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Part 3
The Ethics of Meat

The Goods and Bads of Using Animals For Human Consumption And of Using Technology to Improve their Productivity

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Discussion Paper

CEIBS

Editorial Note:

In this text the terms ethics and morals are used interchangeable. However, technically speaking this is not correct. According to the ethicist Christian Dürnberger a separation of the terms became established in the scientific discourse. Morals are all those relationships in family and social context which guide us in our decision making. These include norms, values, principles, intuitions, beliefs and 'common sense'. Ethics on the other hand is the structured, theory-led reflection on morals and moral problems.

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1. Introduction

Most human consumption of animals, which today mostly means eating animal proteins, involves creating, raising and slaughtering such animals. Usually, these animals have been created as a species or breed and were born and raised for the sole purpose of serving a need of human beings. Stated differently, if humans did not make use of them, they would neither exist as an individual animal, nor as that particular breed, and often not as a species. This makes these animals different from whales for instance, which used to be slaughtered for human consumption, but which had been around independently of humans. By having created animals specifically for consumption, and guarding them, humans have a special responsibility towards them. Beyond economic considerations of property and utility, and legal considerations of rules and regulations, this responsibility is also governed by ethical dimensions.

An ethical framework, just as a legal framework, defines rights and duties, which structure and govern the responsibilities and gains from the subject under consideration. Together these define what is right and wrong, good and bad.[1] A basic ethical framework needs to answer at least three core questions:

a) On which AUTHORITY are humans granted their ethical rights and duties, and by implication to which such authority are humans accountable when utilizing animals for their own consumption?
b) For which JUSTIFICATION (or reason) do humans have ethical rights and duties for these animals and, based on this reason, may or may not utilize the animals for their consumption?
c) For what PURPOSE (or objective) are the ethical rights and duties exercised?

These three questions touch on central subjects of ethics: authority, justification and purpose. These are neither new questions, nor can finite and universal answers be found. They need to be answered for every new technology and cultural norm that humans evolve. The new technologies and challenges of utilizing animals in the 21st century will need such ethical guidelines as well.

21st Century consumers show a heightened interest in, and have the means to know, under which ethical conditions animals were raised and slaughtered. Similarly, they are concerned about the extent to which the animals are subjected to old and new technologies that increase their productivity. Such ethical guidelines have existed for a long time: for instance, kosher and halal codes have provided ethical directives concerning the treatment of animals for thousands of years. The Christian church used to impose many restrictions on which meats to eat and when and how. The influential Indian-Tamil Tirukurral song, a guideline towards ethical living probably composed in the AD 500s, states in verse 257: "*With other beings' ulcerous wounds their hunger they appease; if this they felt, desire to eat must surely cease*". What may have changed, compared with previous times, is that with modern communication and sensor technologies

[1] In ethics or philosophy, a good or a bad is a fundamentally normative concept, of respectively conforming to a moral ideal, or distancing from it. Classical definitions of what a good can be are according to: Aristotle: "The good is that toward which it tends in all circumstances " (Nicomachean Ethics); Spinoza: "By good, I mean, any kind of joy, all that fills the wait"; Locke: "Good is everything in us pleasure" (Essay Concerning Human Understanding; Kant: "The virtue and happiness are the highest good" (Critique of Practical Reason).

21st century urban consumers are better equipped to be directly informed about the ethical norms under which the animal product was created, raised and slaughtered.

This report does not take a position and does not make a recommendation as to which ethical norm is the right or wrong one, or is better or worse. The report wishes to structure the subject of ethics for using animals for human consumption in a neutral way. It analyses the above three core ethical questions and discusses the main ethical concepts for each of them. The report also discusses several technologies in the light of those ethical concepts, as illustrations of how different ethical positions arrive at different answers for how to utilize animals.

The report does recommend that every member in the value chain of creating, raising and slaughtering animals for human consumption, be it companies, governments or civil society groups, adopts an ethical framework for its operations, and then makes itself both controllable and accountable against this framework. The report assumes that such a framework represents an investment into the ethical capital of the organization. Such ethical capital earns dividends in terms of trust by the final consumers, and by being granted the social license to operate in society. This report assumes that organizations without sufficient ethical capital will struggle in the future to perform successfully, especially if they are directly or indirectly involved in creating, raising and slaughtering animals for human consumption.

The report assumes that such a framework represents an investment into the ethical capital of the organization

Summary of the Report

Animals have been an indispensable part of the development of human civilization. They were critical suppliers of work and services, yielded a broad array of organic materials, and provided nutrition in the form of meat, eggs and milk. Moving into the 21st century, the predominant function is for nutrition. In that purpose, animal-derived nutrition, primarily proteins, remains paramount to the human diet. Humanity has been adapting traits of domesticated animals through selective breeding for more than ten thousand years, continuously increasing their productivity for humans. This has been a key contribution towards the healthy lives that the majority of global citizens enjoy today.

In this environment, it is critical that an organization, whether company, government or civil society group, creates for its operations an ethical framework that governs its processes, systems and structures concerning the creation, raising and slaughtering of animals. It is advisable that an organization makes itself transparent, accountable and controllable against this ethical framework.

It is advisable that an organization makes itself transparent, accountable and controllable against this ethical framework

Animal rights advocates operate extensive websites with downloadable background materials where ethical positions and ethical arguments are explained. These materials differ substantially in quality. There is also a vibrant scientific debate among professional ethicists at universities and think tanks. Their discussion, as is typical for scientific discourse, is difficult to digest for non-specialized decision makers. This report is targeted at decision makers and outlines six different ethical perspectives around three ethical questions in a simplified manner, for which an ethical framework should have an answer or have a position.

The first question concerns AUTHORITY. The two main concepts are speciesism/humanism and anti-speciesism/equalitarianism.

The second question concerns JUSTIFICATION/REASON. The two main concepts are utilitarianism/teleology and duty-based ethics/deontology.

The third question concerns PURPOSE/OBJECTIVE. The two main concepts are either sharing the world in cohabitation with nature, or sparing one part of the world, handed over fully to nature where it is to be protected from humanity, and the other part handed over fully to humanity to

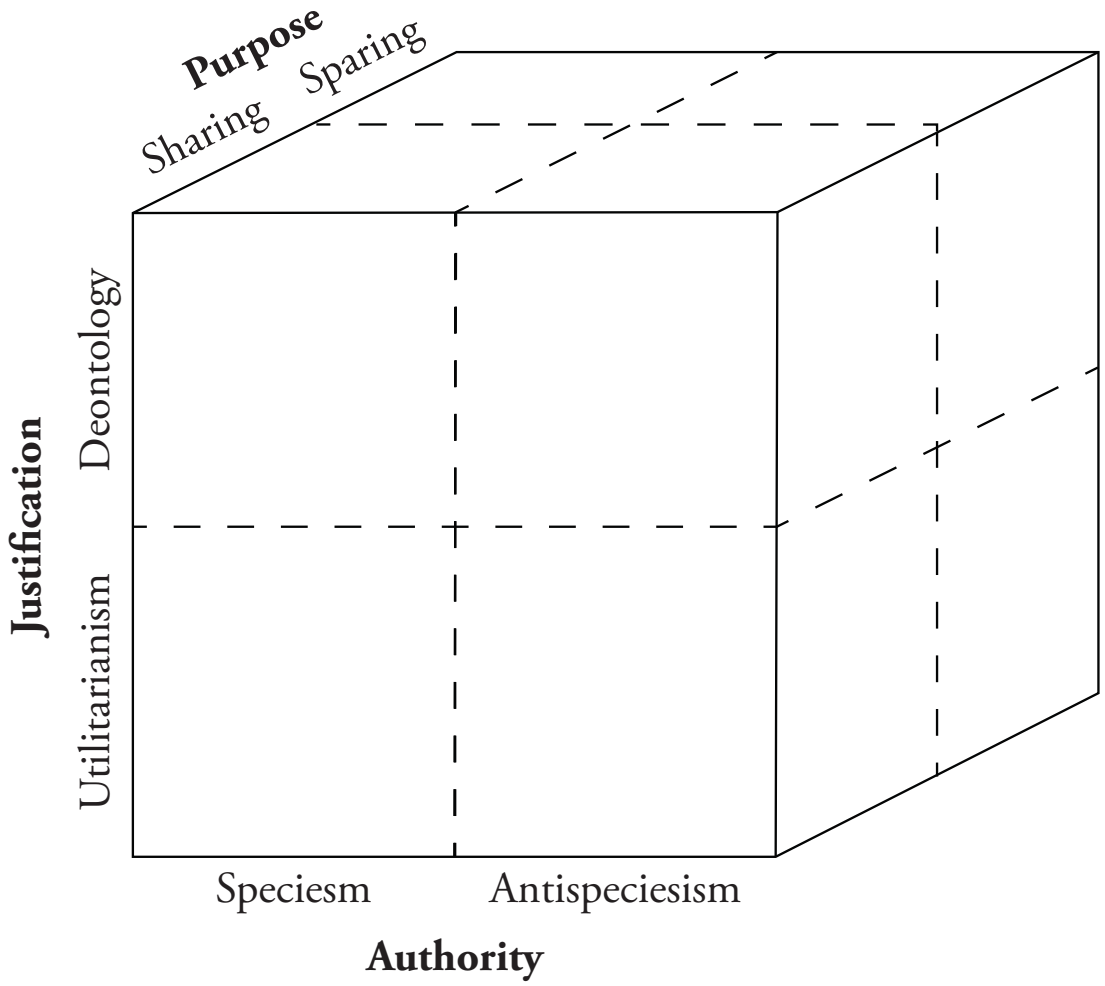
make use of its maximum potential with minimal restrictions.

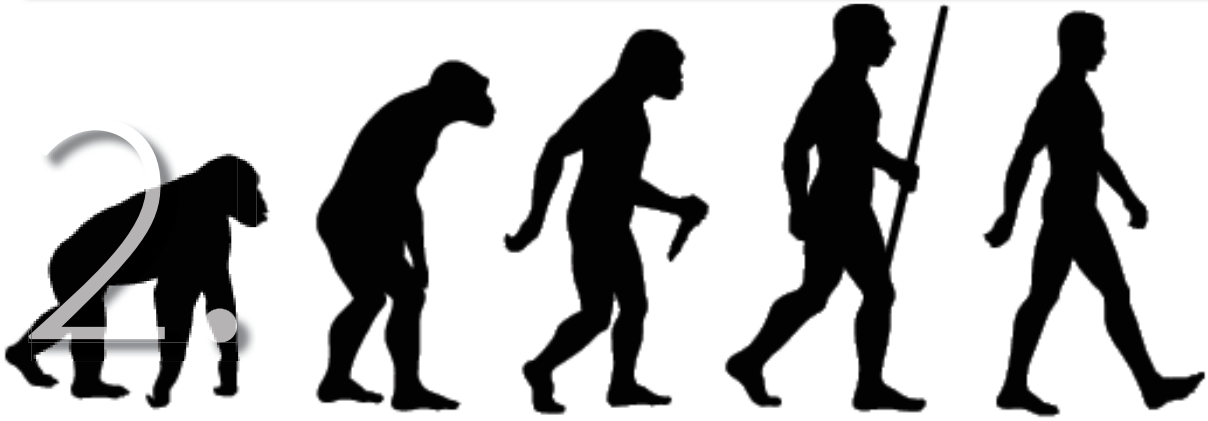
The first two questions are either/or choices, where opportunistic 'it depends' will yield unsatisfactory results. The last question can have multiple answers, but it is important to have an understanding of which kind of nature is meant to be protected or exploited.

The three ethical questions are illustrated by evaluating three recent technology case studies under each question from each perspective. This demonstrates that it is possible to arrive at different conclusions depending on the ethical position one assumes. The three technologies are a) gene-edited pigs that are immune to PSSR disease, b) gene-edited pigs that can become sources of xeno-transplantation organs such as hearts or kidneys, c) artificial intelligence facilitated translation package for better communication with domesticated animals. Each case study is concerned with pigs. However, this is for illustration purposes only. The report is intended for all species of animals and the organizations working with them.

More background on each of the three ethical questions is provided in the overview chapters 4, 5 and 6 of this report.

Exhibit 1: The three ethical questions and their perspectives





2. The importance of animals in historical context and relevant ethical concepts

Animals have been of foundational importance to the development of both the human species and to human civilization. Therefore, with rare exceptions, their legal status is one of being valuable property. As a matter of simplification, this historical role could be used as a justification for the continuation of this status in the future as well. However, legal frameworks evolve and follow societal and technological progress. Therefore animals could achieve a different legal status in the future. Also, legal frameworks are only one of the fabrics that bind a society towards being a functioning entity. Ethics are a further, at least equally important, fabric. To refer to and rely on public law, rules and regulation only is unlikely to be a sufficient answer to the concerns of final consumers and societal stakeholders. A good starting point for developing an ethical framework is to highlight some historical developments.

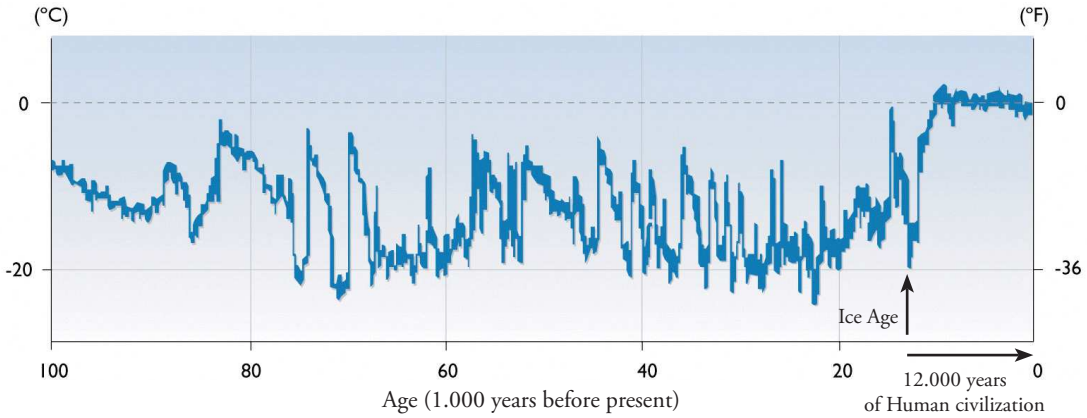
In our era, the nearest living relatives to *Homo sapiens* are the chimpanzees, which are assumed to have branched off the evolutionary tree some five million years ago. Around two million years ago, the fossil record seems to branch into various *Homo erectus* species. Throughout these two million years, *Homo erectus* species had three common and distinguishing hallmarks: a) walking in an upright position, b) using sophisticated tools made from stones and wood, c) making and using fire. The most widespread tool was the hand axe, colloquially called the Swiss army knife of the Stone Age. The stone splintered hand axe improved over time, but at an evolutionary rate, which makes the pace of the proverbial glacial movement look like jet-travel by comparison. Moreover, the basic technology did not change over those two millions years.

At some point, currently thought to be around 200,000 years ago, modern *Homo sapiens* evolved. It spread, probably from Africa, around the world. As far as can be told, nothing much distinguished *Homo sapiens* from the several other *Homo erectus* species that inhabited the world. There is unambiguous genetic evidence that Neanderthals, Denisovans and Sapiens were interbreeding, as their respective DNA is still traceable in modern humans today. Judging from the teeth of fossil children, the childhood period of Sapiens became increasingly longer compared to other *Homo* species, of which the Neanderthals are the best known. Neanderthals were larger, stronger, more upright walking and even had a bigger brain than Sapiens, but what, if any, difference this made is unknown.[2] It seems that for the first 170,000 years of its existence, *Homo sapiens* was no better or worse equipped with tools and technology than all the other *Homo* species.

Then between 40,000 and 12,000 years ago there is an odd concurrence of several developments. First, all other Homo species except Sapiens die out. Second, on all continents where the new Sapiens species arrives, there is a mass extinction of land-based mammals, especially those with a weight of more than one metric ton. Third, Sapiens feature new weapons, particularly the fearsome spear thrower and the bow. The spear thrower has four times the kinetic energy of the previous standard spear, and can be thrown with speeds of up to 150 km/h, at either a high-precision lethal range of 30 meters or a long distance range of up to 80 meters. Fourth, cave paintings and art objects appear in larger numbers. Fifth, towards the end of this period, the global climate is rapidly warming, and from around 12,000 years ago, has never been as warm and particularly never been as stable as in the entire 100,000 years before.

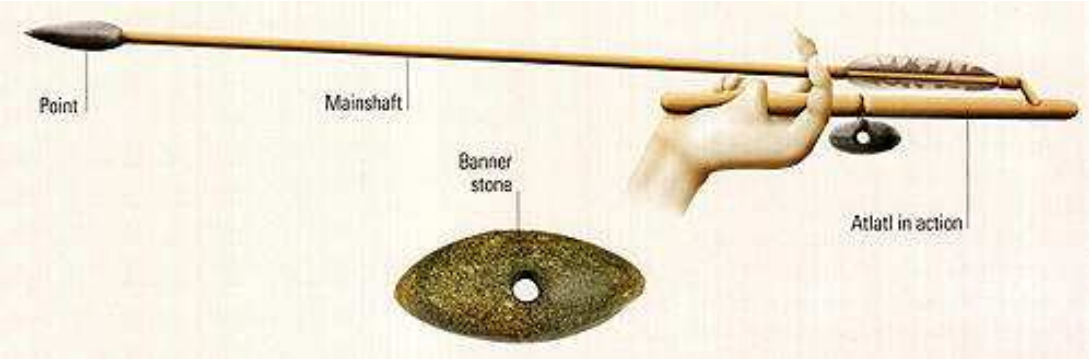
[2] https://www.mnn.com/earth-matters/animals/stories/surprising-facts-about-neanderthals

Exhibit 2: Global temperatures in the last 100.000 years



Source: ACIA, 2004

Exhibit 3: Cave paintings and spear thrower



Source: http://www.weapons-universe.com/Swords/The_Origins_of_Edged_Weapons.shtml

The last glacial period ended 12,000 years ago (colloquially called the ice age, though in geological terms the last ice age began around 2.6 million years ago and has still not ended since there are still large areas of Earth that are covered in ice). With its glaciers covering half of Europe and Asia, this last cold spell puts a heavy cloak on our capacity to know what the world looked like before. One can only conjecture the cause and connections between these five developments mentioned above. Mostly there are three camps of theories. The first camp says that climate change, namely rapid and chaotic cooling and warming over several thousands of years, caused the environment to change so fast, that the more adaptable *Homo sapiens* fared much better than the other *Homo erectus* and large-scale mammal species, which could not keep up. This argument fails to acknowledge that these animal species survived for millions of years of even more volatile climate, and the various *Homo* species made it through several climate change cycles unharmed. The second camp says that the rapidly cultural evolving *Homo sapiens* deliberately killed or even ate the other *Homo* species and the large mammals. A kinder version of that camp states that Sapiens so successfully occupied the natural habitats of the other *Homo* species and mammals, that those had no place to live anymore. This kinder version is unlikely to be the case, because then remnants of the *Homo erectus* should have survived in some remote locations, just as today there are uncontacted populations of Sapiens and great apes living in jungles or remote islands. The third camp says that both causes were mutually reinforcing: climate change put the species under stress, and Sapiens put the last nail into their coffins.

Except for rare circumstances, humans do not need animals anymore for providing physical work or services

A fourth camp of theory is only rarely mentioned, but would explain the evidence best: long before the last glacial period, 20 to 30.000 years ago, *Homo sapiens* began to domesticate and live with animals in structured and culture-enriched societies. In due course zoonotic diseases struck Sapiens, to which Sapiens developed immunity, while the Neanderthals and Denisovans had none and thus were completely wiped out. Domesticated animals may well be the reason, why Sapiens is the only Homo species alive today.

There are problems with contradictory evidence for each of these theories, but there is no denying that large-scale environmental change, mass-species-extinction and the rise of Homo sapiens' civilization all happened at the same time during those thirty thousand years before the end of the last glacial period, in what in geological time is merely a blink of the eye. If the ecosystem of nature on Earth was in a slowly changing equilibrium over millions of years, and then suddenly shaken by explosive change, the one variable that was entirely new to the system was a species with an unprecedented capability: Sapiens' skill of cumulative cultural evolution, possibly enabled by domesticated animals.

So possibly, even before the last glacial period, animals were of fundamental importance to the Sapiens species. After that last glacial period, progress of human civilization galloped even faster through the Neolithic, the Bronze and the Iron Age, and the enablers of this progress were mostly animals. This remains the case until the modern age of today.

Animals fulfil three essential categories of functions for human populations:

a) Animals as supplier of work and services:

In the days before the industrial revolution, animals were the backbone of most land-based transportation systems, were critical to high-productivity agricultural practices, and supplied special skills such as smell or speed or flight to many activities like hunting, guarding, messaging or more. With the exception of a few pockets of poverty in the world, these functions have become unnecessary: 21st century machines perform all of these activities more productively than animals. Except for rare circumstances, for instance as a guide dog for the visually impaired, humans do not need animals anymore for providing physical work or services. A special case is the animal's service of companionship and entertainment. Even though not required for survival or progress, humans enjoy purpose-bred animals for their companionship as pets, or to entertain themselves in various sport activities. This applies particularly to cats, dogs and horses, but many other species are used for these

purposes too (koi carps, falcons, etc.). Demand for these companionship and entertainment services are rising across most human societies in the world.

b) Animals as suppliers of organic materials:

A second major function of animals had been to provide organic materials, mostly for clothing, but also for strings or containers from inner organs, knives and needles from bones, liquids for colors, poisons and much more. Fur, feather and skin were essential for the human species to survive changing macro climate patterns such as glacial periods. Later on, with several more animal materials such as silk, wool, wax and oil added, these materials were essential to be able to live in fixed settlements and urban centers. For instance, they were important for keeping infection pressures low by improving hygiene, and keeping dwellings lit in the dark. However, with the onset of industrial revolution, these needs have also mostly subsided.

With the onset of industrial revolution, the needs for materials have also mostly subsided

Cotton replaced wool as a staple fabric already in the Bronze Age, and mineral oil-based materials have equal or even better functionalities than most organics. A recent and still essential special case is animals used for the development of medical goods. Animals have either been used as testing devices or, since a few years ago, are also utilized to grow pharmaceutical substances that are harvested from them. Soon animals could also be used to grow replacement organs for humans, such as hearts and kidneys. Pig-to-baboon heart transplants have already been successfully conducted.[3]

c) Animals as suppliers of food:

The third key function of animals has been to be an important component of the human diet. The high protein and nutrient content of the animal's meat, eggs and milk made it possible for the human species to develop a large brain, consuming 20% of the energy of the total organism, combined with a comparatively small and short digestive tract. Together with harnessing fire and food processing techniques such as fermentation, this allowed the human species to much reduce the amount of time needed to feed themselves, compared to other animal species. Despite technological progress, it is still not possible to replace animal-based foods completely in the human diet without incurring health disadvantages, and in most cases it is economically not viable to replace animal-based foods with plant-based foods (see respectively part 1 and part 4 of the research report series Quo Vadis Meat 2050).

Homo sapiens takes control

The fourfold combination of a large brain, lots of spare time, climate adaptable clothing and mechanical power from domesticated animals – all enabled by consuming animals – ultimately made *Homo sapiens* the most successful species known in the existence of planet Earth. Success is defined in the ability of Sapiens to take active control over the shaping and functioning of planet Earth in the relatively short period of time of probably no more than 20,000 years, both over its inanimate elements, as well as its animated nature.

Several thousands of years ago, this ability to exert active control resulted for instance in the construction of sky-scraping pyramids on the banks of the Nile. It also resulted in the creation of a large portfolio of hundreds of thousands of new subspecies of animals and plants through selective breeding techniques, all purpose-generated to provide better foods, materials and services to humans at lower cost.

The fourfold combination of a large brain, lots of spare time, climate adaptable clothing and mechanical power from domesticated animals – all enabled by consuming animals – ultimately made Homo sapiens the most successful species known in the existence of planet Earth

The human ability to control inanimate and animate nature became more powerful over time, with more progress building on previous achievements, making the human species ever more successful. The degree of urbanization, industrialization and

[3] https://www.sciencemag.org/news/2017/09/scientists-grow-bullish-pig-human-transplants

and harnessing of biology achieved in the 20th century was not conceivable to the citizens of the 19th century, just three generations earlier, let alone the first city-builders some 6000 to 8000 years ago. Yet, the differences between the 20th century, and building the pyramids or domestication of the first chicken in ancient times, were only in scale and magnitude, not in quality.

In the 21st century, arguably the quality of taking control has changed for the first time since about 8000 years ago. The *Homo sapiens* species is developing the ability not just to breed selectively from one reproductive cycle to the next, but to create entirely new species from the ground up by assembling synthetic DNA, and soon will be mixing and matching genes from species almost at will. Furthermore, in the 21st century, the human species has created machines that can think and reason faster and more reliably than the human species itself. By having achieved understanding and being able to manipulate the basic building blocks of life in ever better detail, the human species is now able to create animals, plants and foods that are a step change more productive than traditional animals and plants. Humans can devise nutritional regimes that will soon not require animal-derived proteins anymore to stay healthy. Many of these technologies are still too expensive to be widespread, but it may be only a matter of time to bring their cost down.

Whether and how to use such 21st century technologies, and whether and how animals continue to be food and service providers as a result, requires an ethical answer. Technologies are purpose-agnostic. A knife can be used for many good and useful purposes, but it can also be used to kill or harm other humans. It is not coincidental that legal and ethical codes, such as the 10 Commandments, began appearing in human civilization just around the same time as Bronze and Iron Age technologies with mass-murder capacity became powerful and widespread. Without co-evolving ethical codes on structuring and ordering society, these technologies would have been too lethal for humanity to survive. The fact that the Sapiens species is still around, attests to the success of ethics. All technologies must ultimately be harnessed by ethics.

All technologies must ultimately be harnessed by ethics.

Useful and relevant ethical perspectives

As in every field of science, there are numerous concepts, perspectives and fields of study that readily lend themselves to oversimplification. Ethics is no different. Nonetheless, the ethical debate shapes itself around six main approaches, which can be clustered into three ethical questions.

The following definitions on authority and justification are taken from the Encyclopedia Britannica. They are more extensively elaborated in chapters 4, 5 and 6.

The first question concerns AUTHORITY. The two main concepts are speciesism/humanism and anti-speciesism/equalitarianism.

Definition of speciesism:

In applied ethics and the philosophy of animal rights, speciesism is the practice of treating members of one species as morally more important than members of other species; also, the belief that this practice is justified. The notion has been variously formulated in terms of the interests, rights, and personhood of humans and animals and in terms of the supposed moral relevance of species membership. Opponents of speciesism have claimed that it is exactly analogous to racism, sexism and other forms of irrational discrimination and prejudice.

Definition of anti-speciesism:

The opposite of the above: all species have the same moral importance. The principle of equal consideration of interests (PEC) claims that one should give equal weight in one's moral decision making to the like interests of all those affected by one's actions, including animals and nature. Just as in the case of race and sex, species are morally irrelevant characteristics when it comes to evaluating the like interests of different beings.

The second question concerns JUSTIFICATION/ REASON. The two main concepts are utilitarianism/ teleology and duty-based ethics/deontology.

Definition of utilitarianism:

In normative ethics, a tradition according to which an action is right if it tends to promote happiness and well-being, and wrong if it tends to produce the reverse of happiness and well-being—not just the happiness of the performer of the action but also that of everyone affected by it.

Definition of deontology:

Theories that place special emphasis on the relationship between duty and the morality of human actions. The term deontology is derived from the Greek deon, "duty," and logos, "science." In deontological ethics an action is considered morally good because of some characteristic of the action itself, not because the product of the action is good. Deontological ethics holds that at least some acts are morally obligatory regardless of their consequences for human welfare. Descriptive of such ethics are such expressions as "Duty for duty's sake," "Virtue is its own reward," and "Let justice be done".

The third question concerns PURPOSE/ OBJECTIVE. The two main concepts are either sharing the world in cohabitation with nature, or sparing one part of the world, handed over fully to nature where it is protected from humanity, and the other part handed over fully to humanity to make use of its maximum potential with minimal restrictions. This is also called the LSLS question (land sharing, land sparing). It is typically defined as:[4]

Land sparing: *the intensification of production to maximize agricultural yield within a fixed area and dedicating other land to biodiversity conservation*

Land sharing: *also called 'wildlife-friendly farming', such as that seen within the agri-environment schemes; the aim here is to maintain biodiversity within less intensively farmed agricultural landscapes*

[4] http://press-files.anu.edu.au/downloads/press/p346093/pdf/ch09.pdf

Three short case studies of an ethical evaluation of technology

This chapter describes three currently researched animal-related technologies that will probably be available as a productivity-enhancing product to the market within the next few years. Each of the three technologies is evaluated ethically from the different perspectives that are briefly summarized in the previous chapter and are described in more detail in the following chapters 4, 5 and 6.

All three technologies are chosen from the pig sector. Of all the animals that are living under the agricultural practices management of humans, pigs are the most similar to human beings. They have a similar physical size to humans, and thanks to being omnivorous, also have a similar metabolism. In the wild, pigs live in social groups led by a matriarch, and thus have a well-developed range of social behaviors, communication capacity and culture. Like dogs, that makes it possible to keep pigs as a pet in a human household, where they will adapt and integrate well thanks to their social intelligence.

The three technologies to be evaluated are

1) Gene-edited pigs that are immune to PRRS-disease
2) Gene-edited pigs that make xeno-transplants to humans possible, such as kidneys or hearts
3). Artificial-intelligence translation facilitation package for pigs

The examples below are a suggestion of how such evaluations might look. With different criteria and arguments, it is also possible to reach other conclusions.

how the different ethical perspectives can reach different outcomes of what is good and bad, right and wrong, on the same technology.

First technology: Gene-editing of pigs that are immune to PRRS disease

Porcine reproductive and respiratory syndrome virus (PRRSV) is arguably the most economically important infectious disease affecting pigs worldwide. The causative agent of PRRS is PRRS virus (PRRSV), a member of the Arteriviridae family and the order Nidovirales. Infected pigs of all ages may present with symptoms involving inappetence, fever, lethargy and respiratory distress. However, the most devastating effects of PRRSV infection are observed in young piglets and pregnant sows. In pregnant sows, full abortions or death and mummification of fetuses *in utero* are observed, and live-born piglets from an antenatal infection are often weak and display severe respiratory symptoms. It is estimated that the economic impact of PRRSV to pork producers in the United States alone is more than USD 650 million annually. There is no effective cure or vaccine, and despite extensive biosecurity measures about 30% of pigs in England are thought to be infected at any given time.

Research published by the UK Roslyn Institute in 2017 in the Journal of Virology showed that the susceptibility to this virus can be eliminated by gene-editing. If a receptor called CD163 is slightly modified by removing 450 letters in the DNA, then the virus has no docking possibility. In trials, the gene-edited[5]

[5] Pigs Lacking the Scavenger Receptor Cysteine-Rich Domain 5 of CD163 Are Resistant to Porcine Reproductive and Respiratory Syndrome Virus 1 Infection, Christine Burkard, Tanja Opriessnig, Alan J. Mileham, Tomasz Stadejek, Tahar Ait-Ali, Simon G. Lillico, C. Bruce A. Whitelaw, Alan L. Archibald Journal of Virology Jul 2018, 92 (16) e00415-18; DOI: 10.1128/JVI.00415-18 https://jvi.asm.org/content/92/16/e00415-18

animals showed no signs that the change in their DNA had any other impact on their health, fertility or wellbeing.

In a similar technology, another group of scientists at the Roslyn Institute and Imperial College London use gene-editing to make chicken completely flu-resistant. For this they modify the gene ANP 32, which encodes a protein required by the flu virus to infect its host. If the gene is edited, the chicken cannot get flu anymore.[6]

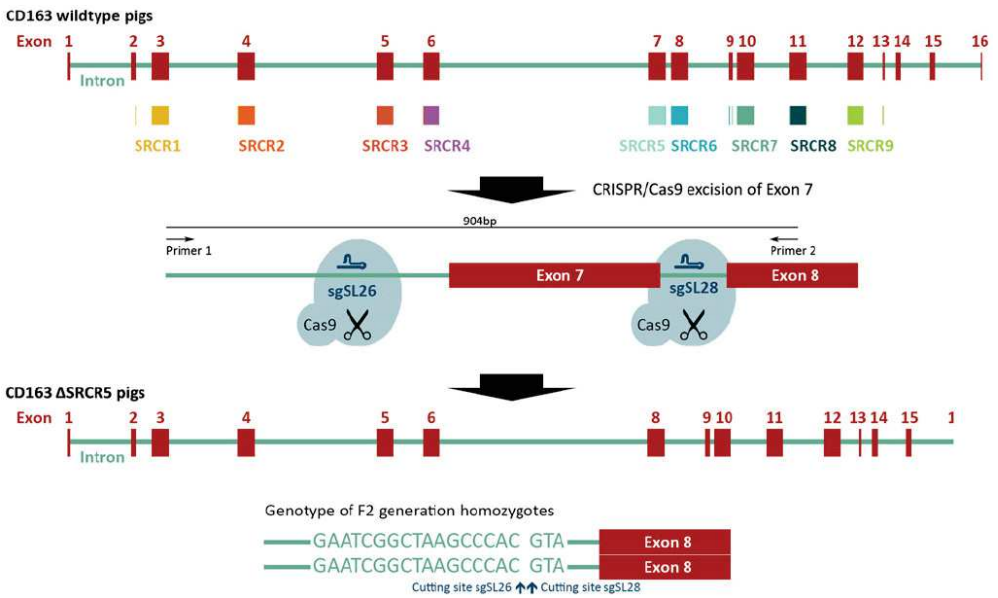
Evaluation from a utilitarian – speciesist perspective:

This technology will improve the economic productivity of the animals significantly, and therefore make pigs (or chicken) relatively more attractive to the final consumers compared with other sources of protein. It cannot be expected that the gene-editing technology will have any negative health impact on the human consumer. This will also be proven in further trials until the technology receives regulatory approval. The technology will also make the animals healthier, and thus reduce the scope for their discomfort or suffering. Thus the interest of the animal is also improved. The technology is therefore to be welcomed without restrictions.

Evaluation from a deontological – speciesist perspective

Whether the technology is to be welcomed or not depends on how the action of gene-editing is to be evaluated in general, independent of its economic or other benefits. Gene-editing could be seen as an unethical technology for a variety of ethical concerns, such as unforeseen or unforeseeable consequences for not fully proven technologies, such as the potential for unintended gene-hopping between species, or such as an inhibition to interfere with God's Creation and natural construction code. On the other hand, if gene-editing is an acceptable technology in general, then there are no reasons not to use it. Both the good of the animal, and the good of the human consumer seem to be enhanced by this technology, so it can be welcomed, pending ethical approval of the technology as such.

Image: Genome editing to generate ΔSRCR5 pigs



Source: https://jvi.asm.org/

[6] https://www.reuters.com/article/us-health-pandemic-chickens/scientists-make-gene-edited-chickens-in-bid-to-halt-next-pandemic-idUSKCN1PG007

Evaluation from a utilitarian – anti-speciesist perspective

While it is generally welcomed that the animal will be healthier and therefore less prone to suffering due to this technology, it does not solve the fundamental problem that a pig animal is only useful to human beings if it is slaughtered and eaten. Thus, the animal must give its life under all circumstances, which represents the highest degree of disutility for a sentient being. On the other side of the equation, the life of the human consumer does not depend on consuming this product. The consumer could fulfil the utility of their nutritional needs with sources of food that do not possess sentience. This technology does not change this equation, but on the contrary may trigger even more pigs to be raised and slaughtered, thus increasing the total amount of disutility. Therefore, the technology should be rejected.

Evaluation from a deontological – anti-speciesist perspective

Pigs are socially intelligent animals with complex mental capacities, and therefore presumably a pig has a highly developed sense of itself. This technology is only of interest to the pig's self if it leads to a more species-appropriate life-style for the animal. This is not the case. On the contrary, this technology may lead to the animals being kept in even more crowded and less natural conditions than before. Neither the good of the animal is increased, nor that of the human consumer. Furthermore, interference with God's Creation is possibly a wrong in itself. Finally, the act of murder of the pig for the sake of human consumption is not prevented by this technology. As nothing good arises out of this technology, and potentially much wrong, it should be rejected.

Evaluation from a sharer or sparer perspective

Sharer perspective: *This technology interferes with the natural balance of the eco-system in a potentially harmful way, and inhibits the natural selection process of the animal's evolution. It is only useful for high-intensity / high-productivity farming systems that cannot be integrated into sharing-oriented circular farming systems. Therefore this technology should be rejected.*

Sparer perspective: *This technology makes animal protein production significantly more productive, and thus reduces the resource consumption. It is a valuable contribution towards resource efficiency, which reduces the environmental footprint of human-oriented consumption. This permits more of the planet's resources to be set aside to zones where nature self-governs its eco-system. Therefore this technology should be welcomed.*

Second technology: Gene-edited pigs that make xeno-transplants to humans possible, such as kidneys or hearts

The concept of xeno-transplantion of pig organs to human beings has been around for decades. The largest challenge until recently was that the pig genome harbors porcine endogenous retroviruses (PERVs) that can potentially pass to humans with possibly damaging consequences. As reported in the journal Science in September 2017, a Chinese research team generated 37 pigs in which all copies of PERVs were inactivated by CRISPR-Cas9 genome engineering.[7] Not only does this work provide insights into PERV activity, but it also opens the door to a safer source of organs and tissues for pig-to-human xeno-transplantation. A company called eGenesis based in Cambridge, Massachusetts, has been founded on the basis of this technology with the aim of providing xeno-transplant organs. The co-founder Luhan Young has been named Young Global Leader by the World Economic Forum.[8]

[7] Inactivation of porcine endogenous retrovirus in pigs using CRISPR-Cas9, Dong Niu et al, SCIENCE22 SEP 2017 : 1303-1307 DOI: 10.1126/science.aan4187
http://science.sciencemag.org/content/357/6357/1303
[8] https://www.egenesisbio.com/technology/

Evaluation from a utilitarian – speciesist perspective:

Each day, in the USA alone, 20 people die while waiting for an organ transplant. The mismatched ratio between organs available and needed will only worsen, as fewer fatal human accidents happen, more people get old, and better surgery procedures become available. The possibility to harvest organs from animals, especially pigs, has been promised for a long time, and its arrival cannot be too soon. Additional genetic alteration technologies will make xeno-transplants even safer, for example, customizing the genetics of the organs towards the scheduled recipient to further increase survival chances. Needless to say, the animals involved will have to die for the person to live. However, since the value of a human life is greater than an animal's life, there is no question that this technology should be welcomed.

Evaluation from a deontological – speciesist perspective

Averting the individual tragedy of a person's preventable death, if no transplantable organ became available, should be a good reason for welcoming a technology that opens up a potentially endless source of such organs. However, there are higher order questions to be answered , which may cast a different light on this technology. One question concerns economic affordability. Can this technology be priced in such a way that it is in principle available to all citizens, or is it a technology that will deepen the gap between rich and poor? Can societal peace as an important good be maintained if this gap begins to mean not just a few years of longer life expectancy, but decades of longer life expectancy for the rich? Another question concerns the interference into God's Creation and the natural order. Are we crossing a threshold towards turning human beings into cyborgs, and are the social, cultural, religious and economic consequences of this crossing sufficiently appreciated? Regardless of the concerned individual wanting this technology or not, is society ready to provide its social license of permission to it? These questions must be well considered and answered before the technology can be given a green light for human application.

Evaluation from a utilitarian – anti-speciesist perspective:

There is clearly a shortage of transplantable organs for which there are few or no alternatives available in the short term, other than resorting to xeno-transplantation. It is unfortunate that the life of an animal will be lost for a human being to continue a life. However, since a human being has a higher degree of sentience and a higher intra-species utility than the animal, the overall utility will be enhanced by this transaction. The technology should therefore cautiously be welcomed.

Evaluation from a deontological – anti-speciesist perspective

While it is obvious that it is in the interest of the individual human being to receive a xeno-transplant (assuming it has been proven to be effective and healthy), it is less obvious from the perspective of society at large (see previous section). Moreover, there is no recognizable improvement for the good and interest of the involved animal or the animal kingdom, whose concerns have the same importance as that of human beings. If anything, the dignity of the animal is lowered even more than before, when it was only a food supplier. Now it is degraded to become a spare parts machine, to be designed and customized towards its future human host wearer. Not only is the interference with God's Creation possibly a wrong in itself, but it also cannot be in the interest of the animal kingdom to enhance the life span of humanity even further, and thus further increase the imbalance between the human race and all other nature. On balance, it is therefore possible that it would be better to reject this technology.

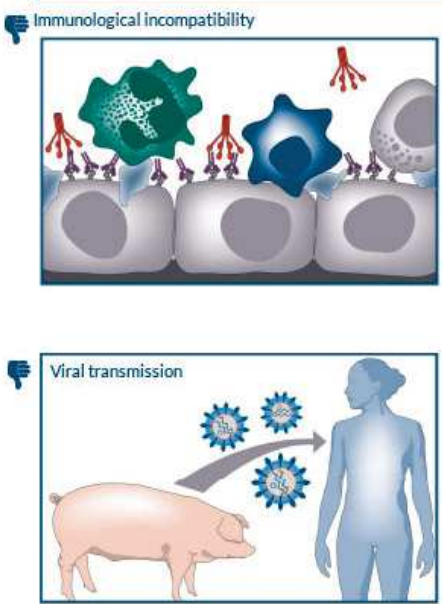
[9] https://www.nbcnews.com/mach/science/dogs-can-t-speak-human-here-s-tech-could-change-ncna836811

Evaluation from a sharer or sparer perspective

Sharer perspective: *This technology introduces yet another human-made and human-dependent system into the natural balance of things, which will be incompatible with how nature would and could self-regulate. Moreover, it potentially increases the overall head count of humanity, which is already too much for a sustainable co-habitation as it is. Though it might be tragic for the fate of the individual, technological improvements should be targeted to improving the long-term sustainability in a co-habitation model with nature, rather than making the imbalance even greater. If the improvement for the individual comes at the cost of diminished long term survivability for the human species overall, then such an improvement should not be permitted.*

Sparer perspective: *This technology makes people live a healthier, longer and more fulfilling life. That will enhance peace and prosperity not only for humankind, but also accelerate technological progress and overall resource efficiency. It is therefore a contribution towards making humanity self-sufficient on its share of the planet, leaving the other share to nature to self-govern its eco-system. Therefore this technology should be welcomed.*

Image: Xenotransplantation challenges



Source: https://www.egenesisbio.com/technology/

Third technology: Artificial-intelligence facilitated translation package for pigs

Understanding animals is difficult, because they do not communicate as humans do. Likewise, the animals do not understand humans either. This is a classic situation where artificial-intelligence-facilitated-translation coupled with robotics could help both sides communicate with each other more effectively. Better communication can increase the welfare of the animal in many ways. Pigs have ample cognitive reserves. Similar to dogs or monkeys, they can be trained and induced to communicate, and could thus express themselves more clearly with their needs and preferences. Such packages are currently under development for pets, especially dogs.[9] They could also find their application in professional livestock management, such as mother sows, piglet training or hog growing.

Evaluation from a utilitarian – speciesist perspective:

This technology is probably expensive and will incur various process risks. It is not clear how the productivity of the animal would be raised in this way, or whether this can pay for the additional cost and effort. The technology should therefore not be introduced yet, to be reserved until the unit cost of deployment is sufficiently reduced to be able to pay for itself.

Evaluation from a deontological – speciesist perspective

This technology risks demeaning the dignity of human beings and animals alike. Natural evolution has developed separate domains for humans and animals, and these domains cannot be bridged by just translating grunts into human words and vice versa. It is extremely difficult to communicate across species boundaries without creating severe misunderstanding. What if the pig is able to express that it has a headache? What does it mean to the pig to have a headache? Even in translation, it is unlikely that the pig can express the severity or meaning of its condition, and likewise that a human can interpret this information in the right context. The extent to which we need to know about the animals can be known with today's conventional methods. Therefore the technology should be rejected.

[9] https://www.nbcnews.com/mach/science/dogs-can-t-speak-human-here-s-tech-could-change-ncna836811

Evaluation from a utilitarian – anti-speciesist perspective

Animals communicate, socialize and interact with their environment, but they tend to do so in much subtler ways than humans. Their communication is more integrated and intertwined with body movement and other senses such as smell and pheromones. Since humans have complicated and sophisticated language, it is difficult for humans to perceive the subtleness of the animals, and likewise for the animal to understand the abstraction of humans. Having a smart translation tool will reduce the scope of misunderstanding, and therefore increase the chances of well-being for both species. It is probable that the aims and intentions of both species are enhanced, and therefore the technology should be welcomed.

Evaluation from a deontological – anti-speciesist perspective

This technology can help to bring humans and animals closer together. In particular, it will make humans more empathetic to the feelings and impressions that the animal has, and possibly also vice versa. This will help both species to share space and purpose, and grow towards a shared moral community. Such sharing increases the achievement of the good for the total community. The technology should therefore be definitely welcomed.

Evaluation from a sharer or sparer perspective

Sharer perspective: *This technology should make it easier and more effective for the two species of humans and animals to share space and respectively live a dignified life. The technology is therefore welcomed.*

Sparer perspective: *The target is to separate animals from humans for a variety of reasons. Such a technology is therefore useless. There is no need for this technology.*

Image: Chimpanzee translation tests

Source: www.nytimes.com/2007/04/17/science/17chimp.html

4. Overview on authority and accountability: the speciesism question

The next three chapters cover in brief each of the three core ethical questions: authority, justification and purpose, as applied to the question of utilizing animals for human consumption. Each chapter discusses suitable ethical concepts and supplies recent research insights as arguments for them. It is argued that an ethical framework will not be complete if a position is not defined on each of these three areas. The discussion on each question can only be sketched out – an exhaustive discussion is neither intended nor possible in a brief report.

The first question is: On which authority are humans granted their ethical rights and duties, and by implication, to which such authority are humans accountable when utilizing animals for their own consumption? The main concept at issue is called speciesism as a subset of humanism vs anti-speciesism as a subset of equalitarianism.

What is speciesism?

Speciesism states that humans may discriminate other species on the basis that humans are a special category on their own. They are not just another animal species, such as mealworms, herrings or Cat Ba langurs: there would be humans, and there would be the rest of nature. The authority granted to humans for their rights and duties over animals and nature would arise out of humans being this special category, separate from all other nature, and thus humans are also accountable only towards their own human species within their own special category. This would allow humans not only to treat other species, for instance dogs may be treated differently than cows. Similar concepts are anthropocentrism, human exceptionalism or human supremacy. The critical difference to them is that speciesism does not automatically imply superiority or rights to harmful exploitation of animals and nature for human benefits, but at first it indicates only separateness. In common usage, especially by animal rights advocates, the term speciesism is used synonymously with the notion of human supremacy and right to exert unwarranted violence, though this is not correct.

The term speciesism was created by the British philosopher Richard Ryder in 1970, and then popularized by Australian philosopher Peter Singer in his book Animal Liberation in 1975.[10] Both of these authors coined the word as a communication tool for the purpose of rejecting the concept of human supremacy. They stated that discrimination based on being one or the other species should be condemned just as much as racism or sexism has become condemned. Instead, all species should be considered a priori equally valuable and equally dignified. The opposite of speciesism would therefore be equalitarianism, though this definition is not typically used. Usually, the opposing view is called anti-speciesism. Tom Regan, another author, restricted the anti-speciesism position to: *"only self-conscious beings, capable of having beliefs and desires, only deliberate actors who can conceive of the future and entertain goals are subjects-of-a-life.* [This applies] *to all mentally normal mammals over one year of age."* [11]

The strategic alignment of speciesism with racism

[10] https://www.uvm.edu/rsenr/wfb175/singer.pdf
[11] Lori Green, A Companion to Ethics (Mass.: Basil Blackwell Inc., 1993), p. 346.
See also: https://www.catholicculture.org/culture/library/view.cfm?recnum=4226

and sexism, permits the animal rights movement to position itself as a transition catalyst towards a better and improved society. Racism and sexism used to be understood as natural features of a society (for instance by Aristoteles and still lingering in the 21st century in many places), but ethical progress eventually achieved equal rights to all human beings, at least in theory. If the same ethical progress can now be extended towards animals and nature, then society will further improve – so the logic is presented.

Discrimination based on being one or the other species should be condemned just as much as racism or sexism has become condemned. Instead, all species should be considered a priori equally valuable and equally dignified.

For a humanistic position, which rejects the anti-speciesism argument, the challenging question is: if members of the human species shall categorically enjoy rights, duties and considerations over other species, then it must be proven that there is a strong enough distinguishing characteristic that justifies such separation. If humans cannot demonstrate that they are in a class of their own, then the opposite is true, namely that all species of the Earth enjoy inherently equal *a priori* consideration of being valuable and protectable, with only scalar differences based on certain criteria (such as capacity to think, to feel, to suffer, to be sentient, to be sensitive, to be reactive, etc.).

Most animal rights proponents are adamant that the human species does not have inherently superior rights or morality over other species, especially not over other mammal or warm-blooded species. In their extreme, some would propose that the Universal Declaration of Human Rights can and should also be extended to animals. Article 1 of this declaration states *"All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood."* The first sentence in the Declaration's preamble states: *"Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world."*

The argument is, that an extension of these basic rights to animals (or nature), will therefore promote freedom, justice and peace in the relationship between humans and animals, and humans and nature. Historical experience has shown that as these outcomes are achieved in general they also increase the amount of freedom, justice and peace within human society.

Given the high value and desirability of freedom, justice and peace involved, on what basis is it possible to withhold these values from animals? How could members of the human species claim the protection of UDHR Article 1 and further only for its own species and not extend this same protection or some similar version of it also to other species, or even to all species? There are several approaches to such a claim of priority protection and superiority, while denying it to other species. The options fall into four categories:

a) Biology
b) Culture
c) Law and legal personhood
d) Religious convention

Historical experience has shown that as these outcomes are achieved in general they also increase the amount of freedom, justice and peace within human society.

Possible avenues to justify speciesism – recent scientific insights

a) Biology

Biology is the classical argument in favor of speciesism, trying to distinguish humans from animals and nature, and on the strength of that difference, to proclaim the human species to be in a separate category from all others. The claims used to be that animals would not be able to think, would not be conscious, are not reflective, do not have personality, or do not form culture. It also used to be thought that animals are merely

instinct-driven creatures, like complex automatons, which do not have emotions that are comparable to human beings. Both Aristotle and Descartes used the word automata when describing animals.[12] As a consequence, an animal could neither genuinely feel, nor think, nor self-conceive of a conscious presence and purpose in the world, and therefore it does not have any claim on ethical rights.

In the meanwhile science has largely demolished the biological argument on all counts. With the advent of genomic mapping of species, biologists have learned that not only do humans share more than 97% of their genes with orang-utans, but also 60% of their genes with chicken, fruit flies and bananas.[13] Numerous experiments have shown that at least seven species have a perception of themselves as an individual, these being orang-utans, chimpanzees, bonobos, gorillas, elephants, dolphins and magpies. The latter is a particularly important example, because in the evolutionary tree, birds and mammals branched apart some 300 million years ago. These experiments were done with optical clues. Since many animals use other senses as identification markers, there may be many more species who can recognize themselves. Dogs for instance seem to recognize their own smell, which humans for instance are not capable of.[14]

The magpies prove that also dinosaurs (which birds are) and animals with small brains, can evolve the highest order of self-conception. Numerous other species have been shown to be capable of thought, foresight planning and complex social communication, including the formation of grammar and vocabulary. Chimpanzees can make use of up to 20 different tools. Animals have personality and experience the same emotions of fear or joy, attachment or loneliness and many others, usually in the same parts of the brain, with the same brain chemistry, and in the same level of intensity as humans do. Herds of animals have been shown to develop cultural traits that distinguish one group from another. Even genetically identical fruit flies living in exactly the same box, begin to develop different personalities and different cultures within only a few hours of their lives.

Since animals have been shown to have judgement, tool-making capacity, high level cognitive skills, sensation of envy, jealousy or unfairness, and form cultures in their communities, there is little to no biological difference to the human species.

Of course not all species have all these capacities, and even within the more capable species, not all individuals have all advanced capacities. But this is exactly the point of the rejection of speciesism on biological grounds by animal rights advocates. The biological differences ranging from a banana to *Homo sapiens* would be scalar and graduated along millions of species in between, but they would not justify putting humans into a separate category.

All told, biology is hardly a good justification for speciesism.

b) Culture

There are two differences between *Homo sapiens* and all other species that could be relevant to justifying separation into two categories. Evidently, *Homo sapiens* is the only species that writes and reads, that builds skyscrapers, supercomputers and nuclear weapons. Clearly, something is different between humans' modern life and all other animals on the evolutionary tree.

This argument is a dangerous trap for a speciesist if not properly handled. For an argument to be a valid justification for speciesism, it must differentiate ALL members of *Homo sapiens* versus ALL members of orang-utans and bananas. So, the criterion of literacy and numeracy would need to apply also to the long-gone members of *Homo sapiens* who lived 30,000 years ago and did not yet have writing skills or computers at their disposal. It would also need to apply to today's uncontacted tribes who live on North Sentinel Island in the Indian Ocean or in the South American jungles, to children and babies as much as to the mentally impaired or senile. In the animal rights discussion, these human conditions are called 'marginal cases'. These marginal case members of the *Homo sapiens* species do not have the above described advanced cultural skills. On the other hand, several apes were taught basic reading, writing and calculation skills, and it was shown that in some of these mental skills chimpanzees even outperform humans by some distance.[15] If the dividing line is the ability to do

[12] https://www.cambridge.org/core/books/cambridge-descartes-lexicon/automaton/C4F28BA1B641F09E907D5AE617BF7D9A
[13] https://www.getscience.com/biology-explained/how-genetically-related-are-we-bananas
[14] https://www.akc.org/expert-advice/news/dogs-recognize-own-scent-study-shows/
[15] https://www.nytimes.com/2007/04/17/science/17chimp.html

complex mathematics and contribute to modern industrialized life, then many humans would be excluded and some apes would be included. Then a speciesist would indeed be akin to a racist.

However, the special capacity of all members of *Homo sapiens* which does distinguish each of these human members from orang-utans and all other species, is the ability for cumulative cultural evolution. This has been described extensively by Michael Tomasello, Director of the Max Planck Institute for Evolutionary Anthropology.[16] Any child today, and every person even on North Sentinel Island, builds on the cultural achievements of their predecessors and expands them further – they are part of a process of cultural accumulation of skills. This allows a 21st century child to play with a computer already as a two-year-old, which a child of the 20th century could not do. The 20th century child could play with Lego, which the 19th century child could not do, and so on. The human capacity to write, read and construct high speed trains are symptoms of this cumulative cultural evolution skill, not its cause. The first evidence of this skill are the cave paintings of some 30,000 years ago. It is quite possible that it was also this skill that enabled *Homo sapiens* to survive, while other Homos such as Neanderthalensis disappeared. Chimps, dolphins, elephants or magpies, no matter how complex their social structures and cultures, do not have this capacity. An elephant matriarch does not leave her accumulated experience behind in the form of paintings or songs or flash drives, for her successors to improve on these experiences and become an even more knowledgeable elephant. Every elephant matriarch starts from the same level afresh, and ends on the same level as her predecessor.

The special capacity which distinguishes each of these human members from orang-utans and all other specias, is the ability for culmulative cultural evolution

The second special capacity of the *Homo sapiens* species is to be altruistic and hedonistic towards its own species. Humans engage in a wide variety of complex social interactions, the majority of which are unrelated to the purpose of passing on one's own set of genes to the next generation. It used to be thought that various animals are also altruistic, and moreover that animals have an internal barrier that prevents them from harming their own species and instead to try to promote the survival of their species. Various observed behaviors seemed to support this long-held view: for instance the state-building of bees and ants, the sharing of mother's milk among lionesses or the collective hunting methods of various species such as wolves and dolphins seemed to imply altruism.

Norbert Sachser, Professor for Zoology and Director of the Institute for Behavioral Biology at University of Münster explains in his book *"The Human in Animals"*,[17] that this perceived altruism among animals was always a problem in evolution theory. Altruistic behavior is a weak evolutionary trait and should therefore not persist in a population. Over the lifetime of a species, altruistic behavior would inevitably die out because it makes the individual carrier of this gene pool weaker versus the non-altruist. Sachser claims that research in recent years could invalidate both views and vindicate evolutionary theory after all: it could be shown that no known animal species is altruistic, and no known animal species favors the survival of its own species in any special way over other species. Sachser claims that the scientific consensus is now that animals' behaviors and biology are purely regulated by their evolutionary fitness to pass on their own individual genes to the next generation, and that they are not regulated by concerns for their species at large. No known animal species other than humans is sad or angry or worried about the possibility of its own species either flourishing or floundering. In that sense, animals are after all evolutionary Descartian automatons – more complex than at first conceived when they were considered to be purely instinct-driven, but automatons nonetheless.

Both special capacities, the ability to create cumulative cultural evolution and the ability to be altruistic and hedonistic towards one's own species, could be considered to be a speciesist foundation of ethics. It is what makes the human species different from being an evolutionary automaton as all other species are. The human species is the only species in the history of the planet that began to supersede natural evolution, to be able to set the speed of

[16] https://www.eva.mpg.de/psycho/staff/tomas/
[17] Norbert Sachser: Der Mensch im Tier, Rowohlt Verlag, 2018

evolution at a deliberate pace, and to consider the effects this has on the success of its entire species, rather than merely one's own individual success. It is exactly these two capacities which allow humans to form moral communities with shared rights and shared duties. Other species cannot form a moral community with humans, because they lack these capacities. Any right given to animals, remains thus a human-defined right. Any corresponding duty given to an animal is unenforceable, because the animal is not part of the moral community.

It is possible to reject these two special capacities as a justification for considering the human species to be in a category on its own, and therefore to reject speciesism. But it is also possible to accept these two special capacities as exactly that justification. This is a choice that needs to be taken when forming an ethical framework.

c) Law and personhood

The third option to consider humans as a special category apart, is to recourse to actual legal practice. In all jurisdictions in the world, speciesism is the de facto legal standard. Legally, animals are property and things, and human beings are persons. Despite many attempts, for instance the Great Ape Project,[18] no animal has so far been allowed the standing of personhood in front of a modern court of law. Animal or nature protection laws to the extent that they exist, exist for the protection and maintenance

The core problem with granting rights to animals or nature is that the human legal concept of rights and duties also requires responsibility and accountability. Since animals cannot be made directly responsible and accountable for their actions, they can by reverse logic also not have rights and duties.

For the above reason, the debate centers more on the legal concept of personhood. Persons must have intellectual and material resources to upkeep and defend themself. The ability to be subject to a legal framework arises from this resource base. A legal framework is ultimately a structure within which these resources are channeled and systematized. Without a legal framework, it would simply be the one with more resources who wins every time. The progress of civilization has proven that everybody

Since animals cannot be made directly responsible and accountable for their actions, they can by reverse logic also not have rights and duties

is better off, including the better resourced ones, if the law of strength is not the standard. By the same token, the argument is that, despite humans being smarter, stronger and more accountable than animals, civilization could be improved if those advantages do not give them the right to subjugate animals.

Since animals and nature have neither sufficient intellectual nor material resources, that in itself seems to deny the possibility of legal personhood. However, that could be overcome. In the same way as corporations have legal personhood by being represented by natural persons, natural entities could also be given legal personhood and then be represented by natural persons. For instance, New Zealand granted legal personhood to the river Whanganui Iwi. The river was given a fund of NZD 20 million to be able to enforce its legal rights, and it is being represented by two human speakers who are mandated only to decide and act towards the river's well-being. Thus Whanganui Ivi can go to court and demand redress or protection for instance from tourist organizations, power companies or reckless individuals, if its well-being is encumbered. This scheme could be extended to individual animals, or classes of animals as well. is encumbered. This scheme could be extended to individual animals, or classes of animals as well.

Besides granting such legal personhood to Whanganui Iwi in 2017, New Zealand also gave it to the Taranaki volcano and the Te Uruwera forest. In 2016, Colombia granted legal personhood to the Atrato river. These are rare exceptions, but the idea of granting legal personhood has been around for decades. For instance law professor Christopher Jones argued the case in 1972 under the title: *"Should Trees have Standing?"* In 2010, he published an update, already in the third edition.[19] A British NGO called Nature's Rights tabled a European Union directive that they drafted to give nature legal standing.[20] Similar efforts on a global scale are

[18] https://www.greatapeproject.de/
[19] Christopher Stone: Should Trees Have Standing, 3rd Edition, Oxford University Press, 2010.
[20] https://www.natures-rights.org/

for instance the *Global Alliance for The Rights Of Nature*,[21] or the Earth Law Center.[22]

Among ethicists, the legal argument does not help to either justify or refute speciesism. Its main weakness is that it is circular. Law has been created by the human species, and it is the outcome of the ethical texture of humanity, not its cause. If there had been an ancient assembly of all or at least some species, and those species had agreed voluntarily to grant the Homo species a special standing (possibly with some restrictions attached), then the legal argument could have merit. But this assembly never happened. To justify an ethical concept with a legal concept, which in itself is the result of the same ethical concept, is circular and therefore useless. The same circularity applies to the animal rights argument: were a human assembly to grant rights to animals, which the animals cannot ask for themselves, they would be human-granted rights. If the majority of a population in a democracy would want to give nature legal personhood, then modern society would have the ability to create such an institution. But it would remain a human-created and human-enforced right nonetheless, until an assembly of animals is somehow enabled to make its position heard and defended with their own intellectual and material resources.

In consequence, the legal argument is a weak or even non-viable position to defend speciesism.

d) Religion

The fourth option is to look to religious culture as a support for why the human species should be in a class on its own. This is also not fruitful. Different religious cultures produced widely differing viewpoints on this issue. The Judeo/Christian/Islam monotheistic culture complex unequivocally elevates the human species above every other species. Genesis clearly outlines the relevant categories: on Day Three all land and vegetation is created, on Day Five all sea creatures including birds are made, and on Day Six first each kind of livestock and crawling thing, and then subsequently God said: *"Let us make mankind in our image, to be like us. Let them be masters over the fish in the ocean, the birds that fly, the livestock, everything that crawls on the earth, and over the earth itself."*

However, various Hindu cultures have in contrast arrived at a different evaluation, requiring followers in different degrees of sternness to minimize the disturbance of nature and its creatures. Many aboriginal tribes, for instance the New Zealand Maori, make no distinction between their own persona and that of a natural entity that surrounds them and of which they are part.

Similar to the legal arena, ethicists do not put much store into the religious context of justifying or rejecting speciesism. There is no universal theme that is common to all religions and beliefs regarding the treatment and purpos e of nature. Moreover, most religions claim to possess exclusive truth, so following one set of principles by definition excludes those of other religions, which is a contradiction in itself.

Summary on Authority:

If an organization is directly or indirectly involved in creating, raising or slaughtering animals, then it must answer on what authority it is allowed to exert the superior intellectual, material and machine-enabled physical strength of the human species over these other animal species. Since these animals cannot provide permission and authority towards this exertion themselves, such an organization can do so in nearly all cases only by defining the human species as being in a separate category from the rest of nature. This is called speciesism. In speciesist logic, the human species has the permission and right to use and treat nature as it wishes by default, a default granted by the special category of being human. That does not automatically mean exploitation and abuse, but it does mean that the human species can self-determine the extent of permission and rights. In an extreme case, if the human species were to decide to do so, it could grant itself the permission to extinguish all natural life or to use all natural resources of planet Earth only for its own sake and benefit, and to subjugate all animals towards its sole use. In another extreme case, the human species could grant itself the permission to design life forms as it wishes, for any perceived benefit for humans, and disregarding how this life form may feel about itself. While there might be other ethical limits (see next two chapters) that restrict such extremes, the main point is that the extent of utilization or protection of nature and animals

[21] http://therightsofnature.org/founding-statutes/
[22] https://www.earthlawcenter.org/what-is-earth-law/

is a matter of choice and volition of the human species. Nature in itself would have no say in this.

The opposite position is to reject speciesism and to consider the human species as merely another species as every other one on planet Earth. The superior intellectual, material and machine-enabled physical strength of the human species over every other species may not be used to subjugate nature, but on the contrary, if anything it confers a stronger duty and responsibility to protect nature even more. The stronger the human species is, the higher its responsibility. The differences that exist between the species are only seen as gradual and scalar, and none of them justifies one species determining or, with volition, influencing the fate of another, either for good or for bad.

The legal frameworks around the world are all and entirely of a speciesist nature. In law, nature is always treated as human property, and does not have inherent rights on itself. Factual daily behavior of the majority of the human population is also speciesist. For instance, if a choice would have to be made between saving the life of a human baby versus the lives of a litter of seven dog puppies, the outcome of this choice would always be clear, not just legally but also ethically. Nonetheless, neither a legal framework, nor a religious context are good foundations for a speciesist justification. The legal framework is the result of ethical views held by a society, and not the other way around. The source of a legal framework is thanks to human empowerment, and not due to a founding assembly where all of Earth's species agreed to be lorded over by humanity. The legal argument is therefore circular. Any religious contexts on the other hand are not universal enough across all of humanity to be a consistent basis. Different religions hold widely differing views.

The traditional justification for speciesism used to be biology. However, with increased understanding of the building blocks of physical and chemical life, it has become clear that *Homo sapiens* is not a special biological creature. It uses exactly the same building blocks as all other life. This is true for its biochemistry, but also emotional and communal elements. Human emotions and social behavior are governed and realized by the same neurochemical circuitry as in animals.

So far, the only two identifiable categorical differences between the human species and all other species are that humans have evolved the capacity to experience cumulative cultural evolution, and that humans have the fidelity to be altruistic and hedonistic towards their own species. No other species of planet Earth is known to have these two capabilities.

Whether these two differences are sufficient to justify a speciesist position or not, is a matter of choice. It is also an absolute choice. Either one adopts a speciesist position or not, but it is not possible to be a little bit speciesist, and a little bit not, or to be speciesist depending on circumstances or times or conditions.

In public discourse, the term speciesism is primarily a negatively 'loaded' word. It is regularly used by animal rights advocates to describe every humanistic position, which denies rights to animals. At the same time, ethical science has failed to create a position that does not ground itself in a humanistic perspective, for the simple reason that all ethical reasoning happens exclusively within the confines of the human species. No dolphin has so far participated in the discussion. So while animal rights advocates denounce speciesism as being wrong, they can call themselves only anti-speciesist. One result of this situation is that it is rare for ethicists to describe themselves as being speciesist or to defend speciesism. They would typically call themselves a humanist, and be a speciesist only by implication.

Two instances deserve to be highlighted, where well-known ethicists explicitly defend speciesism. Christopher Grau of Clemson University is a vegetarian and finds no excuse in animal suffering or killing animals for human purposes. At the same time, he defends speciesism in his article *'A Sensible Speciesism?'*.[23] Tim Chapell of The Open University UK wrote in a chapter called 'In Defence of Speciesism': *"I want to defend a position which I think deserves the name speciesism. So I had better start by defining it. Speciesism, as I shall use the word, is the belief that differences of species can, do and should provide sufficient reason, in themselves, to ground major differences in moral significance, in a way in which (for example) differences of gender, race, intelligence or sensitivity to pain do not and cannot ground such differences."* [24]

[23] https://www.academia.edu/5172019/A_Sensible_Speciesism
[24] https://link.springer.com/chapter/10.1007/978-1-349-25098-1_6

5.

Overview on justification for having rights and duties: The utilitarianism vs deontology question

The second question is: for which JUSTIFICATION (reason) do humans have ethical rights and duties over animals and nature and, based on this reason, may or may not utilize the animals for their consumption? The two main concepts are called utilitarianism and deontology.

For what reason do humans have responsibility for the animals under their guardianship, and for what reason do humans have responsibility for nature in general? Ethics provides two fundamental concepts that can serve as a justification. These two concepts represent the possibly most contested general issue in ethics, which remains unresolved among professional ethicists. One concept is called utilitarianism (which is a subset of teleology or also called consequentialism), and the other is deontology (also called duty-based ethics). The British philosopher Charles Dunbar Broad argued in his landmark publication in 1930 that all ethics can be classified into either teleology or deontology.[25] [26] The consequences from the choice of one over the other are far reaching. The choice is not dependent on the answer to the previous question, of speciesism versus anti-speciesism. One can be a utilitarian speciesist (for instance the founder of the utilitarian school, Jeremy Bentham in the 18th century[27]) or a utilitarian anti-speciesist (for instance the above mentioned Princeton University's Peter Singer, or also John Stuart Mill in the 19th century). Likewise, one can also be a deontological speciesist (for instance University of Michigan's Carl Cohen or the more classical Immanuel Kant of the 18th century) or deontological anti-speciesist (for instance above mentioned North Carolina State University's Tom Regan in his 1983 book *'The Case for Animal Rights'* [28] or Harvard University's Christine Korsgaard in her 2018 book *'Fellow Creatures: Our Obligations to the Other Animals'*). As in the previous chapter, the choice is also absolute. It is not possible to be opportunistically the one or the other depending on circumstances without quickly entangling oneself in choking contradictions.[29]

A utilitarian approach

Under the utilitarian concept, the extent of human responsibility for the animals (or nature at large) is determined by the extent of their usefulness to the

[25] For an online version of Broads treatise: http://www.ditext.com/broad/ftet/ftet-con.html
[26] For further reading, for instance: T.A. Salzman: Deontology and Teleology, Peeters Publishers 1995
[27] Bentham is also sometimes called as a witness for the anti-speciest school, but he clearly was speciest: "Bentham recognizes that animals indeed have more limited capacities than humans; specifically, they can't conceive of their own futures the way that we can. Thus, we do no real harm to them if we kill them for food or to prevent them from attacking us." From James Fieser 2010: Applied Ethics, A Source Book, Ch 11. https://www.utm.edu/staff/jfieser/class/300/11-animals.htm
[28] https://animalstudiesrepository.org/cgi/viewcontent.cgi?article=1003&context=acwp_awap
[29] The influential ethicist Timothy Chappell of The Open University UK, argues that it is not useful to categorize all ethical questions into either this or that school, especially not to simplify everything into being either consequentialist or deontologist. But he does make nonetheless the point that any ethical position "must be as considered, rationally defensible, and coherent as possible." He admits himself, that staying within a particular ethical paradigm has a larger chance of being coherent and defensible, than self-brewing a concoction. His critique of categorizing too easily into schools is more directed towards this creating a lack of due consideration, which makes an ethical position less convincing and less powerful. More for instance in his essay: 'Ethics Beyond Moral Theory' or his well-regarded 1998 book: 'Understanding Human Goods: A Theory of Ethics.' http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.600.1542&rep=rep1&type=pdf

human species and the usefulness to the animals themselves. Vice versa, if an animal (or nature) is not useful or if the same utility could be achieved without an animal (for instance deriving proteins from plants instead of meat), then humans should ignore the animal existence, and should neither promote nor disturb it. Usefulness can have several dimensions, for instance also a temporal dimension. Possibly an animal or a species could be useful in the future, and thus it needs to be taken care of today on behalf of future generations of humans.

Usefulness can be graded into different degrees: for instance it could be graded from essential for survival, via convenient but not necessary, towards being merely enjoyable. The scales can be expressed quantitatively or qualitatively. Usually multi-modal utilitarianism models are created. In those the positive utility created to the taker is traded off against the negative utility of the supplier or vice versa. If the net balance of the transaction is positive, then the activity is considered ethically justified.

The appeal of utilitarianism lies in its nearly arithmetic quality. For instance, many animal rights advocates like making calculations similar to the following: For a human person to enjoy a meal of chicken, the amount of joy and nutrition created for the person is only brief and unexceptional. However, if it was an industrialized high productivity broiler, then this animal had to suffer pain and deprivation through most of its lifetime, and then experience the fear and panic of being slaughtered, in some cases even being cut apart while still being conscious, if the abattoir was of poor management. Even if it was an organically raised broiler in optimal welfare conditions, then still this animal would have to give up its life, which is a large disutility to this individual, in favor of only a small utility gained by the human eater. One could go as far as to measure the lifelong lasting amount of agonizing neural activity of depression, pain and mortal fear of the broiler, and compare this against the short-lived amount of neural activity of probably weak satisfaction and joy of the human eater. The quantitative balance in the neural activity of joyful versus fearful emotions would certainly be negative, and therefore under a utilitarian concept, it would not be ethically justified to eat this chicken.

The appeal of utilitarianism lies in its nearly arithmetic quality

Despite its first-sight appeal, there are numerous weaknesses with the utilitarianism concept. This can be illustrated with another example: bull fighting. Assuming a crowd of 10,000 people watch with joy and ecstasy how a bull is fighting for his life and then experience catharsis as the bull will ultimately be stabbed and bleeds to death. Applying the above arithmetic would clearly come down in favor of bull fighting. The bull has had a good life of being pampered and well-fed up to the moment it was led into the arena. Even during most of its fight, the bull will experience a delightful cocktail of hormones in his brain, with all kinds of beta-endorphins powering him forward and numbing the pain of the first stabs into his shoulders. Only in the final few moments the bull might realize that he lost, and pain and terror might overcome him, if the matador does not penetrate his heart in the final estocada. (Veterinarian studies claim that bulls are so pumped up that even then they do not experience pain.) Counting against those possible few seconds of the bull's agony, are a crowd of ten thousand human beings enjoying the rush and excitement of the spectacle. In terms of the total balance of having created ecstasy and joy versus suffering, the result would be overwhelmingly positive, and therefore utilitarian-minded animal rights advocates should be asking for regular bull fights as a staple entertainment activity, not just in Spain but all over the world.

The main problem with utilitarianism is that the trade-offs are not as simplistically countable as it looks at first sight. May be the bull-fighting dilemma for a utilitarian animal rights advocate could be solved by attaching different prices (or weights) to the different categories of utility and disutility. So, for instance, an incurred death carries a multiplier of one 1,000,000, 'pain and suffering' has a multiplier of 1,000, nutritional gains have a multiplier of 100, and enjoyment only a multiplier of 1. Then the death of the bull would weigh much more than the joy experienced by 10,000 spectators. However, the balance could be tipped back again, if the bull was not stabbed but only teased, and then after being weakened enough would be released

The main problem with utilitarianism is that the trade-offs are not as simplistically countable as it looks at first sight.

back to the meadows, or he would be shot to death to avoid any pain, and then the meat be distributed in a great BBQ feast among the 10,000 spectators, thus enhancing the human benefit even more than before. The numbers could be tweaked for many different scenarios until the desired outcome is achieved.

The example shows that in practice it has proven difficult to identify and attach numerical or other weights to ethical benefits and ethical costs in order to make the justification for an ethical decision a matter of arithmetic (for a more critical debate on this approach, see a contribution from modern ethicist Thomas Wells). Nonetheless, this ethical approach attracts a large following, and a considerable amount of scientific research and thought is invested into identifying the right weights for utilitarian-based ethical solutions, both against and in favor of animal rights. Economists and sociologists are particularly fond of this line of research. Likewise, a considerable amount of debate is invested to convince human decision makers to adopt this approach to ethical decision making.

A deontological approach:

The alternative to utilitarianism is deontology. In deontological ethics an action is considered morally good because of some characteristic of the action itself, not because the product of the action is good (the latter would be teleology).[31] The historical extremist of the deontological position is Immanuel Kant, the 18th century German philosopher of the enlightenment. In his famous example, his extremism becomes clear: *"If a murderer knocks at your door and wants to be let in to meet his victim, who he knows is at your house: Should you lie to the murderer about the whereabouts of the victim, or be honest and let him in?"* According to Kant (superficially), lying is wrong behavior, and therefore you should not lie, even though the outcome will be that the victim will be murdered in your house. The deontological position is exactly that the result of an action does not condone the means. The action is either wrong or right, independent of its outcome.

Kant's murderer knocking on the door has driven friends and foes of his philosophy alike into intellectual contortions, which is probably exactly what Kant intended with his example. Rather than switching to the ethics of consequentionalism when the deontological outcome is too hard to bear, Kant is asking for deeper reflection. For instance, a more reflected answer is to investigate the action of lying more thoroughly. The murderer asks us to let him into the house, which means which would be the participation in a wrong. It is not the narrow action of our lying (which is wrong) that is to be evaluated, but it is the broader contextual action of passive participation in a crime (also a wrong) versus active measures to preserve a life (a good), which needs to be evaluated. Therefore lying may very well be the right ethical choice – but again, not because of the consequence, but because of the value of the action itself.

that the murderer wants to make us the accomplice of his murder, which would be the participation in a wrong. It is not the narrow action of our lying (which is wrong) that is to be evaluated, but it is the broader contextual action of passive participation in a crime (also a wrong) versus active measures to preserve a life (a good), which needs to be evaluated. Therefore lying may very well be the right ethical choice – but again, not because of the consequence, but because of the value of the action itself.

A good introduction to the animal rights debate from a deontological perspective was published in a well-regarded book in 2001; '*The Animal Rights Debate*'. Here, two leading ethicists, Carl Cohen and Tom Regan, argued pros and cons on animal rights.[32]

Christine Korsgaard is considered among the top 50 most influential currently living philosophers[33], and in her field is regarded as the most prominent deontological interpreter of Immanuel Kant for our modern times. She has also written about the responsibility of humans towards animals, for instance in an essay called: *'Animals Selves and the Good'*.[34] This essay is part of a book, which was published in September 2018, called *'Fellow Creatures: Our Obligations to the Other Animals.'* The book is a tightly argued deontological case for why and what rights and duties human beings have over animals. Here are two brief excerpts:

[30] https://www.abc.net.au/religion/the-incoherence-of-peter-singers-utilitarian-argument-for-vegeta/10096418
[31] https://www.britannica.com/topic/deontological-ethics
[32] https://www.journals.uchicago.edu/doi/abs/10.1086/345630?journalCode=et
[33] https://thebestschools.org/features/most-influential-living-philosophers/
[34] https://sites.fas.harvard.edu/~korsgaar/CMK.Animal.Selves%20and.Good.pdf

Abstract: *"If we would save a human in preference to some other kind of animal, does that show that we must think humans are more important or valuable than the other animals? If everything that is important must be important to someone, and everything that is good must be good for someone, it makes almost no sense to say that humans are more important than the other animals. This paper constructs and defends a theory of the good that reflects the idea that everything that is good must be good for someone, in particular that everything that is good must be good from the point of view of a self. But the extent to which an animal has a unified self or identity is a matter of degree, and that makes the extent to which things may be good or bad for animals a matter of degree: some things may be both better and worse for animals with more unified and substantial selves. This may explain our intuitions about cases in which we would give the preference to people or the higher animals without invoking the absurd idea that some animals are more important than others."*

Conclusion: *"Within a tethered conception of value, sense can be made of the claim that the deaths and perhaps the pains of some kinds of creatures should matter less to us than the deaths or pains of some others. Such deaths and pains should matter less, if they should, because — and only because — they matter less to the creatures themselves, not because the creatures matter less. What exactly follows practically is a matter for detailed argument. But a general preference for the human good over the good of the other animals does not."*

Such deaths and pains should matter less, if they should, because — and only because — they matter less to the creatures themselves, not because the creatures matter less.

The abstract clearly announces Korsgaard as an anti-speciesist, when she describes the differences to human beings to be only a matter of degree, not of category. Her last sentence in the conclusion arises logically from this anti-speciesism, stating that: *"there are many important differences between the species, but they are just that—differences."* [35] Combining a speciesist position with Korsgaard's deontological reasoning, which is possible without contradictions, would arrive at a different conclusion, namely that the human good does have a preference and superiority over the good of the other animals.

Summary on Justification:

If an organization is directly or indirectly involved in creating, raising or slaughtering animals, then it must answer with which justification it is allowed to exert the superior intellectual, material and machine-enabled physical strength of the human species over these other animal species. There are two mutually exclusive lines of reasoning. One is called utilitarianism, the other is called deontology.

With a utilitarian approach, the means of treating animals are justified by the ends of creating utility to the human consumers and to the life of the animal. The human utility could for instance be measured in qualitative or quantitative terms, in terms of economic productivity, or quality of life, or even neurological activity of sensations achieved. Combined with a speciesist position, the utilities (or disutilities) of the animals involved in the process would not have to be counted, because only human utility would need to be considered. In cases where human-felt compassion with the experiences of the animals create disutility in the human consumer, then these can become included in the calculation. For instance, eggs or meat can be produced under more expensive conditions but with less suffering of the animals. The end product will be economically more expensive to the consumer, but will still be worth it to this final consumer if he/she has the compensating emotional utility that less animal suffering was involved. Even though the animal suffering is considered, it remains a strictly speciesist argument: it is not the utility of the animal that is considered, but the utility of the human, including the human's emotional comfort.

The combination of an anti-speciesist and utilitarian approach leaves little room for animal utilization for human consumption. The killing of any sentient animal would be nearly impossible. Milk and eggs could only be obtained if the animals that are involved can lead an almost undisturbed, naturalistic life so that there will be minimal disutility incurred to them, while creating utility for the humans.

With a deontological approach, it is not the utility outcome to either the human or the animal that

[35] https://green.harvard.edu/news/ethics-eating-animals

Combinations of an anti-speciesist and utilitarian approach leaves little room for animal utilization for human consumption.

matters, but the inherent good or wrong of the action itself. This allows the definitions and degrees of good and wrong factors that are different for humans and animals and all life forms. For instance, it allows this definition along the lines of Korsgaard, that a good can only be good if it is perceived as such by a self (for Korsgaard also plants or bacteria have a self, because they react to their environment. Inanimate objects such as a rock or a lake, do not. However, even organisms with a self would only become relevant to a human ethical debate, if this self has the capacity to reflect on its self, which would typically be the case for higher order mammals). Whether an action is a good, is determined by the interest that this life form has in this action. The amount of the good is determined by the strength of the self (a bumble bee has a weaker self than a polar bear). This is how Korsgaard arrives at the conclusion, that pains in animals can and should only matter to humans to the degree that it matters to the animals themselves.

If a deontological position is combined with a speciesist position, then this permits the elevation of the total human good achieved above all good or wrong achieved for the animals involved. This combination would allow a fairly large scope for for animal utilization, including deaths of these animals for human consumption. This is because even though an animal rarely opts for voluntary death and thus its life is typically precious to its self, it also clearly does not attach the same degree of cultural value to its death as the cumulatively culture evolving humans do. Therefore, both the quality and the amount of the wrong of an animal's death is in a different category from the associated good for the human being.

If such a deontological position is combined with an anti-speciesist position, then such a general elevation of human good is not possible, and all good or wrong of all species have *a priori* the same quality. This does not categorically rule out the utilization of animals by humans. But for Korsgaard at least, it rules out the justification for vertebrate animals to be slaughtered by humans, because the sentient selves of these animals are too strong, and their interest in self-motivated survival are too high, to be ignored by humans. Whether the same reasoning would apply to insects or carrots would need to be analyzed and decided, but probably not, since these organisms seem not to be able to reflect on their self.

A helpful summary on the moral status of animals is also published by the Stanford Encyclopedia of Philosophy,[36] and a good overview of the legal concepts involved is published by the Animal Legal and Historical Center of Michigan State University.[37]

[36] https://plato.stanford.edu/entries/moral-animal/
[37] https://www.animallaw.info/article/introduction-animal-rights

6. Overview on the purpose question: which nature shall be guarded?

The third question is: Towards which purpose, or which objective, are the human rights and duties for their animals exercised? A more specific question is also related: which kind of nature should humans maintain, guard and protect, if at all?

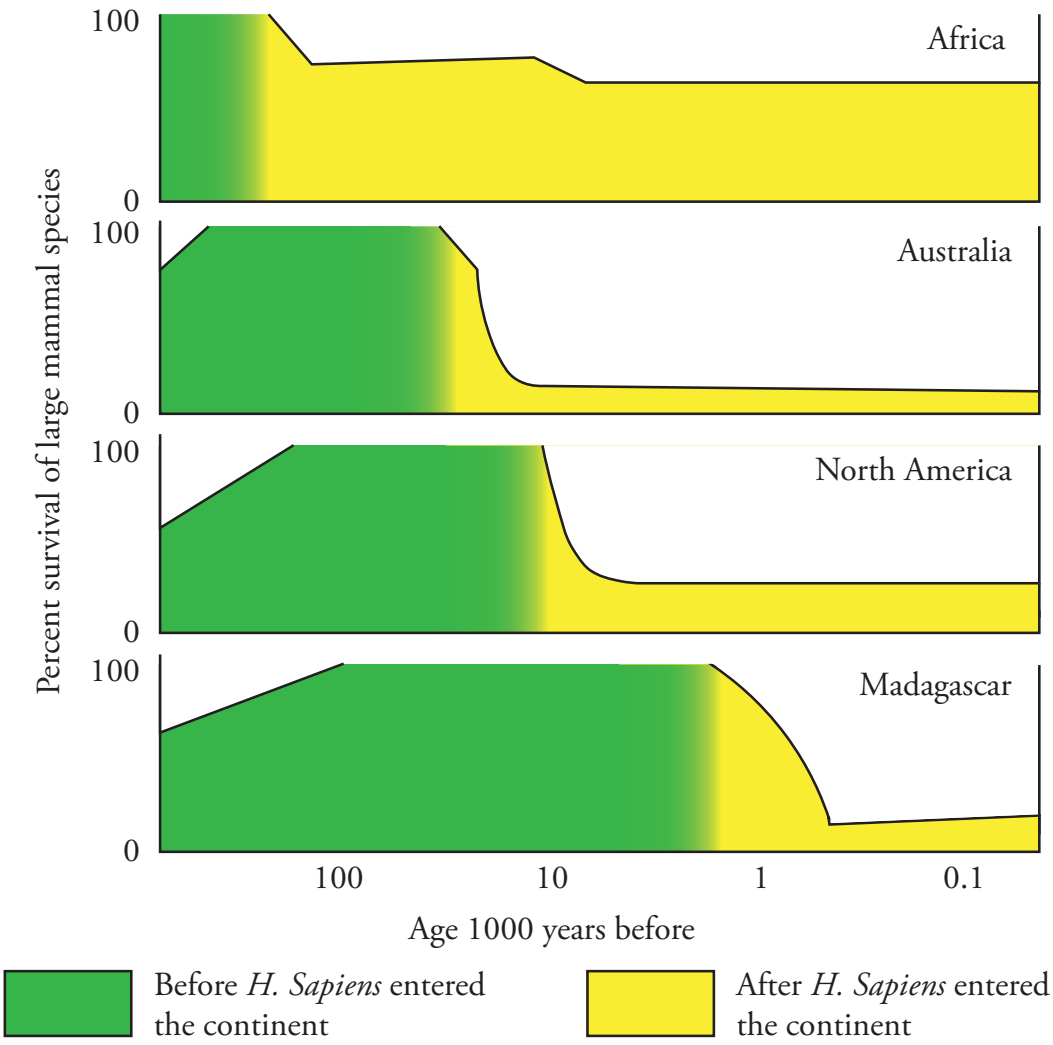
The answer to these questions revolves around the protection and maintenance of biodiversity, the natural functioning of the eco-system, and the well-being of the individual members of this eco-system, including the animals in them.

Independently from what basis an ethical framework arrives at a conclusion as to which extent the human species has rights, duties and responsibilities to guard, protect and preserve animals and nature – whether speciesist or anti-speciesist– and regardless of whether this protection is driven by utilitarianism or deontology, the question is then: which state of nature is to be protected?

Homo sapiens has changed the condition of planet Earth profoundly, far-reaching and in irreversible ways. The first major change was probably in Paleolithic times, during the mass extinctions of large-scale mammals. As written above, the degree to which *Homo sapiens* is responsible for this extinction is under discussion. The undisputed fact is that the majority of large-scale mammals disappeared when *Homo sapiens* appeared. Only some large mammals remained, for instance most members of the ungulate family, such as bison, elk and reindeer. Bears also survived. Smaller mammals such as rodents had no difficulty with *Homo sapiens* at all. The common denominators of those species that came through the Paleolithic *Homo sapien*s crisis unscathed, were that they pose no threat to humans because they are relatively docile herbivores, or that they are omnivores who could retreat into difficult terrain and feed from a versatile menu, or that they are small and reproductive enough to be able to evade humans. Dangerous carnivores on the other hand, for instance from the cat family, did not survive in Europe, only in remote locations in the Americas and Asia, and reasonably well in Africa. Almost all of the ton-plus sized animals have disappeared everywhere, only five exceptions survived: elephants, giraffes, rhinos and hippos in Africa, as well as the Asian elephant. It is telling that they survived in Africa where they co-evolved with this dangerous *Homo sapiens* species and thus learned to keep their distance. By the time their American, Asian and European cousins found out about the danger emanating from this cumulatively culture evolving species, it seems that it was too late for them.

Especially the disappearance of the ton-plus-sized animals, such as mastodons, mammoths, rhinos, giant sloths or giraffes, which had been roaming the Americas, Europe and Asia in large numbers not too long ago, will have changed the local eco-system significantly. Where these animals roam in Africa, forests will usually not develop at all or only as a loosely canopied savannah. Possibly Paleolithic *Homo sapiens* has not only eradicated these species, but also changed the landscape with it. If the then emptied landscape had grown over with dense forests as a result, this may have even triggered or reinforced the latest glacial period between 16,000 and 12,000 years ago (forests create cloud cover, and cloud cover reduces the net temperature on the surface). Regardless of the extent of the impact, a return to the nature of pre-Paleolithic *Homo sapiens*

Exhibit 4: Large mammals survival rates



Source: Wikipedia: Megafauna

is entirely impossible – *Homo sapiens* had already done too much damage 20,000 years ago.

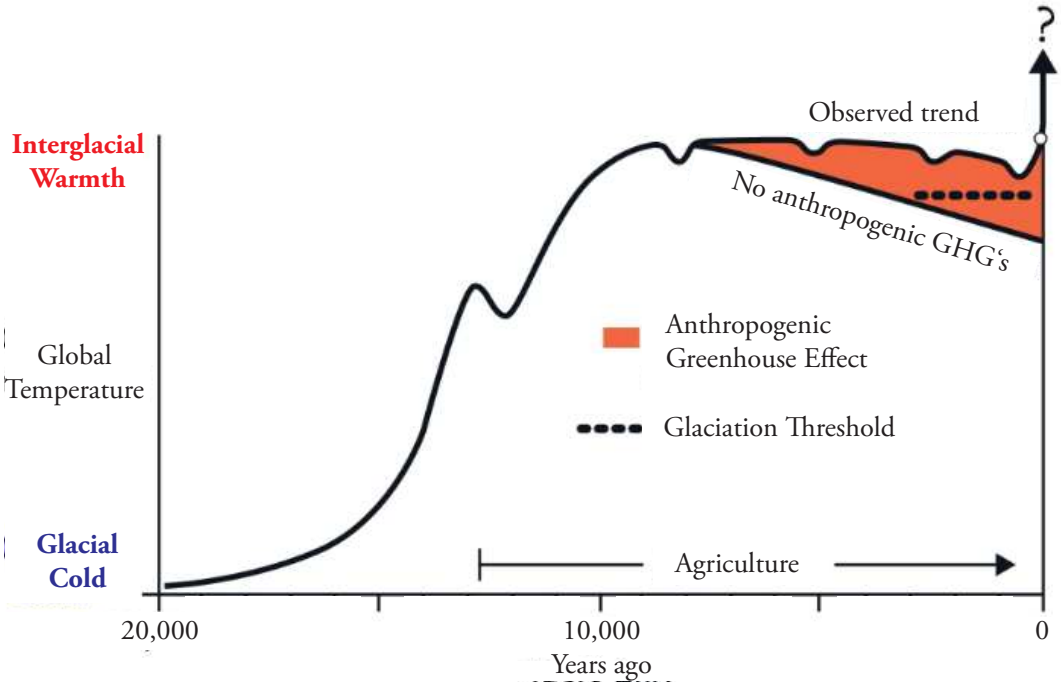
While the Paleolithic impact might have been a matter of unintended consequences, the Neolithic age after the ice receded, put *Homo sapiens* in turbo-charge. Already 8000 years ago, Neolithic men and women had subjugated large swaths of land across the Eurasian continent to agriculture. Professor William Ruddiman believes that the fast increasing practice of agriculture, beginning from 8000 years ago with all its various climate impacts of CO2 and methane emissions, decreased forest canopy and river diversions, began to stabilize the climate at a high temperature, and counteracted the otherwise natural tendency of the climate to grow cold again. On Ruddiman's reading, man-made climate change has a tradition that is older than written history.[38]

The Neolithic period was also when large scale speciation began. Most of today's domesticated animals and crops have their roots in those days when farmers began selective breeding to increase agricultural productivity. This speciation impacted the natural equilibrium strongly as well, as human-created animals and plants began to occupy ecological zones that were previously held by natural nature.

From around 2500 years ago, the tools of the Iron Age unleashed a third wave of transforming the face of the planet. Wherever the so-called high cultures took root, they left no stone unturned. The Mediterranean Sea lost its forest and the rest of Europe most of its original vegetation, the Sahara went dry and became the desert we know today, the vast Chinese jungles and extended low-land river

[38] https://www.evsc.virginia.edu/ruddiman-william-f/

Exhibit 5: Climate human-made global warming since 8000 years



Source: W. F. Ruddiman, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2015RG000503

enough for *Homo sapiens* not to establish absolute rule over it. Animals or plants that could not adapt rapidly enough to the fast spread of this aggressor disappeared. Only in the mid-20th century did humanity begin to notice that Earth's resources are finite, and that the eco-system could be disturbed beyond repair. Even the vastness of the oceans and the skies were not large enough to absorb and digest the filth which humanity has been injecting into them.

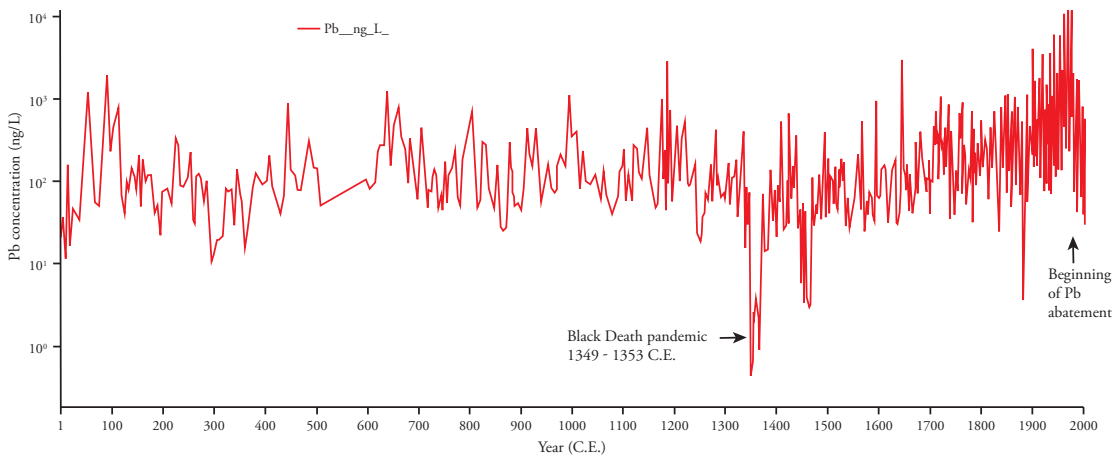
Which state of nature shall be preserved or be returned to? There is no nature left that is untouched by *Homo sapiens*. For better or for worse, this species has directly and indirectly terraformed, bio-shaped and genetically engineered every little bit of this planet. If there is a nature that has the inherent right to exist unencumbered by the impact of Homo sapiens, then hopefully it established itself on other planets in the Universe as well, because Earth was altered beyond the point of return many thousands of years ago.

It is by no means certain which of the above described four historical waves had the most rise impact on the natural ecosystem. Thanks to the industrial revolution, there are today 7.5 billion human inhabitants on planet Earth, scheduled to about 10 billion by 2050. Their settlements for housing and transport occupy around 1.1 million square kilometers (mkm^2), out of a total of 130 mkm^2 available (not counting 20 million km^2 of ice-covered Antarctica and Greenland), so 0.8%. A further 16 mkm^2 are used as croplands, 33 for pasture lands, and 28 of forests are human-managed. So today agriculture has around 60% of Earth's surface under its direct control (see part 1 of the Quo Vadis Global Meat report series).

In antiquity, at around 1 AD, it is estimated that the global population was around 300 million people, 4% of today's levels. However, agricultural productivity was also only around 5–10% of today's levels. Combining that with considerably less concern and knowhow for environmental sustainability, and that the global population then was concentrated in much fewer areas than today, it is likely that the environmental footprint of the populations of antiquity was about the same as today.[39] The same logic extends back to Neolithic

[39] The total global amount of land under agricultural use in antiquity was around 10% compared with today, which is compensated by a generally much lower quality of food for the general population, in particular drastically less availability of animal proteins. However, the agricultural and industrial practices of those times were also more destructive per unit than today. A total balance of the environmental footprint of antiquity is yet to be researched.

Exhibit 6: Lead concentration in atmosphere



This graph shows lead concentrations in the atmosphere taken by measurements from the Colle Gnifetti ice core used in the study. The graph covers the period of circa 1 – 2007 C.E. The Black Death drop marks the years 1349-1353 C.E. during which there was almost no civilizational activity, and thus this level points to the natural background rate of lead pollution in the atmosphere. Credit: Alexander More/AGU/GeoHealth.

Read more at: https://phys.org/news/2017-05-14th-century-plague-assumptions-natural.html#jCp

back to Neolithic times, 6000–8000 years ago. When the Neolithic agricultural revolution was in full swing, the global population was probably around 15 million people, only 5% of the levels of antiquity. However, agricultural productivity was then also only around 10% of the levels of antiquity (i.e. 1% of today), since all the genetic breeding optimization of the species had not yet been achieved. Most of those 15 million would already have depended on agriculture for their survival, since the Paleolithic population that was able to live and survive without agriculture numbered well below one million. Neolithic agriculture is documented mostly for the Eurasian continent and was probably restricted to the moderate climate belt on this land mass, but where it happened it must have had a distinctive impact on the natural eco-system.

The good news is that nature has until now accommodated this aggressive cumulatively cultural evolving *Homo sapiens* species rather well. Despite repeated waves of massive intrusion, the global eco-system proved itself remarkably resilient. Contrary to regularly available alarmist headlines, the rate of actual species extinction is surprisingly low.

The IUCN (International Union for Conservation of Nature, founded 1948, 1400 governmental and non-governmental members and 16,000 scientists working and contributing in its projects) is the globally recognized authority for tracking species decline and extinction. It keeps a list of 'recently extinct mammals'. Recently is defined in terms of 'since the year 1500'. On this list there are 80 species, out of a total of 5416. (In 2018, Oxford University Press Journal of Mammalogy updated the taxonomy to 6495 species with 96 being extinct).[40] Roughly 40% of all mammal species are rodents, which is clearly the most successful mammal order in terms of diversity and number of individuals on the planet. A further 20% are bats, and another 10% are shrews and moles. The fourth largest order in terms of diversity are primates.

Out of the 80 listed extinct mammal species, there are only three which were declared extinct after the year 1968, which is the Bramble Cay Melomis in 2016, a rodent from Australia, the Christmas Island Pipistrelle in 2009, a bat from the tiny Caribbean Christmas Island, and the Saudi Gazelle in 2008. Furthermore, only 11 of these 80 were continental species, all others were island species. Due to their special evolutionary conditions, island species are highly vulnerable. They evolve weak evolutionary traits such as birds that cannot fly, and have immune systems that are not trained on the range of threats from continental microbes. It is a serious

[40] https://www.eurekalert.org/pub_releases/2018-02/oupu-tam020518.php; https://academic.oup.com/jmammal/article-abstract/99/1/1/4834091?redirectedFrom=fulltext

methodological fallacy to extrapolate the rate of extinction of island species towards how well mammal species are doing overall. And given the large scale introduction of much fitter continental species to islands around the world due to human activity, it is surprising how well even the island species held up. In addition to the 80 extinct species, there are two mammals which survive in zoos only, which are the Chinese Pere Davids deer and the Saharan Scimitar oryx. The Northern White rhino could soon be joining this list as there are only two surviving infertile females around. However, since both sperm and eggs are preserved, there are attempts to revitalize the species through IVF among Southern White Rhino, who still number around 20,000 animals. This IVF might cost up to USD 9 million, for which funding seems to be available.

The picture is similarly good for the much larger category of vertebrates, which is also a telling example of how wording can create false headlines. In 2015 the Mexican researcher Gerardo Ceballos made global headlines with an extinction rate for vertebrates that is *"up to 100 times faster than the natural background rate"*. This makes it sound as if in the foreseeable future there will be only a few vertebrates left. The reality is exactly the opposite. Out of the 45,000 known vertebrate species, there are 477 which were declared extinct since the year 1900, which is approximately a rate of 1% per century. The natural background rate was estimated by the Ceballo's co-author Barnosky to be 0.02%.

Several issues are wrong with the headline: First, dividing 1% by 0.02% is a rate of 50 times faster, not 100 times faster. Second, the majority of the 477 lost species are island species, which find it much harder to compete against newly introduced continental species. This has very little to do with how humanity treats the Earth in total or the extinction rate of continental species, where the vast majority of life happens. It is more of a localized evolutionary problem of isolated island species having low evolutionary fitness. Keeping island species alive will be a costly affair, and it may well be worth it, but it is a different challenge than keeping continental species alive. Third, the estimation rates for the natural background rate vary dramatically. The problem is obvious data paucity for the times before *Homo sapiens* began conquering the world in Paleolithic times. Fourth, the totalized extinction rate since 1900 ignores that in the advanced industrialized nations of the world with a high degree for environmental sensitivity, the extinction rates went down substantially in recent decades, possibly down to the levels of the natural background rate.

In a similar example of highly misleading headline-formation, the French researcher Claire Regnier estimated based on expert interviews (but not counting herself) that 10% of all the 200 land snail species on the Hawaiian island of Maui are now extinct, which is a rate of seven times higher than the IUCN records show. From this she extrapolated that *"we have probably already lost 7 percent of all described living species"*, which would mean 130,000 species of invertebrates alone, globally. However, land snails are non-representative for the evolutionary fitness of all invertebrates, which are mostly air-borne insects and thus have much higher evolutionary fitness than an exceptionally slow, easily-dehydrated, easily-squashed and land-bound animal such as a snail. And the island of Maui is non-representative of the evolutionary fitness of continental geography where most life lives, and moreover, it is not clear whether it is true that 20 Mauian land snails are indeed gone.

Such dubious Regnier type of calculations lead to headlines that nature may be losing 150 species each day, out of the around 1.9 million species which are described and recorded. Also, the casual reader is unlikely to recognize that these are not the sort of vertebrate species that are typically considered animals, since of these vertebrates, only 477 disappeared over the entire last 120 years. Even if there were a rate of 150 species disappearing per day, which is highly doubtful, then the vastly overwhelming majority of them would be insects, some of them would be plants, and only once in every 1400 days or so, a single vertebrate from a remote island with low evolutionary fitness would be gone. And mammals are virtually unaffected. That is a very different headline.[41]

All of the above should not be a reason to believe that protection of nature is not necessary. On the contrary. While nature has been surprisingly resilient against the multi-millennium onslaught of *Homo sapiens*' cumulatively cultural evolution so

[41] The facts for this and the previous paragraph were taken from an article published at the Yale School of Forestry and Environment in August 2015:
https://e360.yale.edu/features/global_extinction_rates_why_do_estimates_vary_so_wildly

far, this does not mean that it is confidently future-proof. There is enough reason for concern, even without falsely alarming headlines. For instance, the island of Puerto Rico has lost 99% of its native forest, but lost only seven of its native bird species. El Salvador lost 90% of its forest, but only three of its 508 forest bird species. Apparently nature managed to squeeze itself into a much smaller space available, or has learned to change its ways and now to cohabitate with humans at ease. The European blackbird used to be a shy and rarely seen forest bird until as recently as 50 years ago. It has since become a regular feature in gardens and cities, has since become a regular feature in gardens and cities, much appreciated for its songs, and is among the most successful bird species in Europe. However, what would happen if El Salvador lost its final 10%, or Puerto Rico its last 1% of forest? If what remains of the forest of El Salvador is largely cut down, can those 505 remaining forest birds squeeze into just 1% of their original space? Do we want to find out?

Other deep reservoirs of nature are also under imminent threat. The world still has around half of the jungle cover it used to have before the age of colonialism began to install plantations in the 1700s. The pace of jungle deforestation has quickened ever since and currently stands at 18 million ha per year, with roughly equal shares going to South America, West Africa and Southeast Asia. At this rate, all original jungle will have disappeared at around the year 2100, early enough for most of today's children to experience in their old age.

The Zoological Society of London tracks 16,704 populations of mammals, birds, fish, reptiles and amphibians, altogether representing 4000 species since 1970. Between then and 2014, they claim that on average the number of animals in these populations decreased by 60%.[42] So even though the number of species is keeping up fairly well, the number of animals per species may not be.

Which nature to guard?

With all of the above as background, an answer must be given towards which kind of nature shall be guarded, protected and preserved. There is no nature left that is non-impacted by Homo sapiens. Contrary to common belief, this is not a recent phenomenon associated with the industrial revolution. The previous waves of human intrusion into the natural balance, in antiquity, during the Neolithic agricultural revolution and during Paleolithic emigration were possibly just as dramatic, or may be even more so. What is presented to us today as "natural", is already a strongly shaped evolutionary response of nature to what Homo sapiens has caused over the past 20,000 years. The clock cannot be turned back on this, not even just 200 years.

The second aspect to consider is that after centuries of intruding ever deeper into the natural balance, the most recent decades of human civilizational progress may have actually improved things for nature to thrive, even if this achievement is so far mostly restricted to the advanced industrialized nations. It is well recognized that today, poverty is a much greater threat to nature than wealth. This should be an argument in favor of more technological progress and economic wealth creation, rather than less, in order to protect nature.

The third aspect is that for better or for worse, the 7.5-billion- soon to be 10-billion-strong population of humans are here to stay, and they are demanding healthy and nourishing food. A significant portion of the Earth's resources in terms of land, water and nutrients will have to be directed towards this purpose.

Sharing or Sparing?

Among nature conservationists a debate rumbles on between the sharing or the sparing faction. Sharing suggests that the lands, oceans and resources of Earth should be managed in a mostly gentle and nature-friendly way, so that natural biodiversity can cohabitate with human activity. Sparing suggests that nature and high productivity civilization are so fundamentally incompatible, that both are better off when strictly separated. A large enough portion of Earth should be handed over to nature in well protected nature reservoirs to largely fend for itself and survive, and the remainder will be given to the human species for it to conduct its high productivity agriculture, industry, urban life and leisure.[43]

Both factions have weighty arguments in their

[42] https://www.zsl.org/global-biodiversity-monitoring/indicators-and-assessments-unit/living-planet-index/living-planet
[43] for an overview of this debate, see also:
https://e360.yale.edu/features/sparing-vs-sharing-the-great-debate-over-how-to-protect-nature

favor. The sparing faction argues that the numbers of the sharing approach do not work out. The necessary restrictions for utilizing the resources in a gentle fashion reduce productivity too much for the human population to be sufficiently serviced with their desired lifestyles. At the same time, nature would not thrive sufficiently either in this scenario, as biodiversity and natural balances are still too much disturbed by even low-impact-designed human activity. In the end, neither nature nor people would be adequately provided for, and therefore it would be better to split Earth's resources in a clear cut way, one part for nature, the other part for humans. After 20,000 years of nature being confronted with a cumulatively culture evolutionary species has proven that nature always comes out short. Therefore, the best way to protect nature, is to make large parts of it nearly inaccessible to the *Homo sapiens* species.

On the other side, the sharing faction argues that the nature reservoirs, which might be set aside in a clean cut way, are at risk of becoming too disconnected from each other, and thus do not allow meta-ecological evolution to take place, and thus set nature on a perilous path. The weak condition of island species testify how nature loses out under conditions of isolation. Sharers also fear, that in practice, the amounts of resources in terms of land, ocean and water, and the extent of the reservoirs protection will not be high and strict enough. Most of the relatively undisturbed resources that could become such reservoirs are in parts of the world that have poor political governance, or in the case of the oceans, none at all. Those resources that have been disturbed will be too difficult and expensive to return to nature. Moreover, some of the Earth's resources cannot be split along geographical lines: the atmosphere, the climate, the ocean currents cannot be cordoned off. Furthermore, the past has shown that the aspirations of humanity are insatiable: every productivity advance was used to set the global consumption aspiration even higher, rather than to cut down on resource utilization. If that characteristic of humanity is not fundamentally changed, then the nature reservoirs would eventually be sacrificed. If that characteristic must be changed, then now is as good a time as ever to do so, to forsake the pursuit of productivity increase and instead focus on a reduction of consumption.

Both factions advocate for a utopia: the sparing faction hopes and believes that it will be possible to set aside enough of the world's resources and enforce these reservoirs stringently enough for nature to continue to exist relatively undisturbed, independent of the Homo sapiens species, and for the rest to be available to humans for their free and unencumbered disposal. The sharing faction hopes and believes that humanity is willing to voluntarily reduce its consumption desires, for the rich of the world to reduce their living standards, and for the poor of the world to give up their dreams of attaining that degree of wealth, so that the total output of agriculture and industry can be scaled down towards levels compatible with long term sustainable use of Earth's resources under a cohabitation model with nature.

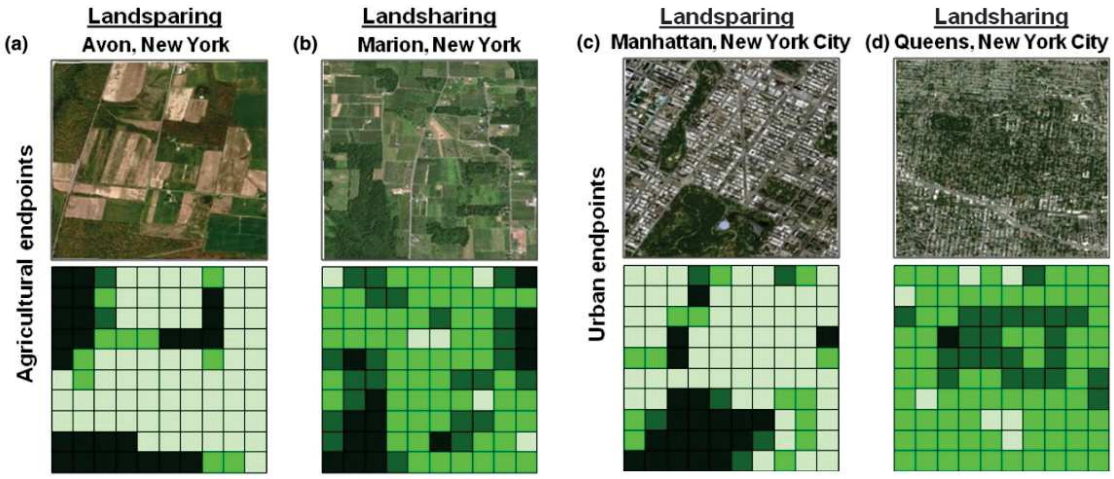
The deployment of existing and new technologies can be a solution towards achieving either utopia, or also a combination of both. When deciding on an ethical framework for the use of such technologies, it is necessary to be more specific when stating that the natural environment should be protected. Which condition of the natural environment is targeted? The choice to preserve a natural world, even a partial world, that is unimpacted by humans does not exist anymore and can be ruled out. There are two options. One is a world where nature must accommodate itself to an environment that is heavily governed and administered by the human species: the sharing proposal where both nature and humans share the resources and cohabitate. The experience from densely populated regions in Europe, India and China show that with enough effort, the biodiversity of species might be maintained in this way. India even manages to keep a sufficient tiger population alive with this model of intensively managed care. One likely result of this strategy would be that what is left of today's large biospheres that are relatively untouched – the jungles, the deserts, or the tundra forests – will come under human management as well. Both sides to the bargain would need to yield: nature would lose its self-governance for good, but maintain its biodiversity, and humans would give up much of their consumption desires, but would gain a flourishing, somewhat natural environment to enjoy.

The other option is cleanly separating nature from the human species. This allows nature largely to continue on its own as it has for the past 600 million years, with only minimal support or disturbance from humans. Confined to its protected reservoirs, nature would have less space than the full planet

available. Experience shows that nature does not need the entire planet to maintain its systems. Nature has so far survived human encroachment relatively well, and has survived glacial periods and ice ages, when there was much less space available. The other part of the resources would be free for the human species to use at maximum productivity to feed itself and satisfy its aspirations. This strategy also has the added benefit that humans are less exposed to the dangers of nature. Humans will not need to fear sharp-toothed carnivorous cats, angry hippos, boars, bears and wolves, poisonous snakes, nasty mosquitos, and all the deadly zoonotic diseases that animals impart on humans when they live in close interaction with each other.

As with the two previous chapters, an ethical framework that does not specify which kind of nature is to be guarded – an as original as possible nature, or a cohabitational nature – will not be able to provide guidance to an organization. In contrast to the two previous chapters, here the choice is neither absolute nor digital. It is possible to pursue both options and to attempt gradations of both. But any direction that is chosen requires more detail than simply stating that nature or the environment should be protected. Too many different kinds of nature exist for this to be a useful statement.

Image: Spectrum of spatial configurations



Spatial patterns of land-use intensity for (a, b) agricultural landscapes and (c, d) urban landscapes. For all grids, a cell size of 200 × 200 m is used, and the green shading darkens with increasing extent of tree cover, which we consider to be the key biodiversity-supporting vegetation in these landscapes. The figures highlight two ends of the land-use spectrum from the isolated patches of vegetation cover associated with a land-sparing model to the spatial continuity of a mosaic of low-intensity land uses associated with land sharing. Many intermediates exist between these endpoints yielding great variation in ecological impacts.

Source: Brenda B. Lin, Richard A. Fuller, FORUM: Sharing or sparing? How should we grow the world's cities?

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