [Issue 1](http://link.springer.com/journal/267/56/1/page/1) (July 2015) pp. 193-208. [↑](#footnote-ref-433)
434. ‘Adoption of the Paris Agreement’ Presented at the *United Nations Framework Convention on Climate Change*, 21st Session, Paris (November 30th-December 11th 2015). [↑](#footnote-ref-434)
435. *EISA Annual Report* (Berlin: EISA Publications, 2015): <http://sustainable-agriculture.org/wp-content/uploads/2016/01/EISA-AR-2015-final.pdf> accessed 25/01/2016. [↑](#footnote-ref-435)
436. ‘Natural and Social Capital’ IISD Webpage: <http://www.iisd.org/topic/natural-and-social-capital> accessed 25/01/2016. [↑](#footnote-ref-436)
437. ‘Organized Crime Threat to Wild Species on the Increase, Says UN on Wildlife Day’ *United Nations Office on Drugs and Crime Press Release* (3rd March 2015): <https://www.unodc.org/unodc/en/press/releases/2015/March/organized-crime-threat-to-wild-species-on-the-increase--says-un-on-wildlife-day.html> accessed 03/05/2016. [↑](#footnote-ref-437)
438. Katrina Brown: ‘Integrating Conservation and Development: a Case of Institutional Misfit’ *Frontiers in Ecology and the Environment* Vol. 1, Issue 9 (Nov. 2003) pp. 479–487. [↑](#footnote-ref-438)
439. Elizabeth Clancy: ‘Animals as Community Stakeholders: Inclusion of Pets in Social Policy and Practice (Occasional Essay)’ *Families in Society: The Journal of Contemporary Social Services* Vol. 95, No. 4 (2014) pp. 285-289. [↑](#footnote-ref-439)
440. Scruton: *Animal Rights and Wrongs*. [↑](#footnote-ref-440)