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**Title page**

# Can species have capabilities, and what if they can?

Author: Teea Kortetmäki School of Management, University of Tampere

*Abstract*

In this article, I apply the environmental or expanded capabilities approach to species and examine whether species as wholes can have capabilities and what are the implications if they can. The examination provides support for the claim that species as evolutionary groups can possess capabilities. They have integrity, which refers to the functionings that enable the self-making and development (evolvement) of species, and it is conceptually possible to identify capabilities that essentially enable or contribute to species integrity. One central capability for species can be identified from conservation literature: adaptive capacity, the ability of species to react to environmental changes by self-regulative evolution. After constructing the main argument that species can have capabilities and that they possess the capability to adaptive capacity, I shortly expound on the implications of these claims. It turns out that there are at least three different ways to apply the notion, and that the claim 'species have capabilities' does not entail that species are necessarily recipients of justice.

Keywords: capabilities approach, species, adaptive capacity, extinction, ecological justice

# Can species have capabilities, and what if they can?

## Introduction

In the face of increasing human impact on the natural world, theorising about ecological justice or justice in human–nonhuman relations has become an emerging theme in political theory and its rise is of great importance (Dobson et al. 2009, 318–319). One approach that has attracted recent interest is the expanded or environmental capabilities approach (hereafter the ECA)[1]. It builds on the core ideas of Martha Nussbaum's central capabilities approach but expands the community of justice to nonhuman beings and ecological systems and collectives. Nussbaum (2011, 157–159) acknowledges that the central capabilities approach enables adopting stances like that of the ECA, but she endorses limiting the capabilities-based approaches to humans and sentient individuals rather than expanding their application further.

The inclusion of ecological collectives in the capabilities framework signifies a nearly paradigmatic change. While sentient beings are 'subjects-of-life' and non-sentient individual organisms have in common what can be called 'an organismic life process', systems and collectives are ontologically and epistemologically different. Collectives often have arbitrary or contingent[2] boundaries, and it might be hard to capture how the notion of harm, let alone injustice, should be applied to ecological systems. Thus, the ECA faces multiple challenges that arise from its theoretical aspirations. First, it should explain how the operation of an ecological system can be conceptualised in the language of functionings and capabilities. This explanation must also give an account on how such systems can be harmed in a sense that is morally relevant, rather than just in a

[1] For the initial articulation of this approach, see Schlosberg 2007. In this article, the ECA refers to the capabilities-based approach to ecological justice. This differs from the capabilities-based approach to environmental justice (for that application, see e.g., Holland 2008; 2012; Heyward 2011; Schlosberg 2012b). The latter emphasises the instrumental importance of environmental conditions for human flourishing. Some proponents of the capabilities-based approach to environmental justice reject the idea of capabilities-based ecological justice.

[2] Yet, the boundaries of some organisms are also very difficult to define: consider mushrooms, for example, or the microbial systems that inhabit human bowels.

sense in which harsh winter conditions harm the city roads (cf. Cripps 2013, 97). Second, if the approach wishes to make claims of ecological justice, it needs to describe the relationship between environmental capabilities and duties of justice, as well as address how the conflicts between various claims of justice are to be resolved.

The ECA has addressed these challenges concerning ecosystems to some extent, but discussion on the status of species as wholes is practically non-existent. Passages mentioning species are scarce and unclear. Schlosberg (2007, 147–148) has noted that because individual specimens can live far apart in different environments, applying the notion of justice to a species as a whole is difficult. Yet he also lists species among entities that can have capabilities (Schlosberg 2007, 153; 157). The status of species is an important question due to the increasing negative impact of human activities on the viability of species. The main objective of this paper is to address this gap in research and examine whether species can possess capabilities, that is, whether their operation can be conceptualised using the capabilities framework. The paper contributes to the discussion on nonhuman capabilities and provides a novel approach to species protection. As opposed to the initial work of Schlosberg (2007), I do *not* begin with the assumption that the applicability of capabilities terminology to a given entity necessarily entails that the entity merits considerations of justice. Such an assumption is not required in capabilities theorising (Robeyns 2016), and I find it conceptually useful to separate these two issues for reasons that are discussed later in this work.

This paper begins with a clarification on what I mean by species as wholes. In the first argumentative section of the paper, I characterise the ECA and the grounds on which it argues that certain kinds of ecological systems can have capabilities. In the second part, I proceed from those grounds and examine whether and how the notion of capabilities can be applied to species. This part comprises the main argument, namely that species have integrity in a sense that makes them potential possessors of capabilities. In the final section, I discuss the implications of the argument

that species can have capabilities. I point out that there are different ways to apply the environmental capabilities framework, and hence, the implications of the argument that species have capabilities depend on the chosen strategy. The conclusive section also suggests some topics fore future research.

An important proviso is that I am concerned with applying the ECA to particular nonhuman groups rather than with defending all elements of the ECA. Justifications for the idea of collective capabilities can be found in existing literature (Ibrahim 2006; Schlosberg and Carruthers 2010; Murphy 2014). Discussions exist also on the feasibility of doing justice to non-sentient nonhumans (e.g., Low and Gleeson 2002; Baxter 2005; Schlosberg 2007; Fulfer 2013) although it should be repeated that I do not make a commitment to the view that having capabilities necessarily entails the recipiency of justice. Rather, I begin with the assumption that the idea of nonhuman and collective capabilities merit at least further examination. The interesting question for me is whether they can be applied in the case of species as wholes.

Before proceeding further, some clarifications must be made concerning what I mean by species and what kinds of entities they are. Literature on species ontology has produced manifold fine-grained definitions of species whose differences are important for ecology but less so for philosophers and political theorists. A major distinction between two different ideas of species is, however, important. Species can be understood either as *taxa*, categories in our mind that are based on particular patterns of recurrence in the appearance of organisms; or as *evolutionary groups*, biological entities (Hey 2001; for a more detailed species ontology, see Smith 2016). The existence of species as taxonomic categories depends on human distinctions, and these categories correspond to our perception-based ways of classifying them. Evolutionary groups, in contrast, exist regardless of human identification. They are harder to identify unequivocally, though: some groups appear alike, and there is exchange of genes between certain groups. Taxonomical categories can be understood as ‘hypotheses of the organisms that constitute evolutionary groups’ (Hey 2001, 329). In

many cases, the taxonomical categories correspond with the evolutionary groups, though there will always be borderline cases, and categories are open to corrections. For example, the Nile crocodile *Crocodylus niloticus* was recently 'split' in two when its west/central populations were identified as a separate species *Crocodylus suchus* (Grigg and Kirshner 2015, 11).

A distinction between taxonomical and evolutionary species concepts is essential. Many objections to the moral considerability of species rely on the taxonomical definition: the 'ontological objection' holds that the species Polar bear cannot be harmed because it is only 'a classification of a certain mammal, not an actual mammal or group of actual mammals' (Taylor 1986, 69). By contrast, I commit to species realism and consider species primarily as evolutionary groups, which is not subject to the ontological objection. When I discuss the real-world species, such as Black rhino(ceros), I assume that the Latin label sufficiently corresponds with a particular evolutionary group, i.e. the species name can be used to denote a particular evolutionary grouSpecies boundaries are not perfect and they do not need to be. Even the 'individual' of liberal political theory has a problem of boundary definition, given the amount of nonhuman organisms residing in and on human bodies. Boundaries can always be argued: what matters is that the beings of concern are definable relative to normative and political purposes (Fulfer 2013), and the existence of various protection policies shows this to be the case regarding species.

Another remark concerns the distinction between populations and species. It has been argued that populations are more proper candidates than species for our concern (Baxter 2005; Schlosberg 2007, 147–148). This argument mainly relates to the way in which species are (often) spatially dispersed. This fragmentation, however, is not a reason to reject the examination of species as wholes in political theory. Many indigenous peoples are fragmentarily dispersed, like the Sami peoples who inhabit several countries and of whom many live outside their area of provenance, the Arctic area of Sápmi. Yet such dispersion has not prevented community capabilities theorists from applying the capabilities framework to indigenous and alike collectives (Schlosberg and Carruthers

2010; Murphy 2014).

A detailed treatment of the species–populations differentiation has been presented by Brian Baxter (2005) as a part of his distributional theory of ecological justice as the fair distribution of environmental resources between humans and nonhumans. The precedence of populations over species in this theory of justice is based on three arguments: ontological, consequential, and conceptual (ibid., 128–129). The ontological objection was rebutted above; I will shortly address two other objections with relation to the ECA.

First, Baxter argues that prioritising species over populations has counterintuitive consequences. It could justify a mass destruction of individuals insofar as the species itself remains viable. Focusing on the protection only on the species level may also encourage 'buck-passing' in local arenas, increasing the risk that a single misjudgement about the viability of a species leads to its extinction. These concerns rely on two assumptions: that individuals or populations do not matter when species do, and that species and populations are the only possible objects of concern. The ECA rejects both assumptions: it expresses concern about ecosystems, collectives of specimens (on either the species or population level), and possibly individuals as well. A mass destruction of individuals is unjustified for multiple reasons according to this approach. A concern for ecosystems also minimises the risk of viability misjudgements and buck-passing: any given ecosystem requires concern, and populations are essential constituents of those systems.

Baxter also maintains that the 'good of species' can only refer to the existence of viable populations because it 'is within these that the good of the kind of organism to which we are referring resides' (Baxter 2005, 129). This view differs from that of the ECA which focuses on the integrity, rather than the good, of a given entity. In contrast to the systemic orientation endorsed by the ECA, Baxter approaches ecological collectives instrumentally: he attaches special weight to populations of endangered species but does it only because the fate of those species affects the welfare of their specimens and of other interconnected beings (ibid., 136). Such reasoning might not

satisfy those environmentalists who regard the extinction of a species a regrettable tragedy, even if the species was rather 'useless' for other organisms and the system in question.

With relation to the domain of ecological justice where Baxter and Schlosberg operate, I am doubtful whether populations are in any sense less problematic recipients of justice than species despite their spatial unitariness. It is unclear how justice considerations should deal with population dynamics. Population size, composition, and boundaries change often and sometimes rapidly so. Any single population may be lost due to splitting up, merging, or migrating, and not all such losses are regrettable even if they originate from human impact. In contrast, when a species loses its viability for anthropogenic reasons, that (if something) is certainly regrettable[3].

Populations are not without importance even if the focus is on species: at a minimum, they have twofold derivative value. Populations are 'middle-term members' in the chain between a species as a whole and its individual specimens. Viable populations are a precondition for the survival, self-organisation, and self-maintaining of a species as a whole; and the other way round, the flourishing of individual specimens (of at least any sexual species) often presumes viable populations.

**Grounds for capabilities: ecological systems and integrity**

The capabilities-based foundation of the ECA can be traced to central human capabilities approach that was initially articulated by Martha Nussbaum. Both the human and nonhuman applications of the approach share the same conceptual framework of capabilities (opportunities to do or be something), functionings (realisations of capabilities), and flourishing that requires certain capabilities which in turn enable the actual realisation of one's characteristic form of living. The 'Nussbaumian' school of capability theorising assigns a focal role to a list of central capabilities that

[3] Admittedly, in some rare cases the anthropogenic eradication of a species might not be regrettable: consider a harmful virus whose eradication could protect human health and overall diversity of life forms.

are a precondition for a decent and truly human life and that define the conditions for minimal justice in a decent society (for a more detailed description of the relationship between capabilities and minimal justice, see Nussbaum 2011). Similarly, it is possible to think of central capabilities for various nonhuman beings to describe which opportunities and abilities are necessary for the flourishing of their kind. Nonhuman capabilities are species- and system-specific: the fullness of life of a squirrel or of a blue whale, let alone of an ecological system, involves very different things, and defining central capabilities for each being requires sensitivity to these differences.

The ECA extends the capabilities framework by including ecological systems in the community of capability-possessors. A key area of inquiry for the ECA is to find out what impedes nonhuman entities from realising their potential and flourishing[4] or maintaining their integrity (Schlosberg 2007, 148–151), and the inclusion of systems is essential for such considerations. This is not as radical a move as it might first appear. Ecological problems are essentially related to the malfunctioning of ecological systems. From the normative viewpoint it can be argued that atomising or 'reducing' nonhuman nature to individuals devalues certain life forms and their characteristic flourishing (ibid., 148). Concerns expressed by environmentalists or local people about the eradication of a fragile and unique forest area are not only about the suffering of individual organisms but about the destruction of a unique, interconnected system, a place, and a life process. Expanding the community of justice beyond individuals[5] is a natural step for the ECA that wants to capture such worries in the language of capabilities and of ecological justice. This step also evokes new questions. What kinds of capabilities and functionings can ecological systems have, and can ecological systems or groups be harmed in a way that justifies their inclusion in the capabilities framework (so that the capabilities denote something else than just a mechanical-causal

[4] Schlosberg links integrity and flourishing by stating that maintaining integrity is a precondition for flourishing (Schlosberg 2007, 136–137). This does not mean that to have integrity, a being should be one that can flourish. Hence, it can be left open here whether talk about species flourishing is meaningful, although it can be noted that in our everyday language and even in some academic literature species *do* flourish.

[5] This expansion does not deny the standing of individuals. In this paper, however, I focus on the species as wholes, not their individual specimens.

relation between certain capacities and their realisation), let alone in the community of justice?

The ECA proposes that the central notion in answering the above questions is that of ecological integrity, which refers to the agency and autonomy through which nonhuman nature can develop, self-correct and self-regulate itself: that is, the attributes that make living beings and processes autonomous, able to maintain their existence and reproduce in changing circumstances[6].A being that has autonomy or *autopoietic* capacities can maintain its organisation in the face of external forces and seek to maintain its integrity (Heyd 2005, 5; Westra, Bosselmann and Westra 2012). Ecosystem sciences provide a largely similar definition of integrity: it denotes the autonomy, self-organisation, and self-correcting capacities of an ecosystem; it comprises the functionings and qualities of a system; and it refers to an undivided and complete state of a system (Müller, Hoffmann-Kroll and Wiggering 2000). The ECA maintains that the integrity of an ecological system can be harmed or interrupted by human actions (Schlosberg 2007, 149; 2014, 81; Fulfer 2013), and this is also an instance of ecological injustice. The amount of harm that counts as injustice is unclear, though, because of ecological resilience: ecosystems can absorb a certain amount of disruptions before changing their essential structures (Berkes, Folke and Colding 2000).

Although grounding the moral status or the capabilities of entities on their integrity is not a common strategy in the capabilities theorising,[7] the notion of integrity has gained footing in normative environmental theorising. Harming ecological integrity is morally wrong (e.g., Leopold 1949; Westra, Bosselmann and Westra 2012; Achterberg 1993) or constitutes an injustice (Low and Gleeson 1998; Schlosberg 2007; 2014). It has even been argued that integrity 'represents the idea of noninterruption of functioning, which is, ultimately, what Nussbaum sees as the essence of justice'

[6] This should not be confused with Nussbaum's capability to bodily integrity, which is an entitlement of humans and sentient nonhumans against violence, abuse, and harmful treatment that prevents a being from flourishing in a way characteristic of its kind (Nussbaum 2006, 395–396). The capability to bodily integrity exemplifies a case where there is a vague line between a capability and a functioning realised by it: bodily integrity also refers to a state of intactness. The fact that Nussbaum names bodily integrity as a central capability for nonhumans also amounts to the rebuttal of a recent argument that denies capabilities from nonhumans because they do not make deliberative choices between opportunities (Melin and Kronlind 2016): bodily integrity is not an issue of making deliberative choices.

[7] The ECA departs here from Nussbaum's human capabilities approach where dignity has, at least earlier, been central in defining which entities are recipients of justice (see Bendik-Keymer 2014).

(Schlosberg 2012a, 175). Philosophical-ecological works on environmental management (Costanza, Norton and Haskell 1992; Westra, Bosselmann and Westra 2012; Westra 2016) have also pointed out how certain ecological systems and collectives have integrity that can be harmed in a way that bears normative relevance. Preserving integrity is essential for the existence and maintenance of these living systems. This enables constructing a conceptual link between the states of an ecological system and its capabilities. Integrity is a state or a functioning of an ecological system, and it should be possible to identify central capabilities (or at least one capability) that essentially contribute for creating or maintaining this integrity. It is worth noting that factors which comprise the integrity of a given ecological system are called *capacities*: integrity as a state of an ecological system and capacities that enable it are indeed conceptually closely linked. Can species be said to have integrity and capabilities in a relevant sense? The inquiry shall begin with the question whether species have integrity.

**Species integrity and capabilities**

Examining the status of species within the capabilities framework takes us then back to the notion of integrity that denotes, recall, the ways in which nonhuman nature can develop, self-correct and self-regulate[8]. Species as evolutionary groups have the capacities 'of changing and being acted upon' (Hey 2001, 328). Yet, at least some kind of capacity to change and be acted upon could be identified even in a lava flow or a raindroHence, the notion of integrity requires clarifying to advance the argument that species have integrity but, let say, lava flows or waterdrops do not (for it is not the case that we would like to attribute to them capabilities in a similar sense).

Development, self-regulation and self-correction are related to the capacity of an ecological system to change, which enables its continued existence in changing circumstances. Such capacities

[8] It must be noted that this notion of integrity is much broader than the one used in the discussions of 'species integrity' in molecular ecology, where species integrity essentially relates to their genetic and morphological integrity.

manifest in the adaptation of species through evolutionary time. Perhaps the most used example in teaching Darwinian evolution is the case of *Biston betularia*, the peppered moth (Majerus 2008). During the latter half of the 19th century, industrial pollution in the north-west region of England led to a relatively rapid change in the appearance of the peppered moth whose colouring turned from off-white to black as a response to the pollution-induced darkening of tree barks and other landing surfaces. This kind of evolutionary response is quite literally a form of self-correction in conditions where the old colouring becomes flawed from the viewpoint of not getting eaten. Many evolutionary responses are, of course, more complex and slower in time.

The emergence of new species and subspecies demonstrates a more transformative form of self-organisation[9]. To be capable of self-organization entails that the entities in question are capable of self-maintenance and self-regeneration without human support: this *autopoiesis*, 'the self-making', is common to living systems, including species (Callicott 1992). Examples of the self-organisatory capacities of species that lead to the emergence of new species and subspecies are numerous, whether we look at the emergence of *Homo sapiens* or the evolution of species within for example the crocodile lineage *Crocodyloidea* whose remarkably similar-looking antecedents date back to the era of dinosaurs (Grigg and Kirshner 2015).

Ecological integrity also presumes an entity to have a sort of 'identity'. Although an ecological system or collective changes over evolutionary time, it can be identified as substantially same in a shorter time frame. This sameness is comprised by a particular set of features and functions that together make a given entity the one it is, rather than another one or interchangeable with another one. Consider the example of the Black rhino (*Diceros bicornis*), a critically endangered species known for its impressive horn. The Black rhino is different from and not interchangeable with other species, even those of rhinoceroses: it has its own characteristic traits, unique evolutionary history and genetic pool. Regrettability of its possible extinction owes to this

[9] This may appear to be in tension with the emergence of new species: what is the entity that regulates itself in the process of speciation? I do not see this to constitute problems to the notion, though. Even in the 'emergence' of new human beings, it is hard to say to whom the related autonomy should be attributed, to mother or the unborn child.

uniqueness or identity: this very species with its own history is permanently lost with the extinction. In summary, species manifest *autopoietic* capacities and integrity[10] in manifold ways illustrated in the above examples. These capacities are very different from those manifested in lava flows or raindrops; thus, acknowledging the integrity of species does not create a risk that species and lava flows would merit a similar status in the capabilities framework.

Having discussed how and in which sense species have integrity, it is now possible to address the aspect of capabilities, the abilities that enable or promote the realisation of integrity. Literature on biological and conservation sciences reveals at least one species-related notion that fits in the conceptualisation of capabilities with relation to integrity: *adaptive capacity*, the ability to respond to changes with adaptation. Evolutionary adaptation helps species survive stressful conditions and realise opportunities that result from anthropogenic climate change (Hoffman and Sgrò 2011). In the ocean environment, for example, climate change will affect the temperature, pH and other stressors, and the adaptive capacity significantly determines how likely a species survives these changes (Foo and Byrne 2016). The adaptive capacity of species depends on their genetic diversity, dispersal ability, and phenotypic plasticity[11]. These factors are to some extent internal to species and vary between them, but extrinsic factors like human influence may constrain adaptive capacity, narrowing down the extent to which it can be realised (Beever et al. 2016).

Human activities reduce or constrain the adaptive capacity of species in many ways. The situation of upper montane trees (Garavito et al. 2015) demonstrates the interlinkedness of such impacts. Upper montane trees typically have a low adaptive capacity because they are thermally specialised, surviving only in narrowly defined conditions, and because the possibilities for migration in the high altitudes are scarce. These trees are threatened by climate change but it is not the only threat to them: other threats involve human-caused forest loss and overexploitation of trees

[10] It can be left open at this point whether the case that species have integrity actually convincingly justifies their standing in the community of justice.

[11] Phenotypic plasticity refers to the capacity of a certain genotype to exhibit different phenotypes (appearances) in different environments.

for human use. Together, these threats encumber the adaptive capacity of montane tree species to changing environmental conditions.

Adaptive capacity is essential for the continued existence of a species over time. It is manifested through the functions of self-development, self-regulation and self-correction pertinent to species integrity, and it is one answer to the question of what a given species is able to do: is it able to respond to changing circumstances? For the reasons provided above, it can be proposed that species have a capability of adaptive capacity that enables or contributes to their overall integrity[12]. Let us now consider more closely four ways in which humans may harm the species integrity or related capabilities.

When human activities cause the extinction of a species, the integrity of a species is irreversibly lost. Extinction evidently means the loss of potential for adaptive capacity. Human-induced extinctions are the clearest case of the (and the most serious in their irreversibility) harm done to species. Many species have faced anthropogenic extinction and even more are threatened with it due to direct or indirect human impacts such as climate change and habitat eradication. The rapidity of changes diminishes the prospects for adaptive self-correction. Habitat losses result in the decline in the genetic diversity of a species and narrow down its dispersal abilities; changes in habitat conditions may also disturb the realisation of the phenotypic plasticity. These all amount to the erosion of the adaptive capacity (Foo and Byrne 2016; Beever et al. 2016).

Extinctions are not the only instance of harm to species. An endangered species loses its integrity if its viability and capacity for self-maintenance without external assistance becomes undermined though it might be possible to revive the viability of the species through protection and assistance.[13] On the other hand, many species are nowadays confined to a significantly smaller range than they historically occupied, yet they may still remain viable in the present conditions. Do

[12] I leave it open whether species may also possess some other capabilities.

[13] Consequently, a 'Noah's Ark' strategy (protecting the species from extinction by keeping minimum viable populations in zoos or like reserves) is insufficient for protecting the species integrity. In such conditions, a species has already lost its capacity for self-regulative and self-maintaining processes (including adaptive capacities).

such cases represent a harm to species? The capability aspect helps address this question. If the adaptive capacity of a given species has been significantly reduced or narrowed by habitat confinement, it can be said that the capability and hence also the integrity of that species has been compromised: although the species may in principle remain viable in the present state, its capacities for adaptation and development in the face of any future changes are undermined. Evaluating the status of confined species in this regard should be done case-by-case and involve experts from conservation sciences.

Another example concerns situations where a species can evolve and exercise self-regulation and self-correction, yet it has to do that as a result of human-generated selection pressures. Human-generated selection pressures may be indirect (the case of the peppered moth) or direct (the breeding of domesticated animals). Whether this counts as harm to species depends on how such pressures restrict the future opportunities of a species. The selection pressure of the peppered moth was restricted and affected only populations in heavily polluted regions. The off-white colour also became common again as soon as the amount of pollution decreased: hence, though human actions created pressure on the moth's adaptive capacity, they did not seem to have permanent influence on it. In the case of dog breeding, the result has been the creation of a new subspecies whose genetic diversification and adaptive capacities have improved over time. In other cases, however, selection pressures may lead to adaptation at the expense of losing a significant range of opportunities for future evolvement. If human selection pressures lead to a significant reduction in the genetic pool of a species, it can perhaps be said that the species has been harmed because its opportunity to survive in a longer timeframe diminishes. This question however warrants further considerations which should employ experts from relevant biological disciplines.

It is not only climate change, nor habitat/resource eradication or maldistribution (that has been the primary concern in Baxter's approach to ecological justice) that harm species. Black rhinos are poached for their horns, which is the main reason for its critical status. Poaching harms

individual beings but also the species as a whole when its specimens get dispersed into small pocket habitats, which diminishes the prospects for gene exchange and reproduction: both the self-maintaining and adaptive capacities of the species are undermined.

## So what if species have capabilities?

I have argued that species do have integrity and capabilities – at least that of adaptive capacity[14] – and that their integrity and capabilities can be harmed in different ways. One of the main criticisms for the ECA has been that it has not provided a convincing account on why the integrity of ecological systems grounds them standing in the community of justice (Nussbaum 2011; 157–161; Cripps 2013, 96–99). Cripps has also problematised the notion of harm with regard to the capabilities of ecological systems with relation to harming. Building a dam is bad for a river system but not in a sense in which it is bad for a plant to be cut down; rather, it is bad in a sense in which wet summer is bad for the Edinburgh ice-cream business. Hence, Cripps argues, the applicability of the notion of harm does not justify the moral significance of ecological systems.

In the concluding section of this paper, I outline three possible strategies for answering this major criticism by introducing three different theoretical-normative roles species integrity and capabilities can play within the ECA. Since the main question of this paper is whether species have capabilities, it falls outside the scope of the present work to provide an examination of the general criticism of the ECA. Hence, I will delimit my treatment to this most pressing question.

The first strategy is to apply the ECA in a way that remains true to Nussbaumian origins as proposing an ideal theory of justice (ideal in the sense that the claims of justice are compatible with each other so that they can be fully met in a just society). Cripps (2013, 98) argues that this is a

[14] I hold that adaptive capacity as a central capability is common to all species as wholes. This leaves it open whether there would be a single set of capabilities that fits all species. Differing capabilities may emerge, for example, on the basis of different sexual reproduction methods, for they also define the ways in which genetic exchange and adaptation can occur.

prerequisite for making the ECA a viable approach to justice. In this strategy, integrity plays an essential and comprehensive role in the pursuit of justice: those beings that have integrity and related capabilities deserve considerations of justice, and arising claims of justice can be the object of an overlapping consensus[15]. Species have standing in the community of justice and this engenders related duties such as the duty not to undermine their adaptive capacity (and perhaps to support it to help adaptation). This strategy faces several challenges. First, it must explain why integrity grounds ecological systems standing in the community of justice. There is intuitive support to the view that the integrity of nonhuman life is morally regrettable. Many philosophers acknowledge that there is something intrinsically wrong in species extinctions[16], wrong which cannot be captured by the notion of harm experienced by individuals or by the instrumental value of species (Schlosberg 2007; Baxter 2005, 4; Cripps 2010, 16). Species have also been argued to have a moral right to exist without anthropogenic extinction (Staples and Cafaro 2012) and to deserve protection for their own sake (Rolston 1985; Smith 2016). Hence, this task may not be hopeless[17] but it certainly requires further work. Second, to meet the conditions of an ideal theory, the ECA should formulate nonhuman capabilities in a way that erases the conflicting claims of justice, or define satisfactory principles for resolving such conflicts without compromising justice. It must also provide an account of the duties of ecological justice that is not impossible to fulfil. (Cripps 2010.) One solution would be to consider the duties of ecological justice as primarily negative duties of non-interference (Schlosberg 2014, 82–83). This is to some extent reasonable in the context of species that are 'endowed with integrity' they maintain unless substantially disrupted. Yet, humans may have already initiated the sixth mass extinction where many species have lost or will lose their integrity in years to come. It is unclear how this fact should be incorporated to an ideal theory of justice, but clearly merely negative duties of non-interference will not do the work.

[15] In Nussbaum's account the potential of overlaping consensus over central capabilities justifies them.

[16] In this paper, the term extinction refers mainly to anthropogenic extinctions, for they are relevant for ecological justice (justice in human–nature relations).

[17] It has also been pointed out in this paper that such a notion of integrity would not lead to the inclusion of (say) lava flows or waterdrops in the community of justice.

The second strategy can be identified from Schlosberg's response to the above critique. He maintains that the ECA endorses a non-ideal, problem-solving theory of justice: its goal is to illuminate the conflicts between justice claims and to help minimise injustice in human interactions with nonhuman nature (Schlosberg 2014, 83–85). As Schlosberg points out, conflicts between humans and the rest of the natural world are inevitable. Whereas in the first strategy it is the task of a political theorist to resolve such conflicts, Schlosberg argues that resolving them is a task of deliberative public sphere, where the ECA provides one viewpoint to contested issues (Schlosberg 2014, 85–88)[18]. In this strategy, integrity plays an essential but incomprehensive role in the pursuit of justice: the claim that species merit considerations of justice because of their integrity need not be the object of overlapping consensus in this strategy. Still, this view also has the burden of proof to explain why integrity grounds the standing in the community of justice. It does not, however, need to erase conflicts between justice claims: they are subject to public deliberation. This strategy can also deal easily with the problem of the overdemandingness of duties, since the goal to minimise injustice remains open to different views on how that might be done while taking into consideration all parties that are recipients of justice. This second strategy faces less theoretical problems than the first one, although it also leaves it uncertain how justice to species will be interpreted and weighed against other kinds of claims of justice in public deliberation.

The third strategy differs from the first two. Ingrid Robeyns (2016) demonstrates that a great deal of capabilitarian scholarship extends beyond theorising justice to areas like comparative quality-of-life assessment, research on social phenomena using capabilities terminology, and theoretical and conceptual work on values other than justice. This opens up the possibility that the ECA can examine and apply the capabilities framework to species without making any claims of justice[19]. One way to apply the capability terminology to species (and nonhuman life generally)

[18] This departs from Nussbaum who attributes political theorists the role of a theorist–mediator 'above' citizens, rather than of a theorist–citizen who offers carefully constructed theoretical doctrines for citizens to be endorsed (or rejected) (Robeyns 2016, 410–411). Capabilities-based approaches allow for employing either of these roles.

[19] The third strategy leaves room for different answers on the normative implications of the species integrity.

would be to use it for a quality-of-life assessment, broadly understood: life including its nonhuman forms of presence. The development of our societies could be evaluated in relation to their impact on species' (and other nonhuman) capabilities. When we look at the era of (post-)industrialisation and the expansion of human population, it is axiomatic that the life/ecological development index would look bad considering the rate of anthropogenic extinctions and environmental degradation. The environmental capabilities framework could also be applied for policy evaluation and for resolving the practical problems of species protection policies. Given that societies lack sufficient resources for taking measures to protect all possible species, capabilities framework provides one way to make prioritisations and resolve conflicts. Consider the proposal that devoting half of the Earth's surface to protection could save 80 to 90 percent of current species (Wilson 2016; for doubts on the effectiveness of this proposal, see Sandler 2012, 55–74). From a capabilities perspective, this proposal appears promising. It would support the adaptive capacity of a considerable amount of species without conflicting with central human capabilities. Land protection would restrict land-intensive human functionings but still allow the realisation of related capabilities, the equal land and property rights between humans, if protection measures are planned wisely. Another example comes from the question of how to prioritise protection measures when distinguishing between anthropogenic and other impacts that threaten species is not straightforward. Poaching involves a direct causal link between human actions and endangerment, but often the connection is more complicated, like with climate change. Ian A. Smith (2016, 124) proposes that the weight of our duty to save a species correlates positively with the strength of that causal link: if we had to choose between saving a species threatened by hunting and another endangered by climate change (the most attenuated causal link), we should prioritise saving the former. Although Smith defends his conclusion as logical, it is unconvincing. The ECA approaches the question differently. Saving a species from poaching is unlikely to save other species, except for those that directly depend on the

Although species are not considered as recipients of justice, they may be (and likely are) morally considerable anyway.

poached species. In contrast, saving a species threatened by climate-induced changes is likely to promote the protection of ecosystems and other vulnerable species in the same area. Hence, if we had to choose between saving a poached species and another threatened by climate change, the ECA would recommend saving the latter to protect the overall nonhuman flourishing more widely. In my view, this resolution is more plausible than Smith's as soon as we look at the environmental problems from a broader perspective. Human activities are largely responsible for the majority of present extinctions and the aim should be to protect the whole of species diversity rather than treat species as if they were independent applicants for protection, even if the holistic protection strategy yields the risk of having 'beneficiaries' that are protected without having been harmed by humans.

This third strategy for applying the notion of species capabilities rejects the language of justice that was quite central for Schlosberg especially in his early treatment of the ECA (Schlosberg 2007). Yet it is perfectly compatible with the ECA project since capabilitarian research does not necessitate theorising justice (Robeyns 2016). Like the justice-oriented strategies, the third strategy illuminates the ways in which human activities undermine the integrity and flourishing of nonhuman life and helps address these concerns with the capabilities terminology. The third strategy deserves further research, as it avoids many of the problems regarding the first and second strategy but provides still equally useful conceptualisations for species protection and policy evaluation.

**Discussion**

Whichever strategy one chooses for applying the notion of adaptive capacity as a central species capability, strategies have common features that demonstrate the overall advantages of the ECA. The ECA broadens the scope of our concern regarding species in contrast to views that focus narrowly on extinctions or species viability in a given time. For example, regardless of whether the

ECA is applied in a way that evokes some duties of justice or not, it challenges the assumption that the distribution of ecological space is merely an issue of social justice or equity between human beings (Peeters, Dirix and Sterckx 2014). Even the notion that social justice should be exercised within the limits of environmental sustainability is insufficient, because sustainability is usually defined with regard to future humans and does not involve 'useless' or unknown species. Another advantage is that the ECA avoids speciesism because its core features, integrity and adaptive capacity, are possessed by all species. Accounts that attach species only instrumental value disregard 'useless' species whose ecological functions can be replaced by other species. Even non-instrumentalist approaches can be speciesist: Smith (2016, 81–94) views the intrinsic good of species as relying on sexual reproduction, which excludes some invertebrates, even some fish speciesf, and many plants from the sphere of concern. This is strongly counterintuitive: it sounds odd to claim that our duties to protect species do not concern a given fish species because its reproduction methods are asexual.

There are several unresolved questions that warrant further research. The theoretical issues involve the question whether species also possess other capabilities; identifying them is a multidisciplinary task that requires the utilisation of biological and conservation sciences. There may also be some genus-specific capabilities. Another important topic would be the status of subspecies. Following the Hennigian species concept, Smith (2016, 4) points out that subspecies are not real in the same sense as species are. Hence, the preservation of a subspecies like the Bengal tiger cannot rely on the same principles that evoke duties to species. I have made less strict ontological commitments but nevertheless argued that species integrity is linked to their status as real evolutionary groups. Subspecies comprise a heterogeneous category instead. Some subspecies are merely taxonomical, 'made up' by decisions based on differences in appearance. Others are less arbitrary, however. The Saimaa ringed seal (*Pusa hispida saimensis*), one of the most endangered mammals according to many conservationists, has been isolated for millennia and adapted to

freshwater ecosystems. It would have a hard time trying to survive in saltier waters where other ringed seals live, which clearly distinguishes it in a very real sense. The Saimaa ringed seal has its own integrity and identity and something unique is permanently lost if it becomes extinct. In any case, addressing species and subspecies protection in the non-academic realm requires contextual sensitivity rather than theoretically rigorous criteria that end up excluding all subspecies from the domain of concern (Oksanen 2016).

Practical applications of the ECA to species are numerous and resolving them has not been the aim of this paper, due to which I only want to mention two important topics for future reseach. One is genetic modification. It interferes with the self-regulative capacities of a species and has been argued to violate species integrity in the case of *Homo sapiens* (Miller 2013), but it may also improve the adaptive capacity. This raises the question whether (and what kind of) genetic modification would be morally justifiable to protect species from climate change[20]. Human-controlled breeding of nonhuman species, including the creation of new subspecies, is another issue that calls for further evaluation.

The present paper has illustrated how the ECA can be applied to species and, in so doing, it has addressed questions that have received contradictory answers in earlier literature. Among the advantages of the ECA, as discussed in the previous section, are its holistic approach to species protection, and terminology in which all species merit protection – not just 'useful' or sexually reproducing ones. The paper has also pointed out, importantly, that there are three possible ways in which the ECA can actually be applied: the chosen strategy determines both the outcomes of such theorising and theoretical challenges that require addressing. The present paper is best viewed as an opening in a discourse that offers conceptual and theoretical tools for addressing human–species relations from a novel viewpoint, that of environmental capabilities.

[20] A related question is whether the 'identity' of a given species is lost in such practices and, particularly in the case of sentient beings, whether the individual well-being is promoted or hindered by genetic manipulation. For example, a manipulation method that would help save a species but make its future specimens suffer at the individual level, is unlikely permissible from any viewpoint.

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