Extinction

How dying species force us to reconsider our place on earth

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The drawings on the front page represent my personal attempt to mourn for the many. The hokkaidō wolf and ivory-billed woodpecker have blank eyes because their souls are gone. These two species have come extinct and we will never be able to know them anymore, not to see them, nor to hear them, nor to meet them, nor the watch them in the eyes, through which their inner world will never again beam.

We must co-exist for until we do,
The Trees will continue to stand alone,
In their majesty and ancient wisdom,
Bearing witness to our crimes
As we slaughter them. Oh love,
Let us see their tears.
- Kirstin Miller, “The Trees”

Hierbij verklaar en verzeker ik, Janneke Sindram, dat deze scriptie zelfstandig door mij is opgesteld, dat geen andere bronnen en hulpmiddelen zijn gebruikt dan die door mij zijn vermeld en dat de passages in het werk waarvan de woordelijke inhoud of betekenis uit andere werken – ook elektronische media – is genomen door bronvermelding als ontlening kenbaar gemaakt worden.

Nijmegen, juli 2018

Herewith I, Janneke Sindram, declare and ensure that I have created this thesis independently, that I have not used sources or devices that I have not referred to, and that the passages in this work that have been copied verbatim from other sources – including electronic media – have been identified as such by references.

Nijmegen, July 2018
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Abstract

As a consequence of modern industrialization wild, untouched nature is degrading, with the current mass extinction event as a poignant result. Whilst humanity is broadly acknowledged the cause of the extinction wave, people express sadness and mourn for the vanishing species and the general demise of nature. From the act of mourning an urge to repair the wrongdoing of the past emerges, leading people to protect nature and its species. But while certain species may be held from extinction, we may fail in preventing further losses of nature’s profound, but poorly acknowledged values. Given the fact that we mourn for extinctions and nature, and our valuation of nature this loss is, paradoxically, what we do not want.

Introduction

Species are massively going extinct and we are the cause. We, humanity, have brought the Tasmanian tiger, the ivory-billed woodpecker and the hokkaidō wolf to extinction. But we saved the Guam kingfisher and the California condor from extinction. We have decided to conserve them, as we have become the rulers of this world. Species of all kinds increasingly depend on us. We are the ambivalent power to steer them to death or not. It puts us in a unique position that we struggle to understand and to use wisely. This thesis aims to explore the meanings of dying species and shed light on our new position and the difficulties that come with it.

Extinction of species is as much a natural process as adaptation, and, through time, the evolvement of new species. At times the dynamics of ecological systems allow a species to flourish and at times they bring a species to death. Over the past thousands of years, the latter happened at a rate that is referred to as the ‘background rate’. How large this background rate was is hard to know since by the time accurate estimations could be made, the current mass extinction event had already begun.

Most scientists agree that we are now at the start or somewhere half-way earth’s sixth mass extinction event. Estimations indicate that extinctions occur about a 100 to a 1000 times more than before 1900, before the latest extinction crisis began. But since we do not even know how many species this planet roughly counts – estimations run from a mere three to 100 million species, most of them unknown to science– the determination of extinction rates remains restricted to rough estimations (Pimm et al. 2014). Yet for this thesis these exact numbers are not important. What counts is that species are massively running out of existence. What counts too, as we will see, is that many of them are dear to our hearts.
Five times earlier mass extinction events have taken place on this planet and such an event can occur naturally. But for the first time now, a mass extinction event is caused by one single species: *Homo sapiens*. As Thom van Dooren states in his book *Flight Ways* “it is tragically clear that ours is an *anthropogenic* extinction event. Current deaths of species are being brought about, directly and indirectly, by a range of interwoven, human activities.” (van Dooren 2014b, 6). These interwoven human activities form the prelude of extinction, the first of the three moments of extinction.

This first moment, the prelude, is shaped by all circumstances that brought an entire species to death. Strictly, extinction is the death of the last individual of a certain species. But before the last individual is the last, the rest must have died already. This process is much larger than the death of that one individual that happens to be the last. Hence extinction is also about the death of all the others, which is never a mere accident but intimately interwoven with the rest of the world. The human related threats of ‘human population growth’, ‘habitat conversion’, ‘global warming’, ‘impacts of exotic species’, ‘overexploitation’, ‘pollution’, ‘fragmentation’ and ‘new pathogens’ may sound neutral, but they hide a devastating impact on the natural world and its species. An impact so severe and at so large a scale, that species are massively running out of existence and collectively form a mass extinction event (Estes et al. 2011).

The second moment of extinction is the death of the last individual. When it dies, the species is actually extinct.

The third moment, that what happens after extinction, is closely related to both the prelude and the actual extinction, and forms a main theme of this work. That is not to say that the prelude and actual extinction are not important, on the contrary, they are continuously interwoven in the text. For without a prelude, species would not go extinct and there would be no third moment.

This third moment, after extinction, is discussed in the second chapter. After extinction a threefold gap unfolds. First, the ecosystem that the species formed part of shifts into a new equilibrium, comparable the way a team reacts to a missing member. But some extinctions may penetrate into the cultural domain of humanity. Second and on rare occasions the extinct species grows into an icon of its time. Mammoths and dodo’s are such an example, each representing a specific wave of man induced extinctions. Their deaths hold us a mirror reflecting our place on earth. Our current time of mass extinction is still lacking such an icon but I will propose two brotherly wolf species as good candidates to teach us who we are.
As the third gap, extinctions have a cultural meaning for many of the species are dear to our hearts. We feel sad and sorrow and mourn for them. (The feelings of sadness and sorrow, and subsequent mourning, refer mostly to big, beautiful and charismatic animal species like birds and mammals. Although they form just a minor part of the collection of extinct species, they are of major cultural importance. Therefore, I will focus mainly on such appealing species.) Whilst subjective expressions are well represented in various forms of art, sparingly and unconsciously leaking into science, the major scientific discourse holds no place for such feelings. My statement will be that in science, and through the importance we ascribe to it, we are missing an ethical moment. This leads us to forgetting the profound meanings of nature and disregarding the importance of wild, untouched nature.

The assessments of the threefold gap after extinction form the ground for future improvement regarding our position to the animal and natural world, and extinctions. In chapter 3 I will shift my focus on what’s next. I will introduce the Ark concept, based on Zwart (2016), that draws a parallel between the Biblical Noah saving animals on his ark and modern humanity saving animals on places protected by us. The model both helps us to understand the shifting relationship between humanity and nature and appeals on human’s newly acquired responsibility over nature. I will critically assess this model in a search for a way to properly co-exist with nature. For if we are not careful, our human and technological well-meant touch will increasingly impact nature. The extinction of species is a clear and tangible example, but the impact of our influence goes beyond mere extinction, into shifting ecosystems and, finally, causing a demise of nature. I will argue that, as a result, nature becomes more humanized and less natural.

My final statement will be that the degradation of nature and the fundamental loss of naturalness as such, is captured adequately by nor biologists, nor scientists, nor policy makers. Due to this lack of recognition of nature’s profound values we fail in preventing further losses. Given the fact that we mourn for extinctions and nature, and our valuation of nature this loss is, paradoxically, what we do not want.

But before engaging with these questions I will first illustrate three near extinctions in the first chapter. This thesis intents to cultivate real, lively and non-abstract impressions of extinction, as subjective emotions are a common thread through the text. Therefore, three cases of dying vultures are given, offering us good, tangible examples on how extinctions and the gaps behind it can
establish themselves. Through a little piece of story-telling they portray the broad senses of extinction, setting a tone for the rest of the text.

Chapter I Dying vultures

Vultures are notably animals that stand between life and death. They feed themselves exclusively with the dead flesh of animals. Thom van Dooren shows in his work how vultures take part in a multispecies community in which species are connected and depend upon each other in a more-than-human-world (van Dooren 2014a, 16). “Eating is, of course, one of the most important ways in which the dead are woven into the lives of the living” (van Dooren 2014a, 45). The manner in which vultures are part of the world becomes clear in the gap that they leave behind on their way to extinction.

Vultures are big birds whose numbers are declining rapidly, however none of them is (yet) extinct. The large land surfaces of Asia, America and Africa have lost the majority of their scavenger birds (Ogada, Keesing, and Virani 2012). Yet the losses in these three regions cannot be compared.

1.1 Entanglement in Asia

The people and vultures from India have lived alongside each other for centuries, profiting from the presence of each other. For Indian Hindu cows are sacred animals and although India is a particularly cattle rich country, many inhabitants refuse to consume cows. This results in millions of death cow left out in the open for vultures to scavenge their carcass (van Dooren 2010). Before the vulture decline, up to a hundred birds ripped and stripped the carcass clean in as few as 30 minutes, till only meatless bones were left. The white-rumped vulture (Gyps bengalensis), slender-billed vulture (G. tenuirostris) and Indian vulture (G. indicus) kept diseases under control, killing the pathogenic germs with their strong stomachs and they offered rats and street dogs no chance to grow into plagues. Yet the entangled relationships between human and vulture went deeper. For traditional Parsee communities vulture
exposure is the most appropriate way to take care of their dead – a custom that was also practiced among Tibetan Buddhists and other communities (van Dooren 2010, 2014a, 45). The deceased body is entrusted to so-called ‘Towers of Silence’: broad, round but short towers usually located at high places in the landscape, typically with a row of vultures waiting on top. The belief is that dead human flesh defiles fire, water, air and earth – all of which are sacred (van Dooren 2014a, 51). By giving the corpses to the vultures, this unwanted process is averted. The body can literally return to the living.

Notwithstanding their sanctity, for poor rural communities a cow is also a valuable working animal and beast of burden that can plough and give milk. When such an animal is old and sick, it pays off to use it as long as possible, using the anti-inflammatory drug diclofenac that treats various conditions in cattle such as lameness, mastitis and difficult birthing. After its death diclofenac remains in the body of the cow and however once curing, the drug turns lethal for vultures. A vulture that eats from a diclofenac contaminated cow awaits a slow and painful death caused by failing kidneys and uric acid crystals, building up in its internal organs and cutting into the surrounding tissue that then dies. Two days later followed by the death of the vulture itself (van Dooren 2010, 2014a, 53).

Unintentionally, almost the entire vulture population was poisoned this way. Rats, street dogs and other scavengers now consume the carcasses. But they eat slower and leave more meat rests. Their stomachs are not strong enough and diseases such as anthrax and rabies flourish. Rabies infections increase due to the increased number of street dogs and street dog attacks. The issue stands high on the political agenda and vaccines are distributed successfully, but the number of infections is not decreasing. Apparent explanation: increasing amounts of people and street dogs (van Dooren 2010).

Besides people, the diseases impact hyena’s, jackals, tigers and Asiatic lions, exposing them to rabies, canine distemper virus and canine parvovirus. Some of these species stand on the edge of extinction and when the dog diseases push them over the edge, they go co-extinct with the vultures (although the vultures themselves are not extinct). Co-extinction is, according to Van Dooren, “a mode of dying-together in a world in which our dependence on, and exposure to, others is absolute” (van Dooren 2010, 282). It is an example of the underlying entanglement that exists between species, as a multispecies community.
1.2 The condor and the louse in America

The co-extinction of *Colpocephalum californici* happened in America. *C. californici* was a specialised louse that only fed on California condors (*Gymnogyps californianus*). This large vulture species almost went extinct, a dark time from which its louse could not escape.

In 1983 the world population of California condors existed of 22 individuals and a breeding and reintroduction programme was started to protect the species from extinction. All animals were captured from the wild to participate in the programme, they were divided into genetic groups, the breeding programme was designed and the production of genetic optimal eggs could start (California Department of Fish and Wildlife, California Condor Reintroduction & Recovery). The strategy appeared successful. In 2016, 33 years after the start of the programme, the whole population had increased to 446 animals, spread over two wild and one captive population (California Condor Reintroduction & Recovery). Almost reaching the threshold of 150 individuals per population, omitting the species from danger of extinction, according to the project aim.

Part of the vultures caretaking was a medical check-up that disposed the animals of their parasites. “More overlooked than wilfully extinguished, the last *C. californici* vanished from Earth in a puff of carbaryl-powder fumigation” (Seed).

But how were the condor and its parasite endangered in the first place? Humanity brought both species to the edge of extinction by hunting with lead bullets. The game that died but was not removed from the area became food for the condor, who together with the meat, also greedily ate the bullets. Lead poisoning was the result. This almost killed both species, but whereas the disappearance of the condor was dear to people’s heart – with the precious rescue programme as the evidence – the lice died unknown, only to be remembered with bitterness when it was too late.
1.3  A chaos in Africa

At first glance the African situation appears more prosperously. 11 vulture species live on the continent and according to the authority of the International Union for Conservation of Nature’s (IUCN) Red List, none of them is ‘critically endangered’. This label indicates “an extremely high risk of extinction in the wild in the immediate future,” occurring when the estimated risk is “at least 50% within 10 years or three generations, whichever is the longer” (IUCN 2017a). All vulture species previously mentioned fall under this category.

But appearances are deceptive because whilst the causes of the decline in Asia and America are univocal, the decay of vultures in Africa is complex and chaotic. Six of the 11 species only occur in Africa, five others also abroad. The Egyptian vulture (Neophron percnopterus) seems to be completely extinct in Africa, in other regions its situation is running backwards. In West African rural areas all vultures except hooded vultures (Necrosyrtes monachus) have declined by an average of 95% over the last 30 years (Ogada, Keesing, and Virani 2012). Declines of these species particularly outside nature reserves indicate land use change as an important factor (Virani et al. 2011). Yet the Egyptian and hooded vulture are both listed as ‘endangered’ according to the Red List. Population drops of the five closely related Gyps species, especially within nature reserves and during the migration period, seem to designate to the consequences of human activities, like poisoning outside the reserves as important threats. Vultures are mostly not the intended victim as the poison is meant for lions and hyena’s to protect livestock, but due to a combination of their foraging behaviour and biological characteristics, they are particularly vulnerable to it (Ogada, Keesing, and Virani 2012).

Vulture plight assessment is done in West and Southern Africa, but barely in East Africa (Virani et al. 2011). Over the last 30 years the protected areas of the Sudanese zone suffered a collective decline of 42% and the Masai-Mara area a decline of 62%, the latter with an annual mortality of 25% (Ogada, Keesing, and Virani 2012). Morocco lost its cinereous (Aegypius monachus) and lappet-faced vulture (Torgos tracheliotos). From an ecological perspective many vulture species are dead in large areas of Africa. Besides poisoning they suffer from poaching and hunting and in some areas vulture parts are used for traditional medicine (Ogada, Keesing, and Virani 2012). Intervention from the local government remains unlikely due to the deep cultural practices and beliefs (Ogada, Keesing, and Virani 2012).
As shown by these various vulture examples, the dying of all individuals of a species is a process that takes place in a complex of circumstances that are collectively responsible. The Asian and American examples in which one sole cause is present are exceptional and the African situation is more representative for extinctions in general. Vultures are conspicuous, big and, maybe because of their connection with the dead, fascinating animals. They fulfil an important function in ecosystems. The examples of them dying illustrate the gaps on both the cultural and natural side. People experience a loss and ecological systems become disrupted. The following part draws on this line and researches the consequences of conspicuous extinctions.

Chapter II After extinction

After extinction a threefold gap may establish, to each gap a section of this chapter is dedicated. The first gap, the natural one, manifests itself in the ecological reaction to the unfulfilled niche. The second and third gap both embody themselves in the cultural realm and their manifestations are dependent how the species related to, and was valued by people. In the second gap specifically we come to understand our influence on earth, how we significantly alter our world and cause the prelude of extinctions. Here, there is room for learning about who we are. In the third gap there is room for feelings of sadness and sorrow that lead to the act of mourning for species. At first sight it might appear obvious that we feel sad about the loss of species, but at closer look these feelings often remain unpronounced and hidden, resulting in shifted ethical appeals.

2.1 Withdrawal from nature

Here I will discuss the impact of the first gap after extinction, the effect on nature itself. The ecosystem in which a species lives can be viewed as a network of interactions among living organisms and with the nonliving surroundings. Each particular species influences a piece of the network in its own way. Biologists have caught this insight with the term ‘connectivity’.

A … concept, connectivity, holds that ecosystems are built around interaction webs within which every species potentially can influence many other species. Such interactions, which include both biological processes (e.g., predation, competition and mutualism) and physicochemical processes (e.g., the nourishing or limiting influences of water, temperature, and nutrients), link species together at an array of spatial scales (from millimetres to thousands of kilometers) in a highly complex network (Estes et al. 2011, 301).
How this influence exactly is established defines its ecological role or its ‘niche’. Niches of extinct organisms remain empty and the ecosystem alters a little, comparable to the way a team compensates for the loss of a member.

Such an ecological alteration is different for each species that disappears. The consequences vary from unnoticed, barely changing the system to quite drastic. The term ‘keystone species’ refers to the latter, to species that leave an important niche open and used to influence their surroundings significantly. Often they are widespread and large-bodied animals.

Top predators form a well-known group of keystone species, standing on top of the food web they control the underlying levels. Grey wolves (*Canis lupus*) for example, are famous for their successful reintroduction in Yellowstone Park, where its “presence … triggered a still-unfolding cascade effect among animals and plants – one that will take decades of research to understand” (MyYellowstonePark.com). Wolves hunt again on elk (*Cervus canadensis*), forcing elk to be continuously on the move and so preventing intensive willow browsing. Willow stands are in better shape and beaver profit, setting into motion an incredible range of beaver related effects as they create their own habitat, leaving tracks for centuries. Making the wolves’ extinction undone reverses the ecological equilibrium switch that took place in the original gap left behind by the empty wolf niche.

Much further south, in the extended Amazon of South America researchers have done plenty of research to the disappearance of larger animals. Anticipating on the final section of this chapter it is worth exploring their research here. It has to do with interactions and connectivity and it lifts the veil of how researchers express themselves. The first sentence of a scientific article about animal declines in the Amazon prepares the reader for a grim message:

‘Empty forests’ in which humans have driven large vertebrate species to extinction lack myriad direct and indirect species interactions (Beck, Snodgrass, and Thebpanya 2013, 115).

The sentence contains a lot of information about human influences and extinction and links to vulnerable group of big and scarce animals. But here I am interested in the lack of ‘myriad direct and indirect species interactions’ and the role of the ‘large vertebrate species’. Among these species in the Amazon, white-lipped and collared peccaries (*Tayassu pecari* and *Pecari tajacu*), and South American tapirs (*Tapirus terrestris*) fulfil a keystone role in the life and death of specific tree species. They eat the
tree’s fruit, disperse it, they step on seedlings and disturb the ground, preparing a perfect germination soil (Beck, Snodgrass, and Thebpanya 2013, Galetti and Dirzo 2013, Keuroghlian and Eaton 2009). Higher in the trees monkeys and larger birds such as the fascinating white-bellied spider monkey (*Ateles belzebuth*), the brown wooly monkey (*Lagothrix lagotricha*), particular kinkajou (*Potos flavus*) and a range of parrots and toucans do the same kind of job by relocating the seeds and contributing to the essential processes of recruitment and dispersal (Howe 1977, Nunez-Iturri, Olsson, and Howe 2008). Some seeds even require the passage through an animal’s stomach for germination. Ample research is done on these species and their connections to their ecosystem. With results directing to increased understory, seedlings densities and altered tree composition (trees that rely on non-biotic dispersal appeared to be more abundant in ‘empty forests’), these researches underline the keystone function that middle and large vertebrates fulfil.

Furthermore, researchers underline the often disastrous decline that these species have undergone (although mostly not leading to extinction), the violation to the ‘long-term forest integrity’ (Nunez-Iturri, Olsson, and Howe 2008), the effects of species’ decline on a ‘variety of scales, from the plot to global level’ (Galetti and Dirzo 2013), the ultimate influence on ‘the composition and diversity of the canopy tree community’ (Beck, Snodgrass, and Thebpanya 2013), among others. They worry and their scientific texts are full of alarmistic calls:

> Forests will remain, but we predict in alternative states that simply do not include or support large primates or trees that depend on them (Nunez-Iturri, Olsson, and Howe 2008, 1542).

> What is becoming … is that the loss of medium and large vertebrates cannot and should not be seen only as an unfortunate catastrophic effect on standing biodiversity, but that it can also have enormous implications for ecosystem functioning, ecosystem services and human well-being (Galetti and Dirzo 2013, 3).

It is the connection between and dependence among species that these researches implicitly refer to. They try to warn for a loss that goes beyond the loss of a singular species. It is about shifting ecosystems and an impoverishing nature that becomes more and more vulnerable (van Leeuwen 2017). In the chapter about sad feelings I will further examine the scientists’ writings. For now it is important to grasp the ecological consequences of extinction.
Seeds that are no longer dispersed by monkeys and birds, the Amazon soil that is no longer disturbed by peccaries, the Asian vultures that no longer clean the environment from dead cattle, wolves that no longer chase elk: all disappearing animals leave behind ecological gaps. Viewing extinction as a stand-alone event is inadequate, as Janzen adequately captures it when stating that “[w]hat escapes the eye … is a more insidious kind of extinction: the extinction of ecological interactions” (1974).

We should however be careful to designate species as non-keystone or non-important. Apparent good candidates for such a category would be the rare and small-ranged frogs, trees, tiny insects, soil organisms, fish and others that we most probably do not know. But we do not know their roles in the ecosystem either. Nature’s complexity is not easily caught in terms and papers and the field still develops (van Leeuwen 2017). It is too simplistic to state that it does not matter if they go extinct.

Even if a species is not strictly extinct and a few individuals survive in a corner of its range or in a zoo, the great majority of interactions is gone. Therefore, locally extinct is also a form of extinction. Although there still is hope for the area to welcome the lost species again, the linkages are already broken, the gap left behind by its extirpation is already felt; the natural ecosystem will change and particularly if the species was big and charismatic, the exodus of the beast leaves behind traces in human culture.

Therefore, after having explained the impact of extinction on nature, I will dedicate the following two chapters to the two cultural gaps that occur after extinction. It deals with the impact of extinction on people, our memories and our understanding of our place on earth. Of these, I will start with the latter and explore how our stories can change due to human caused extinctions.

2.2 Changing stories

Extinction is irreversible and many of the species that we knew will be forgotten by all but a handful of specialists. But in those few that we will remember and learn from the second gap after extinction takes shape. These species survive their extinction and live through in our memories. Memories that are kept alive by stories, literature and art. Some species become famous after death and some of them fulfil important roles in our understanding of who we are on earth.

In our history humanity passed three periods of time that are characterized by waves of human caused extinctions. For each period, only one or two species can fill in the second gap by becoming
the icon of their time. The first two have gotten their own iconic species, functioning as a flag for the period in which humanity brought the species to death. These two are famous: the mammoth and the dodo. Their dying tells a story about us via which we gain self-insight and learn about our relation with the outside world. Only the third and latest period (still) lacks such an icon – perhaps because it is still going on.

2.2.1 Mammoths

Mammoths went extinct in prehistoric times, when humanity first started to populate the large land areas of the world. Until then, big herbivores like wooly mammoths (*Mammuthus primigenius*) and wooly rhinos (*Coelodonta antiquitatis*) dwelled on the steppes. Most probably we played a role in their extinction and in retrospective mammoths have found their way back into the lives of humans. Big, fierce and extinct as they are, mammoths continue to fascinate both children and adults. They lived concurrently with our ancestors, whose mammoth paintings and carvings we have discovered. It makes them more immediate and accessible than dinosaurs – also a common child’s fascination – and play a role in our understanding of who we are and what our relation is to the outside natural world.

Wooly mammoths once roamed the dry and cold steppes of the northern hemisphere, eating grasses and herbs. As a keystone species they co-created the typical landscape of the Ice Age, sharing it with other large herbivores (Haynes 2006). But as the climate warmed towards the end of the Ice Age, mammoths started to dwindle. The climate became less suitable, leading to a crash in numbers and yet another hostile force spread over the lands: modern humans (Koch and Barnosky 2006).

Maybe our predecessors with their spears and their traps were the extinction’s major cause, or maybe they only pushed the mammoth a little faster over the edge of extinction. Yet it is safe to assume that humans had a role in it. It was the first time we helped to bring such a large and magnificent animal to its end. It was the first time we dared to take on the great forces of nature.

This insight is reinforced and kept alive by the numerous representations of mammoth hunts in which seemingly invincible mammoths are surrounded by a bunch of seemingly weak people. The mammoth takes the central stage and is represented as a dark and mysterious force, enraged and extremely dangerous it contrasts with the vulnerable people. These pictures show up early in our lives, as children books are devoted to the subject, wall paintings can be bought and teenagers imitate the fight in their computer games, safely sitting in their living rooms. However the teenager
may lose a fight – the game always restarts at the point just before the hunt – the outcome of the scene is known in all cases and hinted at by the spears and bows in men’s hand. Hereby the lack of physical power to take down a mammoth is compensated by the technology of spears.

These images come close when we realize that the depiction stands symbol for a larger picture: our relation with nature and our urge to domesticate it. Just as we fought mammoths and won, we fought the harsh threats of nature and have won the dominance over earth.
2.2.2 Dodos

For long after the mammoth’s end humans lived on the large lands of the world, not causing excessive extinction numbers. But at the start of globalization we started again to discover new lands. If the mammoth stands symbol for our urge to domesticate nature, the dodo (*Raphus cucullatus*) stands symbol for another pivotal moment in our history. This well-known, flightless, bulky pigeon-like bird from Mauritius that stories report was abundant, easily caught but not particularly tasteful to eat went extinct due to a range of factors that are all human related (Quammen 1996, 274-275). Its death inaugurated the dim aspects of exploration, colonization and modernization (Heise 2016, 36). Despite its awful taste European sailors ate dodos by the dozens, which undoubtedly reduced their number, but fatal were the introductions of several nonnative animals to the small island of Mauritius.

Goats, chickens, cattle, deer, dogs and cats were troublesome; pigs and monkeys were disastrous. They multiplied quickly in the forest that lacked a species with a comparable niche. The dodo had evolved without an all-eating generalists and could not withstand the sudden enemies roaming the island. Monkeys and pigs destroyed every nest and young bird (and are also held responsible for the demise of the large tortoises on the island). Although men most probably did not kill the last dodo, they are directly responsible for it through the disturbance of the previously balanced community on Mauritius (Thébaud et al. 2009).

The dodo is perhaps the most famous extinct species and a proxy for a broader crisis in human’s interaction with nature. In the sixteenth and seventeenth centuries European travelers became aware of the astonishing rich flora and fauna they encountered upon their travels, yet for the dodo too late, since its extinction soon came to form part of the traveler’s devastating impact.

European travelers and explorers sometimes expressed regret at the destruction of nature that their own arrival had brought about. … [Regret] for a vanished natural world. … The dodo’s extinction, therefore, has turned into a recurrent symbol of the destruction of nature wrought by the imperialist expansion of European modernity, a destruction that also triggered the first initiatives for conservation (Heise 2016, 37).

In this role the dodo looms large in stories and books on extinction. David Quammen’s book *The song of the Dodo* (1996) alternates between science, history and storytelling. The ‘dry’ science becomes tangible and gains meaning through the book’s interwoven, elegiac narratives and in the case of the
dodo, Quammen presents the reader a good piece of fiction. He described the death of a fictional last dodo, an old and ill female. He described how her last egg “had been eaten by a monkey”, how her last hatchling “had been snarfed by a feral pig” and how her mate was “clubbed by a hungry Dutch sailor” (Quammen 1996, 275). Then a storm rises and the old dodo lady seeks cover, waiting in “patient misery”, closing her eyes, never to open them again. “This” concludes Quammen, “is extinction.”

This story translates science into culture. It reveals how intertwined extinction is with the – in this case disturbed – ecosystem, with the expansion of humanity and with the coincidental menaces of nature. Stories like these allow extinctions to define us and to become aware of our relation with nature that started with the European’s expansion tours. Through dodo stories we are reminded to its fate, and, as a proxy for nature’s fate if we are not careful.

2.2.3 Ōkami and Hokkaidō wolves

The current period of a finalized globalization and a hypertechnical worldwide community that is expanding its presence over earth is still missing a suitable iconic species whose story stands in for the story of its time. I propose two brotherly wolf species that lived on Japan as candidates to function as flags, as their extinction is closely interwoven with the changes earth is undergoing at the moment.

Contrary to the dodo case, the expanding modernization has consequences on places where both humans and nonhumans have lived alongside each other for long, finding themselves in close entanglement. Nowadays people cut stretched habitats in pieces, creating small ecological islands, they chase and pouch on animals, adding poison to the environment and they introduce foreign species to new lands. It led for example to the disruption of the interdependence between Indian vultures and Indian people; and a rough 6.000 kilometers Eastwards it led the Japanese mountain people to a disrupted relation with mountain dwelling nonhumans.

Yama (山) is the Japanese word for mountain. It designates not as much to the physical and vertical alleviation of the land, covered with just any vegetation, as it does to the ancient mountain forest, inhabited by animals and spirits. The yama form a world of their own, with their own way of thinking and their own ethics, a world that belongs to the yama no kami (mountain spirits, 山の神). It is a dangerous, dark place, opposed to the village world where the people live. The danger comes from the hostile, steep landscapes, the vastness, mystery and the boars, the vipers and other animals.
It is the place where the wild forest animals dwell, accompanied by the mountain spirits. Since these spirits often take the shape of the animals, they are closely associated with them, and particularly with the hidden and remote-living animals (Knight 1997).

Among these animals lived two wolf species, ōkami, or the honshū wolf (*Canis lupus hodophilax*), officially extinct since 1905 and the hokkaidō or ezo wolf (*Canis lupus hattai*), extinct around the same time. In Japanese folklore, ōkami is strongly associated with yama. As it is both a benevolent and malevolent animal it reflects human characteristics. “Rather like a human being, a wolf can be good or bad, helpful or dangerous, depending on how the relationship with it is conducted and managed” (Knight 1997, 142). For example, stories are told that wolves protect the vulnerable, guiding the night time traveler safely home through the dark forest, yet if the traveler would look backwards, the wolf would attack. Wolves would protect the agricultural fields between the village and the forest against deer and wild boar. Wolves were known to leave kills as a gift for the village, though if the villagers did not leave a part of the meat as a return gift, the wolf would grow angry. Wolves were thought to be the divine messenger of the yama no kami. In fact, wolves functioned in folklore as a moral judge, mirroring humanity’s own morals. It can be a guard when properly attended to and cared for, but if mistreated, it can turn evil. “Japanese wolf lore tells not of good or bad wolves but of good or bad people” (Knight 1997, 143).

Since its claimed extinction, many ‘ghosts sightings’ have been made: dubious, never verified claims of wolf observations. The phenomenon reveals an unwillingness to accept the loss of these wolves. The cultural important animal serves not only as a natural symbol of society, but also as a metonym of nature. The demise of the wolf happened parallel to the demise of yama in Japan. Deforestation, tourism and changes in farming practice caused this downfall of the yama; additionally wolves also

![Figure 4: A memorial of the last Japanese wolf killed by humans, inscribed is the Japanese poem (haiku): I walk/With that wolf/That is no more.](image)
suffered rabies – all four direct results of expanding modernization (Knight 1997). As the Japanese mourn for the loss of the wolves, they do so for the loss of yama.

The relationship between man and wolf stand for the relationship between man and nature, for the wolf can be viewed as the symbol of animal spirits, the symbol of nature (daishizen 大自然). … It would be as well if the Japanese saw in the various tales of the wolf, with their emphasis on exchange between man and beast, the way in which the relationship between themselves and nature should be conducted (Nomoto 1990).

The extinction of the wolf stands for the end of a tradition of human settlement in the Japanese mountains, closely entangled with the wolves. The mountains became abandoned, the industrialized forestry penetrated the remote areas, disturbing the animals, urbanization took place and life changed. The extinction of the wolf has become a symbol of the unease of the modernization of Japan, a transformation that “is a good deal paler in cultural memory” (Heise 2016, 39), as the memorial in Fig. 4 reminds us to.

2.3 Sad feelings

In the losses of dodos and wolves echoes nostalgia, a longing for what once was and a sad awareness about today’s situation. The sadness is as much about a changing world as it is about the loss of an entire species and its ecological gap. When people have built relationships with a vanishing species, when these nonhumans are of importance to humans, deep senses of sadness can be felt. Feelings that come close to the act of mourning. Mourned is not for every species since we do not value every species equally; California condors must be saved and only afterwards we regret the loss of its louse. It is evident that mourning for big, charismatic and often fluffy species is easier than for less appealing ones.

But mourning is not limited to species, as the loss that comes with extinction is not limited to the species either. Extinction and especially mass extinction are a symptom of a change in the living conditions of species that slowly turn hostile. Ecosystems change and impoverish worldwide, both as a cause for and a result of extinction and we mourn for this as well. On its turn, worldwide ecosystem changes are a symptom of a fundamental change in nature becoming less natural, as human influences increase and reach every inch of our planet. But before engaging in the larger picture, this chapter asks the questions why we mourn for species and how we do this.
2.3.1 Expressions in art

Mourning for species is expressed via various forms of art. Through literature about dodo’s and through tales about Japanese wolves we mourn for them. We mourn for the mysterious Tasmanian tiger (*Thylacinus cynocephalus*), the passenger pigeon (*Ectopistes migratorius*) that once could cover the sky as a cloud, the giant tortoises (*Geochelone* spp.) from the Galapagos that appeared to live forever and the Stephens Island wren (*Traversia lyalli*) that only was discovered because the cat of a new settler to an island caught one and brought home the dead birds (the cat is also held responsible for its extinction). The recent extinction of America’s ivory-billed woodpecker (*Campephilus principalis*) gave rise to a bunch of ghost sightings and six different books were written about it, proofing its cultural meaning and resonance after extinction. Yet various artists express their grief in various ways, exploring how to mourn for species.

In contrary to mourning for a lost person or pet, the object of mourning for dying species is abstract. A species contains multiple unknown elements, even if the species itself is known. The extinct ivory-billed woodpecker as a species is known. It is described in science, people have seen and heard the bird and one individual was briefly kept as a pet. Nonetheless the core of the ivory-billed species remains unknown to us. We could not possible know all individuals of the species, their ways of life in the forest, their connections to other species and their environment. We could not possible know their social behavior apart from our perspective. This obscurity adds an abstract dimension and makes it harder to mourn for.

Artist McIntyre attempted to mourn for two extinct birds. She placed her sound recorder next to taxidermied specimens of the huia (*Heteralocha acutirostris*) and the laughing owl (*Sceloglaux albifacies*), recorded the silence, went to the Kapiti forest where both species used to live, placed her sound system between the trees and broadcasted the recordings in the original habitat of the birds.

This inaudible transmission is a double silence, narrowcasting the silences … of the extinct birds without receivers. It places an inaudible trace of the melancholy remnants of Victorian museological economics and colonial attitudes to the environment into the soundscape of Kapiti, making material the still recent silence in the biospheric fabric, a hole in the air, a placeholder where these birds were projected to be (MacIntyre in Heise (2016, 42)).

Heise in her book draws on several other examples, taking the reader one step further from mourning for one to multiple species. She does so on the hand of Millet’s novel *How the Dead Dream*. 
Protagonist T is a not particularly nature-minded person who experiences the loss of some of his most loved ones, among which his partner Beth. The mourning for her slowly leads to and merges with the mourning for endangered species. Heise writes:

T serially breaks into zoos to spend time with animals who are the last of their kind, “terminal animals,” as the novel calls them. He spends a night in the enclosure of a Mexican gray wolf, for example, tries to imagine the thoughts of a female Sumatran rhino, and meditates on the spatial experience of a swarm of pupfish in a concrete tank. All of these attempts to connect to beings who are isolated from their habitats and social ties rely quite transparently – if rather originally – on the genre template of elegy, since it is his mourning of Beth that leads T to endangered species (Heise 2016, 85).

In this novel the mourning for one opens the way to mourn for many, going beyond the mourning for a singular lost species and towards the global panorama of loss and change. A step that is essential to capture the magnitude of the global extinction crisis. But also a step that is not easily taken for the even more abstract character of multiple species.

Another attempt to visualize the wave of extinctions and the current threat on wildlife in general is Isabella Kirkland’s series Taxa. The series consist of six paintings centered around the changing natural world. Particularly Descendant and Gone are of interest since they feature IUCN Red List species and extinct species. As explained on her website, Gone (Fig. 5) only shows species that are extinct “since the 1700 and the colonization of the New World” (Kirkland 2004a). Hereby Kirkland explicitly underlines the link between the changes that came with the colonization and expansion.

Kirkland studied each species before depicting it and all representations are on life-size. Of animals too large to fit in only parts are represented, like the scull of the Tasmanian tiger at the left and eggs of the great auk (Pinguinus impennis) and Syrian ostrich (Struthio camelus syriacus). Although Kirkland on her website explains that the paintings “explore how current biodiversity science can inform art-making and how art object contribute to both political and scientific dialogues” (Kirkland 2004c), they allow the viewer to comprehend the magnitude of an extinction wave and mourn for the laughing owl, the passenger pigeon, the Tasmanian tiger, the Stephens Island wren and 59 other species of animals and plants.
Yet species run out of existence faster than people can write about them, the current extinction crisis is too big to capture in paintings, not enough zoo cages can hold and save the endangered species and even science can hardly grasp the magnitude of this crisis other than giving estimated extinction rates of a 100-1000 times bigger than before 1900. This number remains abstract. Only databases, catalogues and lists of extinct or endangered species allow to a certain degree to grasp the magnitude of the crisis and thereby, they allow us to mourn a little better.
Catalogues are increasingly impart, being freely accessible on the internet and attempting to comprehend the entirety of the world they form an access to the world of this time. Catalogues inspire artists like Kirkland and start to fulfill their own, specific role in our perception of and dealing with extinct and endangered species, as I will show in the section ‘Missing ethical step’.

All these expressions in various forms of art, from literature and paintings to catalogues show us how affected we are by the loss of species, albeit in some cases the species ‘just’ near extinct. They show how we mourn for dying species.

2.3.2 A spouse’s case

After having explored some attempts of mourning for one or multiple extinct species the interest of this chapter is to compare mourning for species with mourning for someone loved. Surprisingly literature about the phenomenon of normal mourning, free from pathological influences and beyond the classical contributions of Freud and Klein appears largely limited to a long, semi-personal article about mourning over a deceased spouse by psychoanalyst Otto Kernberg (2010). He describes the common experiences of interviewees, his patients and himself. Herein he distinguishes more or less separate phenomena of which some are in line with the observed reactions in literature and art about the loss of species and some not.

Mourning for a deceased spouse and for an extinct species obviously differ significantly. The relationships we foster with these lost objects – either spouses or species – are incomparable and that sets a completely different background for mourning. We intimately know our partner with whom we often have built a life together, creating a shared world. On the contrary we can never know a species this well for it is a compiled whole of individuals and abstract. We can never know their life forms other than from our perspective. Nevertheless and respecting the differences a comparison seems possible.

From the process of mourning, in which guilt and remorse play a significant part, a ground for reparation becomes possible. Reparation, a will to repair some aspects of the lost object, is discovered by the psychoanalyst Melanie Klein in extension to Freud’s work about mourning (Klein 1940, Kernberg 2010). In mourning, reparation is described as the “psychological need to make things “good” – to mend and repair relationships with others” (Greenberg 2012, 7), a “process that allows the subject to negotiate loss” (Galatzer-Levy 2007, 237). For mourning the subject is not necessarily death, it can also be harmed and reparation is an act wherein the mourner seeks to undo
the damage. As I will explain towards the end of this chapter, a trial for reparation can also be done in case of mourning for species and shifting characteristics of nature.

In mourning for a deceased spouse, Kernberg first describes a disbelief upon discovery of the spouse’s death. In the denial of the loss, there is an emotional conviction that the soul of the other continues existing in a virtual world. An “overwhelming internal presence of the lost object” (Kernberg 2010, 91) is observed, forming a discrepancy with the external reality of the absence. Such reality checks are indeed seen as aspects of normal mourning by both Freud and Klein as it is necessary to free the libido from the lost object (Freud 1917, 251). In line with such a disbelief of the loss the phenomenon of ghost sightings is explained. After the disappearance of the ivory-billed woodpecker, the Tasmanian tiger and the Japanese wolves, numerous sightings are done. Yet all of these appear highly ambiguous and lead to long discussions about the actual extinction or not. Other than for a person, hope remains that the species’ extinction is mistaken and however on rare occasions the previously extinct species is found alive, it is not believed that such ambiguous sightings in fact refer to living specimens of the extinct animal and are therefore called ‘ghost sightings’.

At the acceptance of the loss of the spouse from the actual and physical world a pain over the loss and regret over the final nature of it is felt. Also if an entire species is lost, pain and regret can be felt. It hurts that all individuals have died and that the connections of the species with the rest of nature can never be filled again. It hurts that the species can never be seen, heard or otherwise observed again, not by this generation, nor by the future’s.

Besides, partners build a common world together and if one dies, the other feels responsible for that world and a sad awareness that that world will finally disappear with the own, future death rises. The ‘common’ world that is built with a species is, contrarian to a world in which two people engage, one sided. In the wolf case it means that the people engage in the world of folklore and myth, that they assign a meaning to the wolf and its encounters, but that at the other side the wolves themselves are – as far as we believe – not aware of this ‘common’ world. For the cultural meaning of the wolf this lack of awareness however remains irrelevant and if the animal is completely lost one half of the shared world still disappears with the wolf. The fact that only humans understood the relationship is irrelevant. Pain about the loss can still be felt, albeit rather a pain over the loss of a shared world than over a responsibility that now must be carried alone.
Furthermore, the sad awareness over the unavoidable disappearance of the common world upon one’s own death takes a different form in the case of species extinction. This common world is not existent between two people, but between a group of people and a group of nonhumans. If the nonhumans disappear, the people can still tell stories among each other, carrying on the culture that once existed around the animal. The meaning of the stories might change and become loaded with nostalgia, with a world that once was. Especially if the extinction goes accompanied by a significant change in the environment. The vast and unknown yama that were so strongly related to the wolf are gone and replaced by domesticated and thoroughly known forests. Since the wolves stand symbol for the original yama, thoughts and stories about their extinction are deeply related to an extinct forest and wolves themselves have become symbol of a crisis (Heise 2016, 39). Another example is found in the loss of the ivory-billed woodpecker that points to a traumatic past, the history of large-scale ecological exploitation and deforestation of the American South … [E]vocations of the vast southern forests and their wildlife call up memories of a wilder and more beautiful America associated with the nineteenth century. In this respect, the loss of southern cypress forests and of the ivory-billed woodpecker signals to the end of nationalist myth of the United States as “nature’s nation” (Heise 2016, 42).

Kernberg additionally describes the pain over the interruption of the life project of the deceased spouse and the pain over a loss of a deep dependency on the spouse. Both of these aspects are not clearly recognized in the direct or implicit literature about mourning for dying species. Taken together, feelings of sadness about the loss of something valuable feature among the stories about extinct or near extinct species. Apart from the loss of the species itself, and slowly, the loss of direct memories to it, nonhumans in these stories figure as symbols for something bigger that is lost as well. Herein the loss is felt in both cultural and natural aspects. This ‘something bigger’ directs to profound cultural and natural values that become lost as well, albeit never made explicit. Cultural species like wolves and woodpeckers signify for the meaning people assign to it via folklore, memories, symbols and myths, but they stand proxy for the overarching demise of their ecosystem and nature. Besides such a cultural perspective, the interconnectedness of a species to the ecosystems, the lines that connect it to others get lost too.

It is not strange that for some species mourning is easier than for others? A Siberian tiger or giant panda is easier to identify with than an itchy parasite or dirty scavenger. Little, fanciful colored frogs
are so alien the we get caught in admiration or wonder. It is evident that their extinction is a loss, an impoverishment of the wonders of nature. Also from a key-stone species perspective it is reasonable to say that it is worse if a key stone dies out than if an ecological insignificant small-ranged animal does so. More connections are broken and the natural system that hangs around the animal has to do without it.

Upon each species’ extinction the world impoverishes a little bit. We mourn for the loss itself and at times the changes that caused it. We grieve about the shifts that ecosystems and the natural world undergo. We mourn because there was something in the species, surrounded by their nature that we valued.

Such mourning goes accompanied with remorse and feelings of guilt, leading to reparation. Guilt plays a key role as an important social function that shows when relationships are damaged and reparation is necessary. The strive for reparation is a way to alleviate feelings of guilt, to restore the relationship, a desire to undo the wrongdoing, an atonement for the real or imagined damage (Kernberg 2010, Greenberg 2012). Reparation is important both for internal harmony as for the external world as we are often obligated to make reparations to others. Reparations can be manifested in various ways. Among them art is a common and creative method to make reparations for harmed or lost objects, like the Japanese wolf memorial in Fig. 4, but it can also be expressed by apologies (Greenberg 2012). In such acts it becomes clear the reparation is no restoration, as the harm cannot be undone.

Beyond the powerful reparative impulse that grieve and regret create in the course of mourning, mourning may also help in becoming a ‘better person’, enhancing the capability of loving and the appreciation of life. “There is a growth of the motivation and capacity to relate daily life with ethical aspirations and meanings” (Kernberg 2010, 612). There is a regret over the lost opportunities and the value of the relationship becomes utterly visible in the loss of it. In such a loss, one suddenly realizes what he or she had before the loss, a presence that becomes visible in its absence. Health is not received as valuable and until one becomes ill and he or she realizes the value of being healthy.

We are losing nature. We are losing species and ecosystems and the overall complexity of nature is decreasing. Our realization of the loss urges us to act. I will propose that such acts are in fact reparations that follow from our feelings of regret, remorse and guilt over our devastating impact on nature. The third part focusses entirely on such attempts to make good the damage. But first I will
throw some light on science, as this field has remained largely unassessed. The interesting question is how science deals with – or largely fails to deal with – ethical considerations.

### 2.3.3 Missing ethical step

Remember the alarmistic calls of the scientists that wrote about large-bodied vertebrates in the Amazon, about the absence of the compulsory seed dispersers. Some alarm calls hardly name the profound aspects that we value. They are of a more utilitarian character:

Forests will remain, but we predict in alternative states that simply do not include or support large primates or trees that depend on them (Nunez-Iturri, Olsson, and Howe 2008, 1542).

What is becoming … is that the loss of medium and large vertebrates cannot and should not be seen only as an unfortunate catastrophic effect on standing biodiversity, but that it can also have enormous implications for ecosystem functioning, ecosystem services and human well-being (Galetti and Dirzo 2013, 3).

And:

Maintaining biodiversity is crucial to ecosystems and human societies, yet species’ populations and geographic ranges are collapsing around the world (Ripple et al. 2017, 10678).

‘Ecosystem functioning’, ‘ecosystem services’ and ‘human wellbeing’ directly point toward the goods of nature for humans. These arguments are instrumental because they refer to the instrument that nature provides for us. These arguments are anthropocentric and do not recognize the reason why we mourn.

We feel sad because we lost all Ivory-billed Woodpeckers, all Hokkaidō wolves, all Passenger pigeons, all Tasmanian tigers, all male Northern white rhinos (*Ceratotherium simum cottoni*) and we even feel regret about the disappeared *Colpocephalum californici*, the louse of the California condor. We feel sorrow because the Wooly monkey, the Black Rhino (*Diceros Bicornis*), the Hawaiian Crow (*Corvus hawaiiensis*), and the Guam kingfisher (*Todiramphus cinnamominus*) are the last of their species. They perhaps only live in zoos and are locally extinct. However, the expressions scientists pronounce in their publications demonstrate not the same sadness and sorrow for lost species.
A lack is apparent between the inner feelings of loss, sadness and sorrow, and the instrumental arguments that scientists refer to. Their non-instrumental valuation of the species or ecosystem that they research remains unpronounced to the outer world.

Why? Scientists point to anthropocentric arguments, warning for the fact that diminished biodiversity and natural resilience might affect human well-being. The question is whether these truly are the reason for all their passionate research or whether there perhaps are different, underlying motivations for their work. What is the reason for the expressions in art and science about extinction being so different?

Science is about facts and scientists are supposed to research those facts objectively. They are supposed to unravel the matters of facts that are and that compose this world. In the eighteenth century David Hume (1711 – 1776) separated these matters of fact from the relations of ideas that people can hold regarding the matters of fact. He separated that what is from that what ought. He separated matters of fact from matters of concern. A prohibition to incorporate normative ideas in scientific texts was born (ten Bos 2018).

René ten Bos describes how this strict objectivity leads to a distance between science and people. He explains that the matters of fact, the actuality on itself remains without meaning, that it remains empty. We humans ascribe importance and relevance to that what is, imbue it with meaning (zingering). We can add this meaning to the scientific facts by telling stories, metaphors and myths about the scientific facts, adding some feeling, some subjectivity to it. After all, ten Bos argues, scientists are usually passionate people that do not research their Wooly monkey only because a decrease of them could on the long term be disadvantageous to humanity. Ten Bos points to the person behind the scientist. Scientists must give up their particularity to enter the domain of facts and descriptions that we call science. He or she must ignore his or her passion to remain objective. One scientist should be replaceable by another (ten Bos 2018).

In the case of extinction a moral moment gets lost. The inner drive, motivation and passion of a particular scientist to research extinction results in dryly described facts that only via anthropocentric, instrumental arguments can claim any normative weight in the outside world. It result in noncongruent inner and outer languages. The inner language of the scientist might be non-instrumentally driven while the outer language focusses on human-centred, instrumental arguments.
Upon reading their texts more closely we can indeed discover some of their struggle between a personal motivation to fight against extinction and the order to remain objective. Personal concerns and less instrumental motivations gleam through scientific texts:

the loss of medium and large vertebrates cannot and should not be seen only as an unfortunate catastrophic effect on standing biodiversity (Galetti and Dirzo 2013).

Ripple et al. (2017), the authors of an article explaining that predominantly tiny and big animals are vulnerable to extinction, write:

Moreover, [the results] indicate that, without intervention, anthropogenic activities will soon precipitate a double truncation of the size distribution of the world’s vertebrates, fundamentally reordering the structure of life on our planet (10678).

And:

From an evolutionary perspective, the trends we identify may portend to shifts in the patterns of ecological interactions; changes that could engender important and everlasting evolutionary effects to many components of the ecosystem (10682).  

Contrary to instrumental arguments, these arguments stand on themselves and do not function as part of a larger argumentation with an anthropocentric interest. They have no instrumental value. For our survival ‘catastrophic effects on standing biodiversity’ are not necessarily problematic, nor is a fundamentally reordered structure of life on this planet and other than emotional, we do not suffer from ‘everlasting evolutionary effects’. Therefore these arguments are non-instrumental.

The authors acknowledge the loss as an ‘unfortunate catastrophic effect’ and warn for ‘altered evolutionary effects’. Herein the text reveals a deeper valuing of their research objects and, beyond that, the balanced ecosystem of the Amazon and this planet. It appears that a deep feeling of loss makes them warn for extinction.

These feelings of loss can only be explained by the intrinsic value that is in the species or ecosystem itself. But this concept is subject to extensive discussions among environmental and natural philosophers and has gained a plethora of possible meanings and co-notations. The term is abstract

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1 In italic my emphases.
and for our purposes the less problematic term ‘non-instrumental values’ serves equally well (O’Neill 1992). Therefore, I refer to the latter.

But if scientists are motivated by the same feelings of loss as artists are, why do they express themselves so differently, bringing in and appealing to so different arguments? The answer can be found in the aims of science. Science ought to be objective, presenting findings and adding to our shared knowledge. Too much subjectivity in published texts is not allowed. The role of a scientist is to provide information and, nowadays, to warn for the implications of their findings. Societal relevance involves utilitarian, anthropocentric arguments. Overly subjective expressions are not scientific and thus not published. Scientists and journals aim for relevant articles and by using anthropocentric arguments they reach a larger (political) audience. These two reasons cause scientists to be careful of showing their personal opinions about the state of their research object.

A bridge comes from an unexpected field we have seen before. Catalogues and lists appear to link scientific texts and non-instrumental motivations. Catalogues and lists form a genre that allows scientists to show their valuation of different life forms and current changes in the natural world. Catalogues have been called the “modern epic” of our time (Moretti 1996) and a “new way to structure our experience of ourselves and of the world” (Manovich 2001, 219). Indeed a plethora of catalogues, lists and databases has emerged in reaction to the spectacularly increased extinction rates of the last few decades: ARKive.org, the Catalogue of Life, the Consortium for the Barcode of Life, the Encyclopedia of Life (EoL), the Global Biodiversity Information Facility and, among others, the IUCN Red List. They have become a method to grasp the immensity of the species loss and thereby help to understand our current world. They are the epics of our time:

Biodiversity databases and Red Lists of endangered species can be understood as a new variant of the modern epic or world text and as a new form of nature writing: the forever incomplete attempt to map the entirety of biological life and classify it according to risk of extinction, as part and parcel of a battle of heroic scientists and conservationists against ignorant authorities and indifferent masses. In this battle, the future of planet Earth itself is at stake, as biologists and conservationists regularly claim – an epic view of contemporary environmentalism if there ever was one! (Heise 2016, 65-66)

Especially the IUCN Red List has become the worldwide authority on the vulnerability state of species. On a closer look the Red List, as I will refer to the IUCN Red List from hereon, provides
more information than only which species are threatened with extinction. Originally the administrators aimed to list exclusively threatened and endangered taxa worldwide “and thereby promote their conservation” (IUCN 2017b). But in the inclusion of some and exclusion of other species the list mirrored the scientists’ valuation of species.

They now try to include as many non-threatened species as possible, aiming for a global biodiversity database, a “Barometer of life” (IUCN 2014). Nevertheless a bias toward valued species remains visible in the ratio between species evaluated by the List and the total of scientifically described species, and by the amount of text that is dedicated to each species.

A decade ago, vertebrates were very well represented: 100% of the described mammals was evaluated for the Red List, 99% of the amphibians, 16% of the reptiles and 11% of the fishes. To grasp a few more: insects: 0,13%; crustaceans: 4,34%; arachnids: 0,033%; dicotyledons (that are most of the ‘normal’ plants): 4,83%. At the bottom of the list are the lichens, for which only 2 of the 17.000 estimated described species were described and the 30.000 mushrooms that had only 1 species described (Heise 2016, Vić 2009, 17). Since the making of this overview IUCN has elaborated on including more species, covering more of the less well-known life forms. But the pattern is clear: big, furry or feathery animals receive much more scientific attention and thereby their conservation is much easier, with more political attention and money available.

Secondly the amount of text dedicated to each species reveals a similar pattern: of the 25 species with the longest textual description are 15 mammals, four cartilaginous fishes, three bony fishes, two reptiles and one plant (Heise 2016, 74). Although catalogues might appear opposite to the narrative storytelling that is found in so many popular (science) books and provokes a certain kind of elegy around the dying species, narrative has found a way into the Red List via the species descriptions.
The jargon of the Red List, furthermore, discloses the focus on decline by *upgrading* species when they go bad and move one class further to the category ‘extinction’, and *downgrading* species when they fare well and move to a safer category, as can be seen by the ‘+’ and ‘-’ in Fig. 6. This up- and downgrading is opposite to the more positive telling one would expect in which upgrading means

![Diagram of the IUCN Red List categories.](image)

**Figure 6**: The lay-out of the Categories of the IUCN Red List. Contrary to one's expectation, a species is 'upgraded' (+) if coming closer to extinction and 'downgraded' (-) if faring well and reducing its extinction risk. The categories Data Deficient and Not Evaluated hold the majority of species, most of them tiny or unappealing for the public. This pattern highlights our appreciation of species.

that a species is moving out of danger and vice versa.

Taken together, the Red List tells a narrative about “nature in decline, on decrease and disappearance”:

While Red List data do not superficially seem to be structured so as to elicit the same kind of emotion that popular-scientific elegies for vanishing species in text or image aim at, they nevertheless invoke a similar storytelling template. The focus on species decline, on last specimens and the value of biological rarity, links Red List to the species elegy and highlights that they are different cultural forms expressing the same underlying perspective (Heise 2016, 75-76).
Catalogues like the Red List directly focus on nature in decline and the subsequent loss of species. They form a medium that directly expresses a non-instrumental value and the concerns about the loss of species are clear. They list them in order to prevent extinction as much as possible. Obviously Red Lists are made by people that worry about extinction because in their opinion, extinction is wrong. Through Red Lists, their inner motivation gleams sparingly to the outside world.

Yet still the scientific discourse frames extinction in instrumental values. The objectivity code leaves scientists with empty hands if they want to articulate why extinction is bad. This lack of moral momentum leads the scientists to substituting utilitarian solutions. It corresponds to the dominant culture and policy of gain and loss from a human perspective. Yet if we are to decide on future policies, our attitude towards nature and the things we value in it, it is essential to know why we want to protect species. As I have showed, non-instrumental values of nature are perceived as important.

Our mourning however goes beyond the mourning for species and is threefold, as the loss of species is threefold as well. Most visible is the loss of species itself, which is symptomatic for the degradation of ecosystems, which is on its turn symptomatic for a decrease of nature’s naturalness. Our mourning follows the same order, most visible is our morning for species, which is followed by mourning for degrading ecosystems and finally mourning for nature becoming less natural. The deaths of species are a direct result of the degradation of their living conditions and ecosystems. We mourn for the loss of these pristine and original ecosystems through which we could connect with nature. Lastly we discern a decrease of nature’s naturalness, a fundamental shift that moves towards a nature that is more and more impacted and even controlled by humanity. Again, such shifts cause us to mourn as nature suffers a fundamental change in character, slowly losing its complexity, its independence from humanity and its naturalness.

The latter is perhaps most difficult to mourn for since naturalness is less concrete than a species. Yet species are embedded in nature, many of them – but not all – requiring healthy ecosystems. Mass extinction indicates degrading ecosystems and a loss of nature’s pristineness. Hence extinction is bigger than the loss of species, it is about connected ecosystems and the plight of world’s nature. Through species’ extinction and our mourning for it we come to understand that we are losing the incredible and overwhelming aspects that healthy and untouched nature carries within it.
Such losses are allowed in discourses where instrumentality is dominant and where nature ought to function in human survival and well-being. Natural philosopher Bas Haring states that extinctions and the world becoming more homogeneous is no problem because we can survive perfectly well without many animals, plants and ecosystems (Haring 2011). But in this plea there is no room or reason for mourning. It corresponds not with our experience of loss and the observation of people mourning for species. As Haring has adopted the instrumentalist view, he states that if he were Noah boarding the animals on the Ark, he would “only take those animals and plants that we really need” (Haring 2015).

The next part attempts to research this statement. The question is whether the substitution by the utilitarian arguments can cover the reason why we mourn for dying species. Besides, what would we do if we were sitting on Noah’s Ark?

Chapter III What’s next?

Sitting on Noah’s Ark we would protect some species, but not all. At the turn of the twenty-first century species are massively running out of existence. We are entering the Anthropocene, the era defined by the human, by anthropos (ἄνθρωπος). The Anthropocene is the new geological era of time that is defined by human induced climatic and planetary changes. The impact of humanity has spread all over the world, reaching even the most remote places. It has to do with global warming, rising oceans, plastic soup, leaking toxics and human influences and mass extinction. The fact that we are aware of our devastating impact on earth and our seemingly paradoxical care for species puts us on a unique position. Are we now to decide earth’s future and its countless species?

It all starts at the dawn of the human history, when wild, untouched nature was omnipresent. Humanity had evolved in this environment and under natural circumstances like any other species. Yet unlike most other species humanity started to create its own living space as an own environment, made by and for people, surrounded by wilderness. With languages, techniques and cultures people gradually began to distance themselves from the rest of nature. Against the background of wilderness emerged their own living spaces around campfires, inside tents and behind front doors. The human living space, as a space besides the existing natural space, had erupted.
This went on for a long time, but recently the relationship started to shift. As humans gained more power over and impact on the entire planet, the old walls between nature and humanity began to crumble. This is the Anthropocene, a new era that requires a new relationship between us and nature, a relationship of responsibility, power and regret. Nature is no longer the vast and wild place it used to be. It is as if the distinction between both spaces as two separate domains is fading away. The human impact on what once were wild lands has increased to the point that there is no single piece of nature left that has not been affected by humans.

We need a new framework to understand this, one that forms a basis to act. The first section, ‘the Ark’, explores and assesses a model that elegantly pinpoints the distinction and relation between nature and humanity. The model is based on the Biblical Ark of Noah and pictures the human space as a large Ark aboard that saves species from extinction. The second section criticizes the model. Examples like kingfishers, ibexes and the Bialowieza forest show a more complex situation as it is not always clear how to invite pieces of nature on the Ark. People disagree, and, more fundamentally, the pitfall lurks that we come to see nature as merely instrumental. How can we possibly take up responsibility for nature? Perhaps we can rescue the bodies of animals, but this section explores which values of nature can hardly be saved.

The third section builds on from the critiques of the second section to shape a more accurate picture of the Ark. The model appears less simple but remains useful if continuous evaluation is performed regarding the ever evolving and dynamic world we find ourselves in.

3.1 The Ark

The principle of ‘Ark nature’ sketches a picture that assesses the relation between nature and humanity and builds on the concept of a human and a natural space. It assumes a shifted relationship between human and nature from humanity being supressed by nature to nature being supressed by humanity. The model explains how the human space has gradually become a large Ark of Noah. In the Bible Noah saves many animal species from the world-engulfing flood. The Ark model is partially based on the observation that this story now appears more relevant than ever before.

Zwart (2016) introduces the Ark as a “concept of the Anthropocene [that] basically conveys the idea that we have entered a global symbolical Ark.” The Ark is envisioned as “a floating, zoo-like device, constructed to survive climate turmoil and mass extinction” (Zwart 2016, 396). The current ‘climate
turmoil’ and ‘mass extinction’ are caused by the extending population and increasing impact of mankind on earth. Against this background of a deteriorating natural world, plagued by an invading humanity, the Ark emerges as a safe haven.

The Ark started to take shape during the Neolithic revolution when agriculture became the standard. Cattle, camels, sheep, grain, grasses and other organisms that agriculture makes use of were invited to live inside farms and villages, they were invited to live on the metaphorical Ark. The collection of species created a distinct artificial environment that was under human control. In other words, these lands formed manmade ecological islands surrounded by natural wilderness.

The agricultural village functioned as a protective shell. “It facilitated exponential population growth, allowing *Homo sapiens* to dwell on earth in tremendous numbers, affecting and redefining the conditions of life for other species, domesticated as well as undomesticated” (Zwart and Penders 2011, 222). It resulted in some animals being included in and others being excluded from the Ark. While the included cows, sheep, goats, and others lived a protected life under the domination of humans, safeguarding and regulating the multiplication of these favoured races, the outside animals awaited increasingly harsh conditions (Zwart and Penders 2011). As a result, domestic cattle and horses are nowadays utterly common, while both their wild ancestors have gone extinct (Warmuth et al. 2012, Soubrier et al. 2016).

Through agriculture the concept of the Ark became tangible in the real world. Since the industrial revolution and the rise of modern science, the Ark took tremendous shapes. It has become much more than mere spatial terrains and includes the human world of techno-culture. It includes what Teilhard de Chardin has called the ‘noosphere’, the global, human ‘thinking layer’ that lays over and above the biosphere – the sphere of biological life (Zwart 2016). The noosphere, called after the Greek word νους (‘nous’, mind, thinking), involves not only thinking itself, yet also everything that follows from it. Technologies, devices, infrastructures, cultures, scientific knowledge, the internet, etc (Zwart 2016). The Ark, with all its technologies and including the noosphere involves everything that is part of the prelude to the current man-induced (mass) extinction. In short, the Ark can thus be understood as a threat to the natural world.

As the noosphere is absorbing and transforming the biosphere, the biosphere enters the human age. In other words, the Ark and the noosphere are extending, absorbing everything they encounter. They relate to each other in the sense that the new attributes of the Ark – beyond the mere spatial,
agricultural features and including modern technologies – are made possible by the noosphere. As such, the noosphere and the Ark merge together in the field of thinking and technologies. Yet while the noosphere is depicted as a global sphere, merging down on the biosphere, the Ark is depicted as a vehicle that can be boarded or not and upon this decision ones survival is dependent.

That is not to say that there is nature outside the Ark, rather, that all nature is directly or indirectly affected by humanity. Natural ecosystems can still be found worldwide, but it is an illusion to state that they do not suffer from increasing human influences, either direct or indirect and either intended or not (Myers et al. 2000). The current climate turmoil reaches every inch, habitats are degrading at high rates and mass extinction is common outside the Ark (Steffen Will, Crutzen, and McNeill, Thuiller 2007).

Many of us feel sad and sorrow, we mourn for dying species and the decline of nature, and these feelings urge us to do something. A drastic act that follows from this urge is to revive the death, revealing an important motivation. Jamie Shreeve, a journalist from National Geographic News summarized the arguments as follows:

Most arguments in favor of species revival fall into two basic camps: we should do it because we can do it. Why impede the progress of science, when the benefits that may accrue up the road are unknown? And we should do it because we have an obligation to do it, to right some of the enormous wrong we have done by driving these co-tenants of the Earth off the planet in the first place (Shreeve 2013).

Here I am not so much interested in the first argument as it belongs to another discussion, instead I want to focus on the second, on the impression that we have an obligation to right some of the wrong we have afflicted, to undo some of the harm that we caused, as it is an attempt for reparation. This argument comes from the most extreme approach to take care of nature, as I will show below, but it nevertheless reveals an important drive to actively protect or restore nature: guilt. Guilt for the extinction of mammoths, dodo’s, wolves, woodpeckers, Tasmanian tigers, Pyrenean ibexes (*Capra pyrenaica pyrenaica*) and many other once loved animals feed the feeling that we should do something. Perhaps our mourning is unconscious, but our impulse for reparation is clearly visible.

In the metaphor with the Ark of Noah where Noah saves animals from extinction, the current Ark is able to appeal to human responsibility. A responsibility that is a direct result from our devastating
impact on the natural world. “As wild animals are currently under increasing pressure from human activity … we inevitably have become responsible for their habitats”, as Zwart (2016, 402), in line with Keulartz (2016). It refers as well to the feelings of guilt and the concept of the Ark appears as an attempt for reparation of our wrongdoings in the past.

The omnipresent influence of humanity characteristic for the Anthropocene is a result of the technologies and global characteristics of the noosphere. The argument that we are responsible for what we have done and ought to save species and nature is accurately captured by the Ark principle. The Ark is the threat and the saviour. But how ought we to take up this new role, letting the Ark function as nature’s salvation?

3.2 Cases and critics

Several attempts for saving nature come from conservationists that try hard to limit our influence on the natural world, preventing extinction, rescuing animals and protecting their habitats. Parallel to Noah with his floating Ark, everything, plant or animal that is protected by humans becomes part of the Ark. Yet this inclusion in the Ark appears not always as straightforward as one would suppose.

In this chapter I will discuss several initiatives to save nature and its species. Based upon these cases I will argue that the clear picture of the Ark as a safe vehicle remains not unproblematic in our complex world. The cases are ordered in five points, ranging from slight comments on the lay-out of the Ark to more fundamental questions about the ambitions of it. These comments are not meant to dismantle the concept of a planetary Ark, but rather to add nuances to the concept in order to improve it.

3.2.1 Ark against Ark itself

The first question is what exactly the Ark needs to protect nature and its species against, as it is the Ark itself that is the biggest threat to nature. Human technologies have proven to be a precondition, or even a cause of the human world and emerging Ark. The Ark is, as it relates closely to the noosphere, still very much defined by technologies. Needless to say that these technologies in combination with industrialization, colonization and modernization are the major threat to nature. We try to protect nature against the Ark by inviting it on the Ark.

This paradox is explained by the fact that the Ark is huge, including opposite opinions and attitudes. Perhaps it is as big as Morton’s ‘hyperobjects’ – objects that are too huge for humanity to grasp their
full meaning (Morton 2013). Climate change and mass extinction are other examples of hyperobjects because they surpass humans in both temporal and spatial dimensions. Equally big is the Ark, its vastness transcending us in time because it existed long before we were born or the Bible was written, continuing to exist long after humanity will have turned the earth in a technical machine, or long after the last person has died and hints of a shift in the world’s ecosystem fade away. The Ark transcends us in space, covering the entire planet and reaching the deepest of the oceans, the internal processes of organisms and the climate. No one can grasp the full meaning of the Ark. But it can affect how we think and coexist with each other and with animals.

The Ark involves all that is human. It included politics regarding nature and a plethora of ideas about how to care for nature is present. The discussion about the Bialowieza forest is a good example. The pure naturalness of this primeval forest is famous and it has boarded to Ark via various protecting laws and acts (among which Natura 2000 and UNESCO World Heritage). But according to the Polish government the Spruce bark beetle (*Ips typographus*) is causing damage to the trees which could fall on passing tourists and rangers. They view the logging as necessary. Even now the European Court of Justice has judged the logging illegal, the country’s authorities still continue their wood harvesting (CJEU 2018). A group of national and international ecologists has argued that the plague of the beetles belongs to the natural dynamics of nature. According to them, the forest does not need protection by means of logging, and the beetle attack is taken as a false reason to harvest wood on industrial scale, they argue.

Visions from the ecological, nature minded side of the Ark do stand opposite to visions from the industrial, economy minded side of the Ark. Both stand on the same Ark but act from different perspectives of what is important. Such patterns occur in all environmental conflicts.

### 3.2.2 Plural Ark

But if agreement is reached on the fact that we want to protect an area or species, the second question is how this should be done. Various tools are at the hand of the conservationist and vary from zoos and wild parks to the new methods of genetics.
Zoos are perhaps the most noticeable inclusion in the Ark. Zoos are increasingly devoted to conservation by participating in breeding programs. The entire population of California Condors was caught, sanitized, multiplied in captivity and partly released again. This species only lives because it was invited in the Ark. The list of species that join in comparable programs is long. In India programs are set up to safe the remaining vultures so that they can occupy the Towers of Silence again (van Dooren 2010). On the Island of Guam a crisis among birds unfolds due to an introduced bird eating snake. The snake invades the whole island at the cost of several bird species. To rescue the remaining, vulnerable birds, people evacuated them from the island, only to be released when Guam is safe again.

Also outside of their walls zoos are increasingly funding conservation in the wild. The World Association of Zoos and Aquariums (WAZA) has even called the institutions to spend at least 3% of their budgets to conservation work in wild parks, national parks, nature reserves or an equivalent area that receives official protection in order to safe its nature (Guardian). However communicated as wild nature, these areas receive Ark like protection from humanity and in some areas human interventions are not uncommon.

Yet the potential of the powers of the Ark is not fully exploited. Recent DNA techniques allow us to remake and revive previously extinct animals. The techniques vary from cloning animals to the bold idea of resurrecting the wooly mammoth (Church 2012). In fact, on July 30, 2003, a newborn baby of the previously extinct Pyrenean ibex marked the ‘de-extinction’ of the subspecies, “a turning point in the history of biology. For on that date, all at once, extinction was no longer forever” (Church 2012, 136). Ironically the individual died a few minutes later due to a physical lung defect (Zwart and Penders 2011). Hereby the Pyrenean ibex is also the only subspecies to go extinct twice.
Conservation based on genetics is an increasingly important tool. First, genomic information can tell if an animal is ‘polluted’ by genes from another, closely related species by hybridization. There are about 12,000 mature American bison (*Bison bison*), which is sufficient to have no extinction risks. Nevertheless a group of conservationists started a project to save the species from extinction because just few individuals carry proper, unpolluted bison genomes – 63.6% of the examined populations had DNA from domestic cattle. Second, complete genomes are stored in so-called frozen zoos. These ‘zoos’ store DNA as well as frozen, viable cell structures, embryo’s, semen, oocytes, ova’s, and blood and tissue specimens of extinct, rare or endangered species. It functions as stocks for animals, to amplify the gene pool, increase genetic diversity or rescue endangered population for in case they go extinct. The idea is that the DNA can be taken and cloned into a living individual (Church 2012, 140).

On first sight the different techniques could be complementary, but on a closer look conservationists behind different traditions want to save different aspects of nature and the species in concern. For Church and his colleagues a species is its genome. In the same line of thought stand the bison conservationists, under the lead of James Derr, that aim to save the pure bison genome and conclude that this pure animal has become rarer than we think. “If you don’t have the genome, nothing else you do makes a damn difference. What you are preserving isn’t the species; it is something the hell else – a shadow” (Marris 2009, 951). Yet not every bison conservationist agrees. As Rurik List points out, a bison herd, either pure or mixed with cattle genes, that has lived for generations in an area knows how to live there. It knows where to find water and safe places – it has a memory as a herd, fleshly entangled with its surroundings. The animals look and behave like bison, possessing a bison phenotype. Such animals are not simply replaced by newly introduced ‘pure’ bison coming from another area.

The case raises the question on which entity conservation should be focused. Are it the bison phenotypes that have fulfilled an ecological role but hide a few cattle genes? Or is it the gene that can guarantee that the animal is 100% pure bison but lacks a herd related memory and history in the area? The question is not necessarily to be answered since it depends on what exactly a protection initiative wants to include in the Ark. Both groups focus on a different entity, they sit as it were on different ships of the Ark fleet.
The different ships represent different ideas on how to save nature. They vary in the entity to be protected: genomes, phenotypes, or even habitats and ecosystems can be taken as protection subject. They still belong to the same fleet and their capabilities are often complementary. Saving a species involves saving its habitat and sometimes gene-based breeding programs. But at times the different methods are incompatible and conservationists argue about the essential entity to preserve.

### 3.2.3 Loss of Naturalness

The third question is more fundamental and asks to what extent we humans are able to protect, conserve, re-make or bring back nature or natural elements as nature is often understood as opposite to humanity. It goes back to the question what nature is. A question that has led to endless discussions, but here I want to restrict the debate to the minimum and use a definition of nature that contrasts nature with artefacts.

2300 years ago Aristotle drew a line between nature (physis) and artefacts (techne). Aristotle defined nature as all that can move, grow, acquire qualities, displace itself, be born and die without external help (Lang 1998, Schummer 2001). Nature is contrasted by artefacts that are per definition made by humans. Artefacts do not have the same innate ability to move, grow and acquire qualities as has nature. Herein Aristotle divides nature from artefacts. This ancient concept of nature still corresponds to the common intuition that nature is different from artefacts, or technologies. Even today when machines exist that can do these things. Abilities are still given to them by people, they move according to what they are made of, not to what they are.

Artefacts include technology and are the cause and precondition for the Ark to evolve. Technology and the (unintended) effects from them now impose themselves on what was once undisturbed nature. Even the most isolated and remote areas on earth are affected by human induced climate change (Steffen Will, Crutzen, and McNeill). As a result it is claimed that true nature, defined as nature that stands completely out of humanity’s sphere of influence, does not exist anymore. Indeed it makes sense to state that this kind of nature has gone extinct due to the current, omnipresent influence of humanity.

Aristotle however defined nature as all that moves, grows and acquires qualities from an innate ability, by what it is made of. Is it then right to state that true nature does not exist anymore? Imagine an untouched forest, pristine and primeval and home to countless animals and plants. Then comes a bunch of humans and somehow they succeed in eliminating every single individual of a
specific species, say, all oaks are removed, or all ivory-billed woodpeckers, or all wolves, all dodo’s or all mammoths. The forest that remains stands no longer out of humanity’s influence. But has the forest thus become completely unnatural? The remaining plants, trees, carnivores and herbivores still live there. They still move, grow and acquire qualities from an innate ability, by what they are. Following Aristotle’s definition nature these plants and animals are still nature.

Hence it can be stated that nature still exists and this vision is in accordance to people’s experience when going outdoors. Mountains are still experienced as nature, while this experience is decreased when walking through agricultural fields or even in an industrial area, albeit the latter two also harbor natural elements. A strict definition of nature does not allow for such gradients. The term ‘naturalness’ is more adequate since it implies different degrees of nature. But before engaging in this term light will first be shed on the discussion regarding nature restoration as this discussion is closely linked.

Nature restoration is the artificial ‘restoration’ of an area that has lost its original, natural habitat due to human activities, such as mining. After mining the natural habitat of the area is normally highly disrupted. The aim of nature restoration is to bring back the original features and characteristics of the area. The soil can be reshaped back to a more original state and the ground laid back so that nature can restore itself. Nature philosophers Katz and Elliot have argued against this practice because, according to them, nature can never be restarted by the hands of humanity, for nature is per definition nonhuman. Instead, they argue, nature restoration only results in artifacts (Elliot 1995, Katz 1997). Steven Vogel criticizes Katz and Elliot for their rejection of restored nature being nature. Herein he draws on the idea that nature is all that moves, grows and acquires abilities from an innate ability, although he never refers to Aristotle in his texts.

In reaction on Katz and Elliot, Vogel asks “Why should the products of one particular natural species be seen as somehow escaping nature?” (Vogel 2003, 149). He argues that no artificial object completely corresponds to the creators’ intentions. “Indeed,” he continues, “to build any artifact is to employ forces that go beyond the builder: in this sense all artifacts are natural.” Consider for example a gardener, he builds a garden with a specific intention in mind, but he knows there will be something unpredictable in his garden. It will somehow differ from his intentions. This is true for all our actions, acts and artefacts. The consequences of our actions, in other words, are never entirely
knowable to us. Vogel refers to this as the “gap … between the intention with which the builders acts and the consequences of their acts” (Vogel 2003, 163). He calls this gap nature:

[W]e might come to see that the wild is always there in all our acts, and in all our artifacts. If we identify wildness or nature with the unpredictability of our actions, with the processes we put to work in those actions whose consequences are never entirely knowable to us, we might learn something about the nature of artifacts – meaning now the nature in artifacts: for this moment of wildness arises in every artifact, not just in restorations (Vogel 2003, 163).

He designates hereby to all human acts and artifacts, yet for our interest acts that aim to somehow bring back nature are most important. Moreover, these kinds of actions bear within them the largest gap, as this gap was part of the intention.

Nature restoration thus bears a natural moment. This line can be drawn further to the ‘restored’ ibex. Is this animal artificial because its genome was made by humans? At least it has natural elements in it because the animal bears more in itself than was intended by its creators. An example of this was its lung defect. Of course it was not the intention to let it die within a few minutes, rather it was a natural event. Furthermore the baby goat moved, grew and acquired abilities given by innate abilities, inside its surrogate mother’s womb and for a few minutes on its own feet.

In the ibex’s case Vogel’s natural gap thus refers to the moving, growing and acquiring qualities that Aristotle defined as nature. Vogel himself explains that nature restoration is in fact preparing the ground for nature to develop on, the natural gap intended. The parallel is with the ibex is obvious since the aim is to bring a population of freely living ibexes back in the wild.

Nevertheless, the critique of Katz and Elliot on nature restoration articulates the feeling that restored nature is somehow not what we understand as real nature. It indeed is difficult to call the high-tech produced ibex ‘nature’. The ibex falls in between the categories of artefacts and nature, bearing within it aspects of both. It calls for a third category, somewhere in the middle between artefacts and nature, a category that is identified by some degrees of nature, but not being completely natural.

Here the notion of naturalness comes back. Angermeier defines ‘naturalness’ as “the degree to which a thing is natural, … represented by a continuous gradient between extremes of entirely natural and artificial” (Angermeier 2000, 375). He focusses on ecosystems, stating that since the
beginning of the human induced climate change no ecosystem is purely natural anymore. Nor is any ecosystem purely artificial. He takes the intensively managed cornfields of Iowa as an example that, contrary to our intuition, still yield naturalness in their soil properties and the majority of the corn genes. All areas on earth are characterized by some degree of naturalness. Naturalness, Angermeier adds, should be a key concept for nature restoration to ensure as much room as possible is left for natural aspects in the restoration.

Vogel’s and Angermeier’s theories appear highly compatible since the natural gap of the one, results in the naturalness of the other. Keeping to the ibex example, a certain degree of naturalness can be assigned to the animal. Its natural features expressed by the gap, its artificial features by the fact that it was a result of human technology. Such degrees of naturalness can be assigned to every piece of nature that the Ark aims to save. How natural is the future population of Guam kingfishers when they are released again on their original island? How natural are bison that are selected through gene tests?

With the interference of the Ark on an area or species, some of its naturalness gets lost. A natural species possesses within itself a long, uninterrupted evolutionary line leading back to its oldest history. The species and its genome have always been reacting to changing circumstances, leading to the animal as we now know it. Herein it has always been independent from humanity, resulting in some kind of ‘otherness’ from humanity. Although much discussed, this otherness of nature, directing to it being essentially different than humanity, is a much valued characteristic of nature and its species. It is the source of overwhelming wonder that makes nature so special to us.

The intentions of the Ark are noble in the sense that it aims to save species. But the question must be asked what of the species is conserved and what gets lost. Different Ark fleet ships are able to save different aspects of species. The genome ship saves its genome, the ecosystem ship saves its ecological niches, and the phenotype ships saves its fleshly entanglement and is able to save large numbers. Most ships have in common that they decrease the naturalness of the species or habitat, albeit in different degrees. A species that is reborn in the lab of a frozen zoo harbors less naturalness than one that has passed a period of its history exclusively in zoos. The only ship that might not affect the naturalness at all is the ecosystem ship. The legal protection of the Bialowieza forest causes no decrease in naturalness.
While the ecosystem ship is successful in maintaining the naturalness of an area, it is often less successful in keeping species alive. Saving a forest saves many species, most of them tiny, inconspicuous and obscure. They are the less appealing to humanity than big, beautiful and charismatic animals who also often appear to be keystone species, but are not easily saved by protection of their ecosystem alone. The latter category is a popular saving subject and a good candidate for less natural methods of species conservation. If the different ships were ordered along one axis of naturalness and along another axis of technological prowess on saving a particular species, both axes ran in opposite directions. In others words, the further a species is at the edge of extinction (or even past it) the more technical saving operations will be.

3.2.4 The western, scientific view of nature

The fourth question analyses further what aspects of nature can be saved by the Ark. In order to grasp the meanings that we can assign to nature, it is necessary to go back to the time right after the emergence of the human space and to highlight significant shifts in human’s view of wilderness in the West.

For a long time after humanity started to build their own houses, wild nature remained intact and lived alongside humanity. During all this time humanity depicted wilderness differently. For the medieval men and women the forest harbored many threats and the dreadful Biblical attitudes towards nature lead to a general bias against wild country. This attitude started to shift with the rise of science. At first science came to reveal the beauty, harmony and majesty of nature and indicated a divine source, but after Copernicus and Darwin this view had to make room for physical and biological laws explaining its complexity (Stankey 1989).

At the start of the 17th century social shifts helped further appreciation of wilderness. Seemingly paradoxical, people started to value nature when the distance between them and nature grew. Industrialization, urbanization and increasing wealth “helped foster a society that was at once removed from nature and made more appreciative of it” (Stankey 1989, 15). As a reaction of this alienation from nature the Age of Romanticism unfolded, fueling further appreciation of nature and its wilderness. The distance between wilderness and humanity had increased and people were once again reminded of nature’s beauty, rather than fearing the unknown vastness (Stankey 1989).

If at this moment in history, the balance is made up we encounter scarce natural areas accompanied by high appreciation for them. Both parameters have passed their axes in opposite directions since
the end of the Middle Ages. Yet upon taking the stock we also see that these natural areas are not faring well, as the extinct Japanese wolves stand symbol for the decline of nature. The nature and its species that we learned to appreciate are now running out of existence and it is our own fault.

A fault that has led to regret and a fault that conservationists try hard to limit. One of the most important tools is science. However conservationists may care about the future of the species, in scientific texts and approaches they ought to remain objective. They design their methods and write their texts accordingly, counting their species’ numbers, collecting data, describing, sequencing their DNA, collecting their genome and guarding it in frozen zoos. It results in a modern, western, scientific view of nature and species. A vision that is determined by facts, numbers and dry descriptions.

In our attempt to thoroughly understand nature we have measured natural phenomena and turned it into inanimate facts. It gave us the power of modern science and tools and abilities that come with it. It gave us the power to clone and revive. But the values that nature carries and that are impossible to grasp by objective methods stand under pressure.

A handful of natural thinkers shaped a philosophy that has become known as ‘deep green ecology’. It is beyond my scope to discuss this philosophy and the normative ethics that follow from it in detail, instead I will briefly offer a glance at the ambitions of the authors. They caught the less objective values of nature in texts about non-instrumental values. They refer to the otherness of nature, to intrinsic values, respect for nature and to feelings of being part of nature. Their common effort is to unveil and disclose the values of nature that transcend and are independent from human (economic) interest (Benson 2000). The foundation of this thinking came partly from Aldo Leopold, a former hunter that on one day shot a wolf.

We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes – something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters’ paradise. But after seeing the green fire die, I sensed that neither wolf, nor the mountain agreed with such a view (Leopold 1949, 130).
This quote has become famous. It reveals a deeper, unknown meaning in the wolf’s eyes and mountain, something that goes beyond the body of an animal that ceases to live. The quote furthermore shows how Leopold changes from a man with just ‘trigger-itch’ that aims for many deer to shoot to someone deeply respecting and caring for nature.

If we listen to Leopold or happen to be in an overwhelming impressive natural area, we might come to understand that something has gone lost in the course of science, that the wonders of nature cannot be presented in graphs or published in journals.

But the Ark, deeply anchored in science, acts as objective as modern, western science itself. As shown in the chapter ‘Missing ethical step’ the person behind the scientist is often deeply engaged with the species her or she studies. These people are probably touched by the same subjective feelings they encounter in nature as Leopold was. Yet their tool, through science and the Ark, is bound to objectivity. It leads to an objectivity shell that surveys around the Ark, to a mismatch between the subjective inner language expressing profound values of nature and the outer language bound to objectivity. The inner motivations might be personal, emotional and subjective, but towards the outside conservationists are forced to speak the same language as science, herein losing an important moment in their motivation.

This language is influenced by anthropocentric policies that speak about instrumental values of nature. Therefore the conservationists are bound to write about instrumental values as well as show how important nature is for humanity. Nature in itself as an end motivation is lost.

According to Leopold wild animals are more than mere bodies. If science is able to bring back bodies of previously extinct animals, has it brought back this extra value as well? And how much of it remains preserved in a population that has bridged generations in a zoo? Perhaps it is too soon to answer these questions, but it is time to think about them because if we are not careful, naturalness that rests outside the Ark will be increasingly scarce.

3.2.5. Human bias

The fifth and last question is about a hidden human bias in nature. With the introduction of the human as an agent to actively protect nature, some humanization of nature is lurking in the distance. A humanization not only because we decreased the average naturalness of nature, but also because we are to select who is welcome on the Ark and who is not. A bias toward human valued natural
elements can be glimpsed. The IUCN Red List itself functions as an important selection tool, as it states:

The IUCN … has been assessing the conservation status of species … in order to highlight taxa threatened with extinction, and thereby promote their conservation.

The Red List itself represents a selection of animals and other organisms that are to be saved in the Ark. Remember that the list started with the aim to list threatened organisms only. The IUCN broadened its aim by including all organisms just recently. Yet traces of a bias in favored organisms, the first ones to select, remain visible in the list by the amount of text devoted to each species and by the percentage of organisms of a specific taxon described in the list (all known mammals described versus 0.033% of the arachnids). Unwillingly, the Red List promotes the conservation of favored races.

It prompts the question what we save nature for. Do we want to save species for us to enjoy them? Or do we want to save the naturalness found in ecosystems and their species? Intensively saving selected species leads not to a natural nature that has grown and developed without human interference, a nature so different from us that it provides us with deeper meanings. It leads to an environment managed for desired species, but less welcoming to unwanted and unloved species. It leads to us saving the California condor, but extirpating its louse.

A more powerful side of the conservation of charming species is that saving initiatives are organized around such an iconic flag species, the rest of the ecosystem becomes protected as well. One cannot save a tiger without saving its forest. In communication to the broad public it is tempting and useful to use the tiger as a proxy for its ecosystem, but the conservationist should be careful not narrow the view too much.

Conservation aimed too much on what the species and habitats that we value most, leads furthermore to a humanized nature. If we opt too exclusively on the aspects and entities we want to protect, our selection becomes too powerful and visible, reducing nature’s autonomy. If we allow species to become rare, with the idea that we can always restore the population, we will find ourselves on a slippery slope. Why would we save species if we can bring them back to life? The motivation to protect species and the ecosystems they live in will be reduced by such arguments.
Furthermore these argument only focus on a few species, not on the whole complexity that is an ecosystem and nature becomes more and more humanized.

3.3 Rethinking the Ark

As follows from this assessment, the Ark concept remains not unproblematic. A tension presents itself between our strive to limit or even undo our devastating impact on the natural world and the fact that this per definition cannot completely be done. All human acts result in artifacts to which nature is opposed. Even if a definition of nature is taken that allows for human influences, the naturalness of the subject will decrease with every action we take. Some room remains for nature to grow in such instances, but not all aspects and values found in untouched nature can grow back equally well. Especially the profound values regarding the otherness and independence of nature are irreplaceable.

On the other hand the Ark principle articulates adequately the need for a safe hiding place in times of disaster and climate turmoil. It articulates how dependent species have become of us and how eager we are to react on their dependency. It gives floor to countless saving initiatives, responding to our newly acquired responsibility. We know too well that if we do not act in order to save the California condor, the Guam kingfisher, the bison and the black rhino, these species will cease to exist everywhere but in our memories.

This tension leads to the uncanny apprehension that we have acquired a power we do not want. We do not want to be the managers of nature for it changes the very essence of what nature is. We want nature to be independent from us, a place where we can connect to our roots as a source of self-understanding, a place where we can be overwhelmed by its beauty and where we can feel part of it. A place that demands respect from us.

Each species bears such values within itself too, carried within all individuals. Therefore, the loss upon the species’ extinction goes beyond the mere physical body that ceases to exist. Lost are the identity of the species and its independent evolutionary line that it carried in its genes, reaching far back in history. If congeners were still around, the values would be carried further by these individuals, but lacking the next generation, the death of the last individual means the death of all that was the species, as an authentic piece of nature. Hence extinction can be seen as a hyperloss – a loss that goes beyond the biological category of a species and into the meaning we assign to a species as a part of nature.
A hyperloss that can be prevented by accurate protection from the Ark. Yet the complexity of the Ark escapes us. The Ark is the species’ threat and protector, the pathogen and the cure, contradictory in itself. Not everyone is as susceptible to nature’s profound values as the deep green ecologists. Some have adopted the western, objective view and regard nature as a pile of inanimate facts that are replaceable. It complicates the Ark further, but the Ark still gives us a hand in our thinking as it is this Ark we deploy to save species, adhering the Ark to them, consuming them as parts of our managed world, aiming to save them. But is that possible? Is the Ark able to save species from extinction? Can the protector-Ark put a fence right before the edge while the threat-Ark approaches, pushing in front of it animals to the same edge? Can we prevent a multitude of extinctions, a hyperloss after hyperloss?

Some would say, yes, we can even grab species that already fell over and put them right back on their feet. But deep green values will forever be lost. In a time of mass extinction we mourn, accompanied by feelings of guilt. And indeed, we are guilty for the mass extinction. In our search for reparation we found the Ark. But the Ark can only be a partial reparation for some natural values are valuable precisely because the Ark never touched them.

Thus the Ark principle provides us a strong but problematic picture to understand our relationship with the natural world. This ambivalence is part of the essence of the Ark, as it is the pathogen and the cure. It means that the Ark is no static structure, it should acknowledge its difficulties and continue problematizing it in a never ending self-reflection. Only if the Ark reacts accurately to the evolving environment, at new situations, new questions coming, newly found threats and new technologies with new potentials, only then the Ark will prove to be a strong measure against the harsh conditions that the Ark itself is posing upon nature.

**Conclusion**

Species are massively running out of existence. The extinction of a single species is never a stand-alone event and the mass extinction that is now happening all around us is incredibly big. Big because a species never just vanishes, instead its departure from earth is the result of the prelude, of a close entanglement with its habitat that slowly turns hostile. Hence mass extinction points to habitats massively turning hostile. In other words, mass extinction shows that the world is changing, it is one of the leading themes of the Anthropocene.
Mass extinction is also big because the disappearance of a species leaves behind a gap. A gap that is three folded and consist of an ecological and two cultural part – ecological because the species no longer fulfills its niche in its habitat, impoverishing nature with each disappearing species, cultural because people will remember the species and mourn for it. Our memory of species helps us understanding who we are. We killed the mammoth, the dodo and two Japanese wolves. Albeit indirectly and not necessarily intentionally and even though the species otherwise might have died out as well, these events hold up a mirror. What we see when we look into that mirror is that we have become a species whose impact on earth is omnipresent and undeniable.

We mourn through various artworks. Through these we come to understand that mass extinction affects us significantly. We feel sadness and sorrow, regret and remorse, and parallel to the loss of any other loved person or pet, we mourn for lost species. This mourning resembles but is not equal to mourning for a deceased spouse, as the relationship with the lost objects is different. Yet recognition that people can mourn for lost species and feel guilt, gives insight in what they mean for us and the importance we assign to the animal world. It offers a ground for further acting, a trial for reparation, born in the process of mourning. A trial that is embodied by the idea of a large Ark of Noah, a space where humans are chief and safeguard the struggling animals out there. The metaphor of the Ark clearly pronounces the urge that conservationists feel to save nature.

But opposite to the language of artists, where feelings and emotions have a place, stands the language of science. These scientists and conservationists must give shape to the protection that is aimed for by the Ark. Yet in their language there is no room for subjective expressions; not for the opinion from the person behind the scientist, nor for the message that comes from art. Science students are told that they must relate to society if they want to have any impact, that means that their texts must relate to instrumental values of nature. Many scientists will be personally motivated by other reasons than those instrumental values that are written in their texts. These inner motivation will resemble to the artists’ expressions, but in their most important medium, scientific texts, no room is given to this.

It results in a mismatch between the inner motivations of the Ark, formed by safeguarding ambitions, and the outer language that is picked up by policy makers. The inner and outer language of the Ark do not correspond and herein an important ethical moment is missed. This moment consists of the irreplaceable, non-instrumental values that nature carries within it. Values that we can
perceive through the otherness and independence of nature, its overwhelming beauty and make us feel humble and respectful. Values also, that have become unrecognized in the modern, western understanding of nature as an inanimate pile of facts.

The ethical moment that is lacking is partly compensated for by scientists referring to instrumental and utilitarian arguments. These however refer not to the profound, non-instrumental values of nature that make us wonder and feel humble and are the ground for mourning if species die out.

Different beliefs about what nature is and how it should be saved are recognizable in the Ark itself. Some opt for solutions that stand close to an untouched nature, preserving what is left of it in a way least naturalness gets lost. Others envision nature, and most notably animals, as biological systems that can technologically be built and rebuilt using DNA. Staying in the metaphor of the Ark of Noah, these different approaches form different ships of the Ark’s fleet. Distantly aiming for the same goal – protecting nature – but taking another path towards it. The different paths focus on different entities or aspects of nature. These entities could be genomes, phenotypes, populations, communities, or entire ecosystems and the ideas on how to reach the goal do not always correspond to each other.

Ironically, technologies that are powerful in protecting a single species, or even bringing it back to existence, are the ones that preserve naturalness and non-instrumental values least, as they cannot be brought back by technology. At the other side of the spectrum we find approaches to save nature that take better care of naturalness and preserve non-instrumental values better by actively protecting nature that is left, preventing human interruption as much as possible. These practices however lead to a weaker protection of species, as either control is difficult or the need to protect the area is debated.

Because of non-corresponding visions on how to protect nature, because the profound and non-instrumental values that may become forgotten by many, because nature might become humanized, and because the world is dynamic and complex, we need to continue self-reflection within the Ark. The world moves, new threats, opportunities and methods pop up frequently. Within the Ark ideas, beliefs and attitudes towards nature evolve. Grounds are formed for protection and decisions are made on how it is done. People sit on different ships, but they remain part of one fleet, faring one planet. Perceptions, arguments and attitudes interact with each other. Continuous conversation is necessary to agree on what are the best measures at a certain point in time. This requires functioning
politics. The current tendency is that these politics are based on western visions that have reduced nature to its utility and instrumentality. In its self-reflection the Ark should learn to listen better to the non-instrumental values of nature. But as I have shown, certain deep green, profound values will stand under increasing pressures if western, utility based attitudes are maintained.

Given the fact that we have reached this point in our history from where we rule over unprecedented amounts of live, both inside and outside our intentions, we are to take responsibility. We are aware of the harm we will cause if we continue spreading our impacts carelessly. With naturalness the profound and non-instrumental values of nature will slowly fade away if we do not act. We are in the uncanny position to decide about the future of life on earth. Preservation of single species is an option that, if focused too much on the species, not necessarily saves its entanglement in the complex of nature. We saved the condor, we lost the louse. If we want to preserve naturalness, we should listen more closely to the members of our society that underline the profound values of pristine nature and limit our impact so that the independence of nature survives.

I would therefore propose that we listen to expressions of sadness and sorrow, that we learn (again) to perceive the profound deep green values of nature, and that we learn to mourn upon a species’ death. Being more susceptible for nature’s non-instrumental values enhances the capability we need in our newly acquired responsibility to take care of nature. From such an attitude we would try to prevent the need to save a species, aware of the hyperloss that comes upon its extinction and the gnawing suspicion that, if this comes to pass, we may have also lost a bit of ourselves.
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References


IUCN. 2014. "IUCN Red List - Celebrating 50 years as a "Barometer of Life"." 
https://www.iucn.org/content/iucn-red-list-celebrating-50-years-barometer-life, accessed 3 may 2018.
IUCN. 2017a. "2001 Categories & Criteria (version 3.1)."


Kirkland, Isabella. 2004b. Gone.


