

Applying the Capabilities Approach to Ecosystems: Resilience as Ecosystem Capability

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The capabilities approach has attracted broad interest in environmental ethics. One very interesting application is the environmental or extended capabilities approach, which promotes the notion of environmental capabilities that contribute to the flourishing of nonhuman beings and ecological systems. The approach, however, lacks any account of the capabilities of ecological systems. The environmental capabilities approach can be applied at the ecosystem level with the flourishing of an ecosystem understood in terms of capabilities. Ecosystem flourishing presumes the ability of a given system to maintain its characteristic functions, diversity, and quality, and to do so even in the face of various disturbances. Resilience can be understood as a central capability of ecosystems to maintain their characteristic functioning in disruptive circumstances, which is particularly important with regard to human-induced environmental changes. This approach evokes duties of ecological justice regarding ecosystems. These duties in terms of the environmental capabilities approach can promote more holistic decision making.

INTRODUCTION

The capabilities approach, especially in the form of central capabilities approach established by Martha Nussbaum,¹ has become a prominent framework for theorizing social justice (fairness in the relations between society and the individuals) during the last decade. It has also inspired several applications that go beyond the social sphere and apply the notion of capabilities to environmental issues. These contributions deal with climate change adaptation,² nonhuman animals,³ and

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¹ The capabilities approach to social justice focuses on what each person is able to do and to be, or his or her opportunities and freedoms. This is a remarkable difference to distributional approaches that focus on the distribution of goods or bads. The central capabilities approach is a particular version of the capabilities approach. It maintains that there are certain central capabilities which are essential for any conception of (human or sentient) well-being; these capabilities and their relation to justice will be introduced later in this article. Martha Nussbaum, *Women and Human Development: The Capabilities Approach* (Cambridge: Cambridge University Press, 2000); Martha Nussbaum, *Frontiers of Justice. Disability, Nationality, Species Membership* (Cambridge: Harvard University Press, 2006); and Martha Nussbaum, *Creating Capabilities* (Cambridge: Harvard University Press, 2011), are among Nussbaum's most central works in this respect.

² Kenneth Shockley and Andrew Light, "Sourcing Stability in a Time of Climate Change," *Environmental Values* 23 (2014): 199–217.

³ Nussbaum, *Frontiers of Justice*; Ramona Ileá, "Nussbaum's Capabilities Approach and Nonhuman

environmental and ecological justice⁴—to mention but a few of the contributions. Environmental justice incorporates environmental matters into the social justice discourse by making them an important ingredient of justice. Ecological justice, in contrast, makes nonhuman nature (or certain parts of it) a recipient of justice: it concerns fairness in human-nature relations—and theories of ecological justice are aimed at clarifying how this fairness should be understood.

Of particular interest here is the incorporation of the capabilities approach and ecological justice that expands the sphere of justice to include the nonhuman realm as a recipient of justice. This account was introduced by David Schlosberg⁵ as the extended/expanded capabilities approach. While the extended capabilities approach adopts the core ideas from the central capabilities approach of Nussbaum, it also differs in significant ways. Most importantly, the community of ecological justice consists of not only humans but living entities, including nonhuman beings as well as biotic systems (such as habitats and ecosystems).⁶ This shift from humans to nonhumans and the inclusion of systemic entities raises questions about how the capabilities approach can be applied in such novel cases, a question to which I aim to provide a partial answer.

The core idea of extended capabilities, as laid out by Schlosberg, can be considered as an extensive and interesting opening, but not a mature theory of ecological justice. Perhaps the most pressing question is left unanswered: what are those environmental capabilities that ought to be protected or promoted? This gap is also noted by Elizabeth Cripps,⁷ who argues that Schlosberg “owes us an account of the central capabilities of ecosystems which can avoid . . . dangers whilst still maintaining the idea of fulfilling some positive duty to ecosystems.” The dangers Cripps refers to are that (1) securing ecosystem capabilities would lead to detrimental efforts to “hold time still” and that (2) all human interactions with the nonhuman world become in this view morally unacceptable.

Schlosberg himself distinguishes theoretical considerations from the capabilities

Animals: Theory and Public Policy,” *Journal of Social Philosophy* 39 (2008): 547–63; and Christine M. Reed, “Enriching the Lives of Wild Horses: Designing Opportunities for Them to Flourish,” *Environmental Values* 21 (2012): 317–29. For criticism on Nussbaum’s account, see Daniel L. Crescenzo, “The Problem of Predator-Prey Relations and Predator Flourishing in Nussbaum’s Capabilities Approach to Justice,” *Environmental Ethics* 34 (2012): 177–97.

⁴ David Schlosberg, *Defining Environmental Justice: Theories, Movements, and Nature* (Oxford: Oxford University Press, 2007); David Schlosberg, “Climate Justice and Capabilities: A Framework for Adaptation Policy,” *Ethics and International Affairs* 26 (2012): 445–61; Breena Holland, “Justice and the Environment in Nussbaum’s ‘Capabilities Approach’: Why Sustainable Ecological Capacity Is a Meta-Capability,” *Political Research Quarterly* 61 (2008): 319–32; and Breena Holland, “Environment as Meta-Capability: Why a Dignified Human Life Requires a Stable Climate System,” in *Ethical Adaptation to Climate Change: Human Virtues of the Future*, ed. A. Thompson and J. Bendik-Keymer, (Cambridge: MIT Press, 2012), pp. 145–64.

⁵ Schlosberg, *Defining Environmental Justice*.

⁶ *Ibid.*, pp. 147–51.

⁷ Elizabeth Cripps, “Saving the Polar Bear, Saving the World: Can the Capabilities Approach Do Justice to Humans, Animals and Ecosystems?” *Res Publica* 16 (2010): 13.

list itself, asserting that “[l]aying out a *theory* of capabilities as an element of ecological justice is one thing; the details will take much more work—an interdisciplinary project of theorists, ecologists, and a variety of other participants.”⁸ Yet, justifying the extended capabilities approach would require a more detailed discussion concerning the capabilities themselves. After all, many advantages or problems of the approach can be thoroughly discussed only after there is some idea about what kinds of capabilities there are. Furthermore, the interdisciplinary project for defining the capabilities is unlikely to occur before the framework itself has achieved more credibility.

In this paper, my aim is to provide a partial answer to the lack of environmental capabilities, keeping the focus on the ecosystems that were discussed in Cripps’s critique. This task is divided into three main parts. In the first part, I introduce the key points of the extended capabilities approach, or the environmental capabilities approach as I call it, since this label distinguishes the approach from a different account that has earlier been called the extended capabilities approach.⁹ After that, the notions of ecosystem well-being, functionings, and capabilities are clarified to the extent that is necessary for the main argument of this paper. This discussion is conjoined with the ecological and biological sciences. In the third and final part, I link together ecosystem resilience, flourishing and capabilities, thereby constructing an argument for considering resilience a central ecosystem capability. To connect this with broader discussion and practice, the concluding remarks contain some suggestions on how the environmental capabilities approach could be applied at the policy level.

FROM HUMAN TO ENVIRONMENTAL CAPABILITIES

The capabilities approach puts an emphasis on the question of what each person is able to do and to be: in other words, their *capabilities*.¹⁰ Capabilities enable access to various functionings (states of beings and doings), of which people choose those that are compatible with their own life plan, preferences, and their own conception of the good life. The focus is on the range of opportunities, and the capabilities framework does not entail an objective account of well-being. From these premises, Nussbaum has further developed her own capability-based theory of basic social justice, the central capabilities approach. Her account defends the idea of central capabilities, which are essential for the pursuing of any conception of the good life, and securing and promoting them is a necessary condition of social justice.¹¹

The list of central capabilities has been slightly revised during further developments

⁸ Schlosberg, *Defining Environmental Justice*, p. 157.

⁹ Holland, “Justice and the Environment,” discusses this approach. The extension concerns environmental sustainability that should be added into central human capabilities as a type of “meta-capability” that is a precondition for enabling other capabilities.

¹⁰ Nussbaum, *Creating Capabilities*, pp. x; 17–18.

¹¹ *Ibid.*, p. 76.

of the approach. At present, the central capabilities include entitlement to (1) life (of normal length and worth living); (2) bodily health; (3) bodily integrity; (4) the use of senses, imagination, and thought; (5) feeling different emotions; (6) exercising practical reason and forming one's own conception of the good life; (7) affiliation with others and self-respect; (8) living with concern for or in relation to other species and the natural world; (9) play; and (10) political and material control over one's environment.¹²

Nussbaum has also extended the scope of the capabilities approach, suggesting a modified version of the list of capabilities applicable to sentient nonhuman animals,¹³ yet reminding that the composition of central capabilities may vary greatly depending on what constitutes the well-being and what are the distinctive characteristics of the individuals of a particular species. She has also discussed the ways in which the list could be practically applied to animal welfare, although the discussion is left somewhat open for later complements. Nussbaum's view on nonhuman animal capabilities has also received criticism, as it seems to suggest some kind of "sanitization" of nature, demanding the control of, e.g., predator-prey relationships, which are usually considered to fall outside the moral sphere (and so do not need intervention) in environmental ethics.¹⁴

The capabilities approach is generally person-oriented and, similarly, Nussbaum's account adopts a plainly individualistic stance toward justice. What happens to a particular species is not an issue of justice.¹⁵ However, many environmental ethicists share the intuition that species matter as well, even in terms of justice.¹⁶ In the case of species extinction caused by human action, "there seems to be something further going wrong . . . that is not captured by the harm to the individual: something to do with the fact that, as a result of human activity, the species polar bear and snow leopard are likely to become extinct."¹⁷ Moreover, if an environmentalist had to choose between saving three common red squirrels or one Amur leopard, there would probably be a broad agreement on saving the critically endangered Amur leopard, although it would entail a greater amount of (killed or suffering) individuals. Ecological justice is concerned with such systemic entities; consequently, the capabilities approach is not of great value for ecological justice unless it is significantly modified in these terms. However, it is possible to develop and alter the approach to involve systemic entities as well.

This idea has been developed further in the environmental capabilities approach, a capabilities-based approach to ecological (and environmental) justice coined by

¹² Ibid., pp. 33–34.

¹³ Nussbaum, *Frontiers of Justice*, pp. 325–405.

¹⁴ Schlossberg, *Defining Environmental Justice*, pp. 151–52; Crescenzo, "The Problem of Predator-Prey Relations."

¹⁵ Nussbaum, *Frontiers of Justice*, p. 357.

¹⁶ See Brian Baxter, *A Theory of Ecological Justice* (London: Routledge, 2004).

¹⁷ Cripps, "Saving the Polar Bear," p. 16.

David Schlosberg.¹⁸ This approach adopts its core from the human capabilities approach, but the focus on ecological justice brings about fundamental differences in two respects: non-sentient beings as well as systemic entities like habitats are included in the community of justice. Ecological justice is not a replacement, but a complement for social and environmental justice. Conflicts between different views and recipients of justice are inevitable, and resolving them can be difficult. This problem is unavoidable in ecological justice more generally: it is not unique to the environmental capabilities approach. Addressing these conflicts in a detailed manner goes beyond the scope of this paper, and I do not intend to deny its significance; however, I do briefly discuss below how the environmental capabilities approach actually might provide a promising framework for resolving these conflicts.

The environmental capabilities approach focuses on the well-being or flourishing of nonhuman life. Defining this state of flourishing and the corresponding central capabilities enabling it comprises the heart of this approach. At this point it can be noted that while capability and functioning are important concepts here as in the capabilities approach, Schlosberg prefers to speak about flourishing or integrity (of nature) instead of dignity, which has been chosen as a central term by Nussbaum.¹⁹ The overall nonhuman flourishing is a broad idea, and in this paper the scope is restricted to ecosystems. Ecosystem capabilities make up one subset of environmental capabilities; another subset would comprise, for example, the species-related capabilities of certain animals and plants.

The flourishing of ecological systems is important for two reasons. First, the flourishing of individuals is always closely related to the environment it inhabits: separating the two is impossible. Second, Schlosberg argues that systems are “living entities with their own integrity; atomizing nature into isolated animals devalues a form of life, and the way that this form of life flourishes.”²⁰ Integrity is not an unproblematic concept and can be defined in different ways,²¹ but despite the ambiguity, I hold the main point to be viable: it is important to consider the flourishing of biotic systems as morally important and irreducible to individual flourishing.

In the capabilities approach, promoting ecosystem well-being means promoting the ecosystem capabilities, which often means “deconstructing the impediments to nature’s own capabilities to fully and continually function.”²² According to this

¹⁸ Schlosberg, *Defining Environmental Justice*, offers the first broad discussion on these topics. Rather than a complete theory in itself, Schlosberg’s treatment offers a “blueprint” and conceptual framework for theorizing ecological and environmental justice.

¹⁹ *Ibid.*, pp. 145–47.

²⁰ *Ibid.*, p. 148.

²¹ See Laura Westra, *Living in Integrity: A Global Ethic to Restore a Fragmented Earth* (Lanham, Md.: Rowman and Littlefield, 1998), for the discussion on defining and measuring integrity. An interpretation of the notion of integrity in the environmental capabilities context has been offered in Daniel L. Crescenzo, “Loose Integrity and Ecosystem Justice on Nussbaum’s Capabilities Approach,” *Environmental Philosophy* 10 (2013): 53–74.

²² Schlosberg, *Defining Environmental Justice*, p. 150.

conception of ecologically just action, injustice is done when nature's capability to reach its functioning is obstructed or eradicated. These considerations give rise to a follow-up question: what are these capabilities and functionings of a natural system or, in the case of this paper, an ecosystem? Although Schlosberg in most cases speaks about the capabilities of nature in a general sense, I deliberately take a more limited scope, discussing particular ecosystems in this paper.

There are several reasons why the environmental capabilities approach deserves more attention. First, it binds the academic discussion together with views expressed by environmental and ecological justice movements. It also provides a common language that can be shared, to a certain extent, by both academics and environmental and ecological movements. Second, it is a multidimensional rather than a narrowly distributional approach: by integrating the elements of participation, recognition, and capabilities with distribution, it reaches beyond the distributional injustice and allows a deeper structural analysis of injustice. Third, the environmental capabilities approach has potential to advance the transition from environmental "sick care" to "health care" in politics or, in other words, the transition toward ecological sustainability that aims to prevent problems beforehand rather than just fix them afterward.

To grasp what the ecosystem capabilities could include, it is necessary to have an understanding of what it means for an ecosystem to flourish and how that can be linked with the functioning(s) of a particular ecosystem. Given that ecosystems represent a very different kind of entity from human persons or even individual animal beings, how can we apply the core concepts of the capabilities approach in the case of ecosystems?

ECOSYSTEMS: FUNCTIONING AND FLOURISHING

In the capabilities approach, different states of being and doing are called functionings: reading, eating, raising children, and being healthy are examples of human functionings. They are results of actualized capabilities²³ and contribute to the well-being of the being in question. The relation between capabilities and functionings is asymmetrical: one capability usually enables a broad variety of functionings, whereas some functionings presume several capabilities.

In the ecological sphere, there is a similar connection between functionings, capabilities, and flourishing. As Schlosberg puts it, the central question for ecological justice is whether a living system can transform "primary goods into capabilities, functionings, and the flourishing of the whole system."²⁴ At certain points, Schlosberg refers to an "overall capability" (of an ecological system) to fully function. Yet, that overall capability consists of various other capabilities that are central, or essential, to the full functioning of that particular system and its flourishing. What

²³ Nussbaum, *Creating Capabilities*, pp. 24–25.

²⁴ Schlosberg, *Defining Environmental Justice*, p. 149.

is needed to make this theoretical constellation more applicable is the definition of a flourishing life and the list of capabilities essential to it.²⁵ This task starts by addressing ecosystem flourishing (or well-being, the terms being used here interchangeably). In this shift from social to ecological realms of well-being, the work done by philosophers or political theorists is insufficient. This is important because ecosystem flourishing is not always identifiable for those who are laymen in the context of ecological knowledge: a primeval forest with an abundance of decaying material or a bare mire in its natural state may seem unattractive and perhaps “ill-being” for many; yet both habitats might be flourishing and maintaining their overall functioning in a great way. People with expertise in ecology, conservation biology, or similar disciplines are better equipped to evaluate the condition of an ecosystem.

Creating an exhaustive, universal definition of ecosystem flourishing would be an enormous task needing innumerable context-sensitive conditions and provisos. This is not surprising: even creating an all-encompassing definition of human well-being would be practically impossible (if such a definition respects a pluralist rather than an objective account of well-being), and ecosystems are even more complex entities—and less familiar to us—than individual human persons. However, defining relevant capabilities does not require such an explicit account of ecosystem well-being: a description that captures the essential features of it suffices. This applies to Nussbaum’s central capabilities approach as well. It refrains from endorsing any objective account of well-being and emphasizes opportunities. Having a capability means having options within a space of freedom and having enough capabilities enables flourishing that still enables different ways of life.²⁶ In that account, the defined central capabilities are those that, according to Nussbaum, are necessary for realizing practically any conception of a good human life. In a similar way in our case, understanding what is *central* in ecosystem flourishing helps to understand what is central at the level of capabilities, and all-encompassing definitions are not needed. Whereas the central capabilities approach aims to promote human freedom, in the case of ecosystems and ecological justice, a similar aim is to leave the systems with an open future, one within which they have opportunities to function.

The essential constituents of ecosystem well-being have been perhaps most comprehensively discussed in a broad work of Robert Prescott-Allen that proposes an ecosystem well-being index (EWI) for measuring the overall state of ecosystems.²⁷ Prescott-Allen defines *ecosystem well-being* as “a condition in which the ecosystem maintains its diversity and quality—and thus its capacity to support people and

²⁵ Ibid., p. 143.

²⁶ Nussbaum, *Creating Capabilities*, pp. 39; 109–10. This does not entail that enabling all possible capabilities is preferable: there are capabilities and functionings that are harmful to others, such as the ability to use physical control over one’s family.

²⁷ Robert Prescott-Allen, *The Wellbeing of Nations: A Country-by-Country Index of Quality of Life and the Environment* (Washington, D.C.: Island Press, 2001), pp. 5 and 59.

the rest of life—and its potential to adapt to change and provide a wide range of choices and opportunities for the future.” Prescott-Allen’s ecosystem well-being indicator consists of five sub-indices: (1) land, (2) water, (3) air, (4) species and genes, and (5) resource use, each having two factors (diversity and quality) that contribute to ecosystem well-being.²⁸ This definition of *ecosystem well-being* has been later cited and reviewed by many researchers²⁹ and it provides an informed basis for discussing ecosystem capabilities, although minor modifications make the notion fitter for the capabilities framework. In this paper, *ecosystem flourishing* is defined as a condition in which the ecosystem can perform and maintain the functions characteristic of it, and exhibit and sustain its quality and diversity. A flourishing ecosystem supports life processes that exist within or are connected with that system.

Prescott-Allen has further operationalized the sub-indices into ten measurable elements, such as habitat and species diversity and the degree of soil degradation.³⁰ At least some of the measurable constituents of ecosystem well-being could be considered as ecosystem functionings, states of doing or being, in themselves: consider the land being undegraded or degraded, the water being unpolluted or polluted, and so on. The ecosystem well-being index then offers guidance in defining ecosystem capabilities: proposed capabilities should have an intelligible role in enabling (at least some of) the aforementioned operationalized constituents of ecosystem well-being. Moreover, the ecosystem well-being lends general support to the idea that there are commonalities across the ecosystems that allow us to talk about ecosystems as things that have functionings and capabilities.

Some ecosystem capability candidates may actually correspond rather directly to the functionings listed. In Nussbaum’s central capabilities approach, the second central human capability was bodily health; it is arguable that soil health (sufficiently low level of degradation of soil) could be an ecosystem capability in the land ecosystems, resembling the human bodily health capability. I am not going to make a decisive argument about whether this actually is the case, but the idea deserves consideration. However, many other listed elements seem to have a more complex relationship to the corresponding capabilities: what actually are the capabilities that enable species diversity, for instance? As the issue of diversity is repeated several

²⁸ Ibid., pp. 7 and 59.

²⁹ See for example T. M. Parris and R. W. Kates, “Characterizing and Measuring Sustainable Development,” *Annual Review of Environment and Resources* 28 (2003): 559–86; J. Wilson, P. Tyedmers, and R. Pelot, “Contrasting and Comparing Sustainable Development Indicator Metrics,” *Ecological Indicators* 7 (2007): 299–314; and R. K. Singh, H. Murty, S. K. Gupta, and A. K. Dikshit, “An Overview of Sustainability Assessment Methodologies,” *Ecological Indicators* 9 (2012): 281–99.

³⁰ Land assessment measures both the diversity of the habitats and (species) communities and the degree of soil degradation. Water indices contain the factors of community and habitat diversity and the amount of pollutants. Air and atmosphere quality depend on the amount of pollutants and the chemical balance in the global atmosphere. The species and genes dimension refers to the amount of both wild and domesticated species. The resource use is measured by the energy and material consumption and the resource extraction exercised by humans. (Prescott-Allen, *The Wellbeing of Nations*, pp. 60, 67–93.)

times in the operationalized version of the ecosystem well-being index, it is crucially central for the whole question of ecosystem capabilities. Hence, in the rest of this paper I focus on a capacity that I propose as a capability central to various kinds of ecosystems, one that is strongly linked with the issues of diversity: resilience.³¹

ECOSYSTEM RESILIENCE

Over the last decades, resilience has attracted broad and diverse discussion in social and environmental sciences. A common distinction is made between engineering resilience (the physical sense of resilience), ecological resilience, and evolutionary resilience. All these share the idea of the ability to move either back or forth to another preferred state (stability domain) after disturbances; engineering resilience has only one such stability domain, whereas ecological and evolutionary resilience may have several of them.³² *Social-ecological resilience* is a newer term that denotes the “ecological kind of resilience,” but addresses resilience at the level of coupled social-ecological systems that include both ecological and social properties, acknowledging that the social and ecological dimensions of our lifeworld cannot be separated. Social-ecological resilience refers to the amount of disruption a system can absorb before changing its structure, the system’s capacity of self-organization, and its ability to develop capacities for learning and adaptation.³³ In this paper, my focus is on the resilience of ecosystems (including humans inhabiting them), which comprises one important constituent of the overall social-ecological resilience. Interactions between the different constituents of social-ecological resilience would deserve further scrutiny, and approaching them with the capabilities framework might raise important questions about the relationship between environmental, collective, and central human capabilities.³⁴

³¹ While proposing a complete ecosystem capabilities list would be a more impressive accomplishment, the extent of such a task greatly exceeds the length of an article because Nussbaum’s human capabilities list does not provide much backbone for an ecosystem capabilities list. This is due to differences between human persons and ecosystem entities.

³² S. Davoudi, K. Shaw, L. J. Haider, A. E. Quinlan, G. D. Peterson, C. Wilkinson, H. Fünfgeld, D. McEvoy, and L. Porter, “Resilience: A Bridging Concept or a Dead End?” *Planning Theory and Practice* 13 (2012): 299–307.

³³ F. Berkes, J. Colding, and C. Folke, *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* (Cambridge: Cambridge University Press, 2008): p. 13. For the relations between social and ecological properties and their interactions, see F. S. Chapin III, G. P. Kofinas, and C. Folke, eds., *Principles of Ecosystem Stewardship: Resilience Based Natural Resource Management in a Changing World* (New York: Springer, 2009).

³⁴ On collective or community capabilities, see Peter Evans, “Collective Capabilities, Culture, and Amartya Sen’s *Development as Freedom*,” *Studies in Comparative International Development* 37 (2002): 54–60; S. S. Ibrahim, “From Individual to Collective Capabilities: The Capability Approach as a Conceptual Framework for Self-Help,” *Journal of Human Development* 7 (2006): 397–416; and David Schlosberg and David Carruthers, “Indigenous Struggles, Environmental Justice, and Community Capabilities,” *Global Environmental Politics* 10 (2010): 12–35.

A resilient ecosystem can absorb disturbances if its ecological interactions reinforce and support one another, for instance when there are several species with similar ecological functions.³⁵ Ecosystem resilience has been operationalized in various ways and relevant indicators depend on the particular system in question. For example, the ecological resilience of lake districts can be evaluated by measuring the soil phosphorous and the animal stock density, whereas in the rangelands, as a proper indicator would be the shrub:wood ratio.³⁶ Lance H. Gunderson³⁷ has summarized the ongoing research on resilience and its indicators broadly. In particular, much attention has been paid to the relationship between biodiversity and resilience: biodiversity is suggested to provide cross-scale resilience. It is also often acknowledged that human actions affect ecosystem resilience.

As a work of ecological justice (or justice in human-nature relations), this paper is focused particularly on human-induced stresses and disruptions to the ecosystems. Often the origin of a particular disruption cannot be determined as completely anthropogenic. Still, the current course of human actions—emitting high levels of greenhouse gases, discharging pollutants and toxins such as heavy metals, using renewable resources faster than they regenerate, and so forth—evidently increases the amount of anthropogenic disturbances to ecosystems. Moreover, many of the current environmental problems are already overdetermined in the loosely used sense of the term: even a smaller amount of stress would have caused the problem. Ecosystems have confronted disruptions already before the dawn of *Homo sapiens*. The main problem with current anthropogenic disruption is the extent and rate of interference, which leads to the degradation of the ecosystems in various ways. Our current knowledge suggests that short periods of abrupt and extensive changes have occurred five times in the course of history, causing an event or wave of mass extinction. Now, humans are possibly causing the sixth wave of extinction; and for the first time, it is being caused by moral agents. If so, it invokes moral responsibilities to which I return in the concluding discussion.

In these circumstances, the ability to withstand stresses and shocks is necessary for any ecosystem to maintain its key functionings that enable its flourishing. The importance of resilience (and management that aims to promote resilience) has been widely acknowledged both on the ecosystem and planetary levels, starting from the introduction of ecological resilience and continuing actively in the contemporary discussion.³⁸ It can

³⁵ Ibid.

³⁶ Steve Carpenter, Brian Walker, J. Marty Anderies, and Nick Abel, "From Metaphor to Measurement: Resilience of What to What?" *Ecosystems* 4 (2001): 765–81.

³⁷ Lance H. Gunderson, "Ecological Resilience—In Theory and Application," *Annual Review of Ecology and Systematics* 31 (2000): 425–39.

³⁸ Originally, resilience was introduced in ecological studies in C. S. Holling, "Resilience and Stability of Ecological Systems," *Annual Review of Ecology and Systematics* 4 (1973): 1–23. Among the most cited pieces in the contemporary discussion are Garry Peterson, Craig R. Allen, and C. S. Holling, "Ecological Resilience, Biodiversity, and Scale," *Nebraska Cooperative Fish and Wildlife Research Unit—Staff Publications* 4 (1998) (<http://digitalcommons.unl.edu/ncfwrstaff/4>), and Gunderson, "Ecological Resilience." A pioneering work in the field of social and ecological resilience is Neil W.

be argued that in such circumstances, ecological justice creates an obligation to protect and promote ecosystem resilience. Within the capabilities framework, this invokes a case for arguing that resilience is a central ecosystem capability that is closely linked with biodiversity, an important constituent of ecosystem well-being. This argument deserves a closer inspection.

LINKING ECOSYSTEM RESILIENCE, FLOURISHING, AND CAPABILITIES

Anthropogenic environmental degradation harms and places stress on the elements that were earlier listed as constitutive to ecosystem well-being, such as diversity, nutrient cycles, and the air and land quality. This encumbers the well-being of an ecosystem. In many cases, the harmful actions have a negative effect also on the resilience of ecosystems.³⁹ In addition, disturbances continue to arise from nonhuman grounds as well, which increases the amount of total stress faced by ecosystems.

Ecosystem flourishing and overall functioning requires proper functioning of various elements that are captured, for example, in the environmental well-being index. These factors are either in themselves, or closely linked to, the states of being and doing: the central functionings of an ecosystem. These functionings that are essential constituents of ecosystem flourishing (a condition where the ecosystem can perform and maintain the functions characteristic of it) are threatened and harmed by anthropogenic disruptions.

However, a resilient ecosystem can absorb more such disturbances, leaving room for the adaptation and dynamic reorganization of key functionings. Ecosystems that lack resilience are susceptible to non-linear and non-predictable changes and the breakdown of functionings essential for the identity, integrity, and flourishing characteristic of them.⁴⁰ This does not mean that resilience is about maintaining a stable compilation of populations and processes that would not change at all. Social-ecological resilience assumes multiple stability domains, and the combination of populations in the system may vary.⁴¹ What matters is the rate and nature of the changes and whether the habitats have the chances for adaptation in a way that the ecosystem can remain as the kind of system it has been—in other words, able to maintain its identity.

The close relationship between ecosystem resilience and functioning should be

Adger, "Social and Ecological Resilience: Are They Related?" *Progress in Human Geography* 24 (2000): 347–64.

³⁹ C. S. Holling and G. K. Meffe, "Command and Control and the Pathology of Natural Resource Management," *Conservation Biology* 10 (1996): 328–37. See also Peterson et al., "Ecological Resilience," and Gunderson, "Ecological Resilience."

⁴⁰ For resilience and identity, see G. S. Cumming, G. Barnes, S. Perz, M. Schmink, K. E. Sieving, J. Southworth, M. Binford, R. D. Holt, C. Stickler, and T. Van Holt, "An Exploratory Framework for the Empirical Measurement of Resilience," *Ecosystems* 8 (2005): 975–87.

⁴¹ Adger, "Social and Ecological Resilience," p. 349.

rather apparent now: resilience is necessary for the dynamic maintenance of the key ecosystem functionings in a world of unavoidable disruptions. Yet, this description could be made even without an appeal to the capabilities framework: it does not sufficiently justify the claim that resilience should have a role in the capabilities list. Thus, I next discuss the reasons for considering resilience an ecosystem capability rather than a functioning or some other interesting feature of ecosystems. After that, I show why resilience should be included in the list of central ecosystem capabilities.

Human capabilities define what a person in question is able to do and to be.⁴² Ecological capabilities, on the other hand, are elements in the chain where primary goods are transformed into capabilities and then into functionings that constitute the flourishing of the system.⁴³ Combining these definitions, ecosystem capabilities answer the question of what an ecosystem is able to do and to be in terms of transforming its primary goods into functionings that contribute to ecosystem flourishing. Resilience indeed defines to a significant extent what a given ecosystem is able to do and to be in the world of unavoidable disruptions. When various disruptions threaten the processes in which primary goods are transformed into functionings (that constitute the ecosystem flourishing), resilience allows for alternative ways in which the transformation can be rearranged so that the functionings peculiar to that particular system can be maintained. This is illustrated in the finding that several species with similar ecological functions often make ecosystems more resilient.⁴⁴ This can be now formulated in a language similar to Nussbaum's list of central human capabilities.⁴⁵ Having the capability of ecosystem resilience means *being able to absorb disturbances so that the essential features and functionings characteristic of that ecosystem persist and continue to support flourishing of the system*.

A distinction needs to be made between ecosystem resilience and integrity, two related but not synonymous notions. Integrity is the "power" that makes natural systems autonomous entities and that allows the realization of the potential of those systems.⁴⁶ Integrity is a state in which functioning remains: it is not a capacity or ability.⁴⁷ A more detailed discussion of integrity in the environmental capabilities approach is offered by Daniel Crescenzo, who asserts that integrity is best understood as loose integrity. It is defined as follows: "An ecosystem has loose

⁴² Nussbaum, *Creating Capabilities*, p. 20.

⁴³ Schlosberg, *Defining Environmental Justice*, pp. 148–51.

⁴⁴ Peterson et al., "Ecological Resilience."

⁴⁵ Nussbaum, *Creating Capabilities*, pp. 33–34, formulates most of the central capabilities as being able to do or be X, followed by more detailed clarifications of what it means in practice to have that particular capability.

⁴⁶ Schlosberg, *Defining Environmental Justice*, pp. 136–37.

⁴⁷ David Schlosberg, "Ecological Justice for the Anthropocene," in *Political Animals and Animal Politics*, ed. Marcel Wissenburg and David Schlosberg (Basingstoke, Hampshire, and New York: Palgrave Macmillan, 2014), pp. 75–89.

integrity so long as it retains its capacity to return, after disruption, to functioning as substantially the same kind of system it was before disruption.”⁴⁸ This is not to be confused with resilience which, in turn, is the capacity of an ecosystem to maintain loose integrity; the resilience of different ecosystems also informs how extensive human disruption is permissible in different circumstances.⁴⁹ The view that resilience contributes to ecological integrity has gained support from other theorists as well.⁵⁰ Crescenzo attaches great importance to ecosystem resilience in defining the permissibility of anthropogenic disturbances. This indicates that resilience is one of the conditions for ecological justice: if the subject of justice is below the threshold on the resilience capability, that constitutes a failure of justice.⁵¹

Conceptually, then, resilience fits well with the group of candidates for ecosystem capabilities. But does it deserve a place in the list of central capabilities? In the central capabilities approach, the central capabilities are distinguished from other capabilities by their essentiality for any human life with dignity and well-being.⁵² Another important point is that for Nussbaum, the central capabilities approach is a political project and a question of social justice and just societies. Protecting and promoting central capabilities is the task of a society.⁵³ Consequently, capabilities should be something that can be promoted by political actions, independently of more or less lucky states of affair.

These conditions for a capability to count as central, necessity and governability, are applicable in the case of nonhuman central capabilities as well. There are various factors that can increase the well-being of a given organism or system, yet remain unnecessary for it. Governability is a condition that is particularly important in the case of nonhuman capabilities. While it is possible to regulate for instance human-made greenhouse gas emissions, there are nonanthropogenic factors that affect the atmosphere as well. Even if we agree with Holland⁵⁴ that a stable climate system is a part of the environmental meta-capability necessary for other human capabilities, society’s success or failure in protecting this part of the meta-capability can be judged only in terms of regulation of the anthropogenic emissions. It is possible that the stable climate system may collapse at some point, even if society succeeds in its responsibility to protect it. Similarly, it is possible that a habitat or population may be seriously harmed or even perish due to a nonhuman disaster such as a volcanic eruption or an earthquake.

⁴⁸ Crescenzo, “Loose Integrity,” p. 53.

⁴⁹ Ibid., p. 63.

⁵⁰ See David Pimentel, Laura Westra, and Reed F. Noss, *Ecological Integrity: Integrating Environment, Conservation, and Health* (Washington, D.C.: Island Press, 2000) for a multidisciplinary example on this point.

⁵¹ On the relation between capability provision and failures of justice, see Nussbaum, *Frontiers of Justice*, p. 167.

⁵² Nussbaum, *Creating Capabilities*, pp. 31–32.

⁵³ Ibid., pp. 28 and 77.

⁵⁴ Holland, “Justice and the Environment.”

The necessity of resilience for ecosystem well-being should be rather apparent by now, based on the evidence from resilience research presented earlier in this text, as well as in the conceptual framework. Resilience enables the systems to remain the kind of systems they essentially are, for example, mires or primeval forests, in circumstances where different (internal and external) disruptions threaten this state. If human actions destroy the conditions that are necessary for a primeval forest to survive and the area is turned into a young coppice forest, it may flourish as a coppice but not anymore as the kind of ecosystem it was earlier.

Ecosystem resilience also meets the condition of governability. Granted, there are ecological qualities that cannot be promoted by society, such as genetic diversity of a particular species (the genetically modified diversification of wildlife, for instance, is disregarded here). Yet, the research literature on resilience suggests that ecological (or social-ecological) resilience can be decreased, maintained, or increased—even if not fully managed—through policies and management strategies.⁵⁵

If resilience fits well with the conceptual framework of capabilities and meets the necessary conditions for having a central role among ecosystem capabilities, are there any further reasons to abstain from proposing it as a central ecosystem capability? There are two points of criticism that require addressing.⁵⁶ The first concerns the borders of an ecosystem. It can be argued that because we can always redraw the ecosystem borders, the idea of ecosystem capabilities is very problematic. While I agree that the limits of certain ecosystems are not ontologically unequivocal, this problem arises mostly out of the attempt to come up with a universal political definition of an ecosystem without interdisciplinary reference. Many environmental scientists talk meaningfully about the different states such as health, well-being, vulnerability, and integrity of ecosystems. The boundaries of an ecosystem are context-sensitive; yet environmental policy is overall context-sensitive. The moral status of ecological objects has been discussed by Christopher H. Eliot⁵⁷ who points out that addressing the question involves two interlinked projects. The moral project examines whether and why we should treat certain ecological objects as morally considerable, and the ecological project identifies what kinds of ecological objects exist in a sense that is sufficient for making them objects for such considerations.

⁵⁵ F. C. Berkes and J. Colding, eds., *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience* (Cambridge: Cambridge University Press, 1998). See also C. Folke, S. Carpenter, T. Elmqvist, L. Gunderson, C. S. Holling and B. Walker, "Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations," *AMBIO: A Journal of the Human Environment* 31 (2002): 437–40; and B. Walker, S. Carpenter, J. Anderies, N. Abel, G. Cumming, M. Janssen, L. Lebel, J. Norberg, G. D. Peterson, and R. Pritchard, "Resilience Management in Social-Ecological Systems: A Working Hypothesis for a Participatory Approach," *Conservation Ecology* 6 (2002): 14. These are among the most cited resources on the topic.

⁵⁶ These points have been made by Cripps, "Saving the Polar Bear," pp. 12–13.

⁵⁷ Christopher H. Eliot, "Ecological Objects for Environmental Ethics," in *Linking Ecology and Ethics for a Changing World: Values, Philosophy, and Action*, ed. R. Rozzi, S. T. A. Pickett, C. Palmer, J. J. Armesto, and J. B. Callicott (Dordrecht: Springer, 2013), pp. 219–29.

From the viewpoint of the ecological project, Eliot suggests that ecological objects (including ecosystems) are sufficiently real for moral scrutiny. Therefore, the criticism on the ambiguity of ecosystem boundaries does not, in my view, pose an issue here.

Another problem concerns the responsibilities of ecological justice evoked by the idea of ecosystem capabilities. The capabilities framework is an approach to justice, and therefore the idea of ecosystem capabilities appears to give rise to related responsibilities of justice. Cripps⁵⁸ is worried that securing ecosystem capabilities leads to detrimental efforts to “hold time still” and makes all human interactions with the nonhuman world morally unacceptable. As these questions are essentially connected to the ecosystem capabilities themselves and related responsibilities, they are best addressed with regard to actual capability candidates, here ecosystem resilience. While Cripps’s worry cannot be here comprehensively ruled out concerning other capability candidates that might emerge in future discussion, promoting and protecting ecosystem resilience would not yield the feared consequences. For one thing, the ecological type of resilience⁵⁹ is not about holding things unchanged. Systems may change in time but still maintain their functioning, diversity, and essential identity.⁶⁰ Nevertheless, one might ask whether there is a risk that responsibilities of ecological justice make all human interference with the nonhuman world impermissible. However, this appears not to be the case. Resilience as an ecosystem capability might evoke two types of duties of ecological justice among humans: negative duties not to harm ecosystem resilience and positive duties to promote it. Negative duties are relatively unproblematic here. A great deal of human-nonhuman interaction has no significant effect on resilience (remember that utilizing ecosystems is not impermissible in this sense as far as they can adapt to changes and maintain their essential functionings), and I find it unlikely that protecting the central human capabilities would necessitate undermining ecosystem resilience, for many human functionings can be secured in various ways. Positive duties might be more problematic. As the sixth wave of extinction illustrates, the amount of anthropogenic harm already done is significant: hence, it can be argued that we also have a positive duty to support the resilience of ecosystems in the face of ongoing and forthcoming global environmental change. Regarding this duty, the problem is not the incompatibility of resilience-building measures with human well-being, but the risk that our responsibilities become too demanding. This question of our duties to ecosystems and their demandingness requires scrutiny that goes beyond this paper and requires the analysis of policy impacts as well. An important reminder is, however, that ecosystem resilience essentially contributes to the overall social-ecological resilience that is a precondition for the sustainable functioning of

⁵⁸ *Ibid.*, p. 13.

⁵⁹ It must be repeated here that this notion captures both ecological and social-ecological resilience.

⁶⁰ More generally, the capabilities approach is essentially not a framework that would lead to holding time still. Such a risk is carried by functioning-oriented theories and frameworks, and in this sense, capability-oriented accounts are indeed less likely to result in any normative judgments that would involve avoiding any change.

societies: securing ecosystem resilience is in many cases a prerequisite for human flourishing. To sum up, I find no reasons to argue that it would be impossible to promote central human capabilities and ecosystem resilience in parallel—although doing so would certainly require significant changes in our current practices.

DISCUSSION

Although this paper is essentially theoretical, I wish to conclude with some more practical remarks. After all, the environmental capabilities project should be able to provide something for practice as well, at least if it wishes to justify itself as an approach that bridges the theoretical ideas and practical movements like Schlosberg suggests. But how could one apply the idea of resilience as a central ecosystem capability in practice?

Ecosystem resilience is a feature that has already been operationalized to a certain extent, albeit slowly: it is measurable. Measurability makes resilience more applicable for environmental planning and policy making as well: it is something the progress or decline of which can be tracked. This has several implications. First, using resilience as a policy benchmark helps make prioritizations when the needs of environmental protection exceed the allocated resources: if we cannot protect everything, the focus on resilience helps target those systems that are most susceptible to losing their essential functionalities due to disturbances and human-induced stress. Second, promoting resilience is a valuable approach when the consequences of human actions are uncertain. For instance, predicting the precise impact of climate change on nonhuman nature is in many cases impossible. Increasing the resilience of (particularly vulnerable) ecosystems is often the most effective way to protect nonhuman nature in such circumstances. Third, resilience measurement can also advance more holistic policies: combined with the tools currently used in environmental impact assessment, resilience evaluation would enhance the assessment's ability to take into account indirect effects.⁶¹

The reasons listed above suggest resilience as a promising concept in environmental policy making; yet, resilience evaluation can be used in policy making as such without any reference to capabilities. What surplus does the capabilities approach offer then? The case might indeed be that in practical applications the idea of capabilities is not necessary, just like the Human Development Index has roots in the capabilities framework but remains nowadays rather detached from its theoretical origins. However, the applicability of resilience shows that theorizing ecosystem capabilities has a potential to produce something practically useful, and this provides one more reason why the environmental capabilities approach deserves

⁶¹ On environmental impact assessment (EIA), see M. Lenzen, S. A. Murray, B. Korte, and C. J. Dey, "Environmental Impact Assessment Including Indirect Effects—A Case Study Using Input–Output Analysis," *Environmental Impact Assessment Review* 23 (2003): 263–82. The importance of the notion of resilience in natural resource management has also been noted in earlier literature that integrates ecological sciences with ethics (Rozzi et al., *Earth Stewardship*, and Chapin et al., *Principles of Ecosystem Stewardship*).

more attention. The most important reasons for this concern are the general challenges of conflicting human and nonhuman interests, the demandingness objection, and the importance of bridging holistic theories with practice.

Conflicts between human and nonhuman interests are unavoidable for any theory of ecological justice. When the nonhuman systemic entities including ecosystems, habitats, and species are included in the community of justice, the amount of possible conflicts within the community of justice increases. A theory of ecological justice needs to address these conflicts and make them overall less weighty, without ending up vastly complex or over-demanding. Erasing the conflicts cannot be demanded from a non-ideal theory of ecological justice: rather, the purpose of such theories is to offer tools in which these conflicts can be evaluated and solutions negotiated.⁶² It is here that the environmental capabilities approach has potential to outperform many other approaches.

Now, there is a crucial difference between minimal and non-minimal accounts of justice, and the capabilities approach represents the former pole of this distinction.⁶³ As the conditions of (minimal) justice require equality in terms of exceeding the threshold related to central capabilities, rather than equality in more extensive terms, its demands are modest compared to those theories that extend the demand for equality further. The conflicts of interest that do not jeopardize the central capabilities of any party are not issues of justice: this also involves the “functioning conflicts” that are not essentially linked to diminished central capabilities. This significantly reduces the amount of conflicts relevant to justice and makes the approach less demanding than non-minimal counterparts. Admittedly, there are also other minimal accounts of ecological justice, most notably Baxter’s theory in which “ecological justice consists of the environmental resources needed for populations of species to survive and flourish after their kind.”⁶⁴ That account can, however, be criticized for being already too narrow in disregarding important elements of justice that cannot be captured by the distributional orientation.⁶⁵ Furthermore, by dismissing the question what an ecosystem is actually able to do and to be, there is a risk that due to differences in conversion factor, the equal distribution of resources cannot guarantee threshold equality to all populations or habitats (due, for instance, to greater vulnerability to changes in climatic conditions, something that cannot be addressed by resource distribution alone). The environmental capabilities approach adopts a position that is more relevant for the well-being of those nonhuman entities, but as it is a minimal account of justice, it can avoid a great deal of the problems related to conflict situations and demandingness. This is also illustrated in the notion of loose integrity that leaves enough space for basic human activities such as energy production and agriculture⁶⁶ that are often considered to conflict with ecological justice.

⁶² Schlosberg, “Ecological Justice for the Anthropocene,” pp. 83–84.

⁶³ Nussbaum, *Creating Capabilities*, p. 71.

⁶⁴ Baxter, *A Theory of Ecological Justice*, p. 139.

⁶⁵ Schlosberg, *Defining Environmental Justice*, pp. 121–26.

⁶⁶ Crescenzo, “Loose Integrity,” p. 62.

The capability framework also advances introducing more holistic approaches in environmental policy making, an idea that has been endorsed by many environmental philosophers and political theorists.⁶⁷ Consider a case of a flourishing but vulnerable and atypical forest in the middle of two cities. Policy makers want to make a road directly through the forest, claiming that ninety-eight percent of the forest would still remain intact. From a non-holistic (and perhaps even distribution-oriented) perspective, the amount of disturbance remains very low while constructing the short cut might entail great economic benefits for human society. From the capabilities viewpoint, there is much more than percentages at stake: the road would disconnect the vulnerable forest areas, preventing the populations from moving between the areas. By making both habitats less resilient, the road would significantly impede the central capabilities of the ecosystem and various populations inhabiting it. This more holistic reasoning implies that the damage done by the road would actually be far greater than two percent and diminish the resilience of the affected ecosystems: such a policy would fail to meet the duty to protect the ecosystem resilience in given areas. On the other hand, if the forest system in question is of a common and robust type, or sufficient green corridors would be secured, harming the central capabilities of that system would perhaps not be an issue. Moreover, the effect of the road project on human central capabilities should be evaluated: if building the road harms central ecological capabilities and not building it does not harm the central human ones (of the people living in both cities), there is an argument for not building the road. Less holistic views focusing on the population sizes or total forest area are poorly equipped to take these contextual factors into account. The capabilities framework provides tools for applying the holistic perspective both at the theoretical and practical levels. This promise for practical applicability of a theory, in combination with the other advantages discussed earlier, makes the environmental capabilities approach deserving of more attention among theorists of ecological justice.

Further development of this approach will be needed in order to address the challenges that still remain, in particular with regard to interest conflicts as well as the need for defining other central capabilities of nonhuman individuals and systems. Applying the environmental capabilities approach in practice will also require interdisciplinary cooperation, connecting the best knowledge from philosophy and environmental social sciences with ecological and biological sciences. Yet, I believe that precisely this kind of cooperation will be needed in the future if humans wish to make a transition toward more sustainable ways to inhabit the Earth, ways that embrace the whole community of justice.

⁶⁷ See, for example, Schlosberg, *Defining Environmental Justice* and Bryan G. Norton, *Sustainability: A Philosophy of Adaptive Ecosystem Management* (Chicago: University of Chicago Press, 2005) on this idea.