12 Ecological rights of future generations

A capability approach

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1 Introduction

One of the central questions of our time is how to think about the environmental consequences of our activities for future generations.[1] There have been relatively few attempts to think about this question from the perspective of the capability approach. I will ask what a capability theory of justice should say about the question of ecological obligations to future generations. This investigation lies at the intersection between ecological and intergenerational justice. Ecological justice is about obligations to the human use of natural resources for production and consumption. Some environmental problems may be restricted to contemporaries (e.g. pollution from which only those people currently living suffer), while others will (also) have significance for future generations. Intergenerational justice encompasses but is broader than a narrow focus on environmental resources that present generations should leave behind for future generations (intergenerational justice also raises questions about pensions and education systems, etc.). The inquiry here concentrates on the area of overlap between ecological and intergenerational justice.

A capability theory of justice (hereafter CTJ) will answer the question by drawing upon two core features: a *CTJ is (1) a rights-based moral theory with (2) capabilities as the content of these rights*. It proposes to conceive of justice as a matter of protecting a set of rights to basic human capabilities. I will not say anything about the justification of rights to future generations here. Much work has been done about this elsewhere, and I presume that a CTJ can profit from this work to show why, if present generations have a right to basic capabilities, future generations can lay the same claim to such capabilities (for an overview of objections against this extension of rights into the future, and a refutation of these objections, see Bell 2011). Instead, this chapter focuses on the content of these rights.

First, I argue that we can extend capability protection to future generations by ascribing to them the same capabilities that current generations have, but this leaves open the question of which resources such a CTJ is to leave to future generations (section 2). The influential views of Rawls and Solow are that these resources should be conceived in terms of 'total capital' (section 3). I argue that

a capability approach cannot accept the assumption of substitutability between natural and human-made capital in these approaches (section 4). I propose that a CTJ best fits with a combination of two ecological approaches focusing on the preservation of specific forms of natural capital: the ecological space approach and Daly's resource rules (section 5).

2 Capabilities and resources

The adoption of a capability metric does not dictate one specific way of conceptualizing ecological obligations. At least three different approaches can be distinguished. One can extend moral consideration to the same set of basic capabilities of future generations, introduce a new capability which protects future generations' environmental interests or introduce capabilities beyond humans to other species and ecosystems.

The first approach is defended by Amartya Sen.[2] He proposes that the capability metric should take the place of the concept of needs in the famous Brundtland definition of sustainable development. It then requires of us 'the preservation, and when possible expansion, of the substantive freedoms and capabilities of people today "without compromising the capability of future generations" to have similar – or more – freedom' (Sen 2009, 251–2). His defence of the capability metric in the intergenerational context implies a rejection of both the utilitarian criterion of 'maximizing the sum total of welfare of different generations' (Anand and Sen 2000, 2034) and the resourcist approach of preserving specific resources (Anand and Sen 2000, 2037). Instead, we need to preserve a generalized standard of living, or capacity for well-being. Edward Page's defence of the capability metric in the field of intergenerational justice similarly positions the capability approach as superior to resourcist and welfarist rivals (Page 2007, 464).

A second option is to create a special ecological capability. Breena Holland introduces 'sustainable ecological capacity' as a 'meta-capability'. She defines this capability as 'being able to live one's life in the context of ecological conditions that can provide environmental resources and services that enable the current generations' range of capabilities; to have these conditions now and in the future' (Holland 2008, 324). This capability is meant to support the realization of the *other* capabilities on a list like Nussbaum's (Nussbaum 2006). Her ecological capability is meant to apply to both current and future generations. The second option is therefore structurally analogous to the first one, in that current and future generations have the same capability set; the difference is that the ecological sphere is the object of a special self-standing capability in Holland's approach, but not in Sen's.

A third option is to introduce non-human capabilities. Here, nature itself becomes the bearer of a capability instead of a means to sustaining human capabilities. Given their capacities to function and flourish in species-specific ways, Nussbaum argues that animals are entitled to capabilities to their animal-specific functionings, just like humans (Nussbaum 2006). David Schlosberg objects that

this implies an overly individualistic approach to animal flourishing (Schlosberg 2007, 147–52). He argues that we should ascribe capabilities to entire species and ecosystems:

> In applying the capabilities approach to nature, we do not need to have a particular animal or ecosystem express a desire for a particular functioning; rather, we need to recognize a different type of agency – a potential, a process, or a form of life illustrated by its history, ecology, way of being, and nonreason-based forms of communication.
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> (Schlosberg 2007, 153)

This proposal, like Nussbaum's, in going beyond human capabilities, raises specific problems about the relation between human, animal and ecosystem capabilities (Cripps 2010). Because of the metaphysically demanding nature of these proposals, I will not consider them here and will remain agnostic about their potential.

The difference between the first two options is that the creation of an ecological capability makes enjoyment of necessary ecological conditions itself a matter of capability (and therefore of rights) protection. Which of these conceptualizations one chooses does not matter as much as one may be inclined to think at first glance. If the preservation of a resource is necessary for future generations to enjoy the same basic capabilities as current generations, then present generations are required to preserve it, whether or not this preservation is itself elevated to the status of a basic capability. If a goal is morally required, necessary means to achieve that goal are required as well. The level of environmental protection for future generations would therefore remain the same under both proposals. Because Holland specifies that the ecological meta-capability is about the conditions for the enjoyment of other basic capabilities, it adds nothing substantively to these other capabilities. The main function of introducing a separate capability seems to be to attract attention to the importance of ecological sustainability. It remains the case that ecological conditions are conditions for a list of basic capabilities, which does not itself include those conditions as a capability. In the interest of not inflating our list of basic capabilities unnecessarily, it seems better to me to follow Sen's strategy of founding a concern for sustainability on the (non-ecological) capabilities of future generations.

The next step is more important than this theoretical decision about the introduction of a separate ecological capability. Regardless of whether one introduces such a new capability or not, capability-related ecological obligations to future generations must ultimately be specified or translated in terms of *resources* (I use this term broadly to include ecosystem services). We can only affect the capabilities of future generations by bequeathing certain environmental resources (and institutions) to them. Logically, since we do not live at the same time as future generations (except for the overlap with the next generation), the only link between them and us is indirect, in the world that we leave behind. This means that even if capabilities are the best metric for expressing

claims of justice, the intergenerational context requires us to go beyond capabilities and consider which resources will best realize their capabilities. It is up to future generations to use these resources in such a way that each member of these generations gets an equitable level of capabilities (this includes capability theories' stress on taking account of interpersonal differences in rates of conversion of resources to capabilities – we cannot do much about that since these individuals do not yet exist). We can only bequeath a resources package as a whole.

This turn to a resource metric may seem to be a radical break with the intragenerational context, in which the capability metric does seem to be appropriate (at least for those who accept the general arguments in its favour). However, the difference is less stark than one might suspect. Even in the intragenerational context, we need to specify what it means to protect a capability in terms of the resource inputs necessary to realize that capability. For example, realization of the capability to ride a bike or the capability to be well nourished requires resources (a bike and food, respectively). More comprehensively, the realization of most capabilities is a matter of combining at least three factors: personal skills (abilities/dispositions), resources and non-resource requirements (such as institutions and laws). One doesn't only need a bike; one also needs to know how to ride a bike and how to obey traffic regulations. All of these three factors require the specification of resources. Enhancing a person's skills requires training, which requires teachers that need to be paid a wage, and training equipment, etc. The capability approach can only be made useful for political purposes once we are willing to specify which resources are needed to realize a certain capability. Capabilities and resources are both necessary for a full specification of what needs to be done, as ends and means.

Systematic discussion about the linkages between resources and functionings are largely absent from the literature. There may be two explanations for this. First, for some capabilities it may be rather obvious which resources are needed to realize them (such as the capability to ride a bike). All critical attention then goes to the issue of determining adequate individual resource inputs given differences in conversion rates (pregnant women needing a different diet, physically disabled persons an adjusted bike, etc.). Second, much of the specification of the appropriate resources will be context-dependent (a matter of 'local specification', as Nussbaum says). Even though being well nourished is a basic capability everywhere, there are marked cultural differences regarding the kinds of food that are judged appropriate. Both of these factors are absent in the intergenerational context. It is not obvious which resources need to be preserved for future generations. As we will see hereafter, there are several distinct and competing theoretical possibilities. Moreover, by definition, we lack knowledge about future generations' preferences for context-dependent specification. In these circumstances, leaving the resource question unspecified is unsatisfying both theoretically and practically.[3] *How much* of *which* resources should present generations preserve for future generations?

3 Total capital approaches

In this section I will discuss two very influential proposals to answer the resource question: Robert Solow's view of sustainability and John Rawls' just savings principle. Solow's view is discussed here because it is the standard view among economists. Rawls' principle has been widely influential among political philosophers. I will argue that a CTJ cannot accept either view, for the same reason: they both disregard specific human functionings and their resource requirements.

Solow starts from the following definition of sustainability: we should 'leave to the future the option or the capacity to be as well off as we are' (Solow 1993, 181), also formulated as a 'generalized capacity to create well-being, not any particular thing or any particular natural resource' (Solow 1993, 182). His argument for defining sustainability this way is that we do not know future people's preferences. Thus, while the ultimate normative goal is future generations' satisfaction of their preferences, the goal of sustainability can only be stated in terms of a generalized capacity. It is up to future people to decide what to do with this capacity. The second step is that the means to satisfy this goal is the preservation of a stock of undifferentiated capital. This presupposes that resources are substitutable. Solow stresses that we 'do not owe to the future any particular thing' (Solow 1993, 181) because of the possibilities for substitution. If one form of capital (such as natural resources) is depleted, it can always be replaced by another form of capital (such as man-made capital) to sustain a given output level. The generalized capacity for well-being can be realized by compensating for current consumption (of any sort) by investing in future assets (of any sort). Let's call this Solow's 'constant capital principle' (my term):

> *The Constant Capital Principle*: the currently available stock of capital should at least be preserved at a constant (non-declining) level.

A third feature of Solow's view is that he presumes there is something special about today's level of the generalized capacity. This is what is to be preserved. I add 'at least' because we can decide to leave the future more capital than we have inherited from our ancestors. The obligation of sustainability, however, only demands a constant level starting from today.

Rawls defended a just savings principle for future generations. It may be summed up as follows:

> *The Just Savings Principle*: a) real capital should be accumulated up to the point at which just institutions are established (accumulation stage); b) after this point no further savings are required (steady-state stage).

The belief in substitution is the common denominator between Solow's and Rawls' view. The object of savings, for Rawls, is 'real capital', which he argues can take 'various forms from net investment in machinery and other means of production to investment in learning and education' (Rawls 1999, 252). Rawls

does not explicitly discuss natural capital; indeed, he does not discuss sustainability or ecological concerns at all. His use of the concept of real capital implies, as the just savings principle stands, that natural capital would have been subsumed in this category of real capital. His use of an aggregate, undifferentiated concept of capital is exactly the same as Solow's.[4] One difference is that for Rawls the leading normative criterion is the establishment of just institutions (his first principle of justice). For Solow the guiding normative criterion is utilitarian: to preserve a generalized capacity for well-being among future generations. This reflects a deep difference in theoretical commitments: Rawls is interested in the realization of a just society, while Solow is interested in levels of well-being. Another difference is that Solow implies there is something morally privileged about current levels of capital, so that it is obligatory to make sure that future generations are at least no worse off than we are. This requirement of constancy comes back in Rawls' steady-state stage, but it is distinctive of Rawls' view that the preservation of the current level only becomes normatively relevant when just institutions are established. This necessitates a separate accumulation phase as long as this goal has not been reached. What is really important, then, is the requirement to establish just institutions, and the normative relevance of the present level of capital is contingent on that requirement.

Should a CTJ adopt any of these principles? It is clear that a CTJ will be on Rawls' side with respect to the two points in which he differs from Solow. First, like Rawls, a CTJ reasons about the obligations to future generations from a perspective of justice. Whatever we ultimately conclude about the level and composition of capital (resources) to leave to future generations, the aim is to provide the conditions for a just society in the future. For Rawls, this is a society in which the basic liberties are preserved, while a CTJ spells this out in the (closely related) terms of a list of basic capability rights. Second, like Rawls, a CTJ cannot accept a normatively privileged position for current levels of capital. Whether remaining at a constant level is normatively required depends on whether basic capabilities are currently realized or not by that capital level and on whether that level is itself sustainable for the future population. Whether this requires an accumulation stage is something that I will discuss in section 5. Let's focus first on the main point of contention: Solow's and Rawls' belief in the substitutability of different forms of capital.

4 Substitutability and the capability approach

Convictions about substitutability provide a watershed in thinking about sustainability. Theories of sustainability are often divided into theories of 'weak sustainability' and 'strong sustainability' (Dobson 1998; Holland 1999; Norton 1999). Theories of weak sustainability allow for substitution between natural and man-made capital. These theories are standard in economics (Beckerman 1994, 1995). Theories of strong substitutability are sceptical about the possibilities for compensating one sort of capital with another. These theories are more

popular among ecologists (Daly 1995, 1996). As we have seen when discussing Solow's view, the economist's reason for not differentiating between man-made and natural capital is that both are taken to be infinitely substitutable. We can compensate for a decline in natural capital by additions in man-made capital. Ecologists, on the other hand, argue that any form of economic output relies on some physical input (natural capital). We can substitute computers for typewriters, and typewriters for pencil and paper, but we cannot write without any physical substrate. Each of these options requires some natural capital, albeit that in each the combination of man-made (technology) and natural capital is different. These two forms of capital are complementary, not substitutes.

On both sides of this dispute, people argue about the *functions* that any piece of economic output is supposed to fulfil. This leads to two different questions, as Axel Gosseries has rightly argued:

> There is a sense in which every object is unique (token-uniqueness) and therefore unsubstitutable. But if *we agree that what matters in a good is the function it fulfills*, we can phrase the problem as follows. If a good, be it human-made (e.g. Brussels' Grand-Place or Van Gogh's sunflowers) or natural (the Mont Blanc or an endangered species of butterfly), is considered as the only one to be able to fulfill a function, we then need to see if other functions are not more important. We could argue, for example, that flooding a unique forest to build a dam would help reduce greenhouse effects to the benefits of future generations. Can good g-2 be substituted for good g-1 to fulfill the same function f-1, and can function f-2 be substituted for function f-1?
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> (Gosseries 2001, 343–4) (my italics)

These two questions are often conflated in the dispute about substitutability. The substitutability of two goods to fulfil the same function is a matter of fact: either good g-2 (Van Gogh's sunflowers) can or cannot fulfil the same function f-1 (aesthetic experience) as well as good g-1 (Rembrandt's *The Night Watch*) can. Let's call this 'factual substitutability'.

The substitutability of f-2 for f-1 is a different, normative question: do we want to abandon the availability of function f-1 (aesthetic experience) in our societies and have it replaced with function f-2 (physical exercising)? There is no possible fact of the matter that can answer that question. Let's consider Solow's point of view from this angle:

> The correct principle … when we use up something that is irreplaceable, whether it is minerals or a fish species, or an environmental amenity, then we should be thinking about providing a substitute of equal value, and the vagueness comes in the notion of value. The something that we provide in exchange could be knowledge, could be technology. It needn't even be a physical object.
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> (Solow 1993, 184)

There is an important ambiguity in this passage. For how can we substitute something of 'equal value' if the original thing was 'irreplaceable'? Solow must have dropped the requirement that the replacement investment is a substitute for the exhausted resource, at least in the factual sense mentioned above. He presupposes that it does not matter which concrete functions can be fulfilled, as long as there is a constant level of 'potential to fulfil functions'. Only one function, the abstract 'function-fulfilment', understood as the capacity to produce abstract levels of preference satisfaction, seems to do the work. Under this definition, we can always make sure that people are able to reach an equal level of preference satisfaction, even if some specific preferences can no longer be fulfilled because the goods necessary to fulfil them have been exhausted. We simply make sure that we bring the person to the same level of preference satisfaction by satisfying some of his/her other preferences.

From a capability perspective, this cannot be accepted. The capability theorist's position on substitutability is to accept factual substitutability but reject normative substitutability. The distinction is vital, and the fact that it is overlooked by those who have thought about substitutability from a capability perspective means that their positions do not give a sufficiently clear account of the issue (Holland 2008, 329; Page 2007, 457; Scholtes 2011, 16). This is striking, since, as we see from the quote by Gosseries, obtaining more clarity on substitutability *presupposes introducing the language of functionings*. While not explicitly endorsing a capability theory himself, Gosseries shows us something that cannot be understood in utilitarian or resourcist terms, but requires thinking in terms of what resources do for human functionings.

First, a capability theory can accept factual substitutability. Future generations should have access to the same capabilities to function as current generations do. To the extent that different goods can give them the same capabilities to function, their substitutability is morally unobjectionable. We can thus agree with Solow's argument that a full belief in non-substitutability is absurd, because this would mean that nothing in the world could be touched or used (Solow 1993, 180). We are allowed to develop and replace resources as long as we can fulfil the same functions. Whether we can do so is a factual dispute (Holland 1999, 52). It may be hard to judge whether a given replacement resource is really sufficiently available to replace an exhausted resource. It may be a matter of interpretation as to whether the two resources really fulfil the same function. But, given a list of functions, the questions should be answerable. Note that this requires decisions about the level of specificity at which we define functionings. The function of 'eating fish' cannot survive the exhaustion of all fishery resources, while the function of 'being adequately nourished' can. Questions about factual substitutability require a prior answer to the issue of which functions we think are normatively required.[5]

This problem becomes highly relevant when we consider the following objection to accepting factual substitution: we value many species, ecosystems, landscapes and natural sites because of their aesthetic or expressive value to us. If so, then these ecological goods can by definition never be replaced. Note that this

objection does not rely on the controversial ascription of 'intrinsic value' to (parts of) nature. The value of the ecological good is still a value to us, in terms of our functioning. We can confine ourselves to an anthropocentric framework and still think that there is no substitute for our enjoyment of a specific unspoiled forest or coastline (Birnbacher 2002, 193). Non-substitutability here is an artefact of defining the functioning in terms of the resource, i.e. 'enjoying the Grand Canyon' instead of 'enjoying some piece of unspoiled nature'. The distinction between resource and function then collapses. In response, we should say that it is hard to see how 'enjoying the Grand Canyon' could ever be constitutive of human flourishing or dignity. Many people have lived perfectly fine lives without seeing the Grand Canyon. Basic human functions therefore have to be formulated at a higher level.

Second, normative substitutability between basic functionings must be rejected. This reflects a core commitment of a CTJ to the separate importance of each basic capability, which should not be sacrificed for one or more other capabilities. A capability theory is different from utilitarian theories in dealing with uncertainty about future preferences. The preferences of future generations are by definition unknown. If we – following Solow – substitute man-made capital for natural capital because it provides the same level of capacity for well-being, then we necessarily rely on *current* experiences of human well-being and the relation between resources and well-being. Good A typically provides the average current person with 10 units of well-being, while good B provides that person with 20 units of well-being. However, given the malleability of preferences, this might be different in the future. The utilitarian argument therefore illegitimately extends current experiences to future ones when calculating which resources are necessary (or if it does not, the theory must remain vacuous). By using current experiences to determine the mix of man-made and natural capital that we will leave behind, we are imposing our preferences on the future (Scholtes 2011, 16).

By contrast, a capability theory considers basic human functionings to be stable over time. Future generations will need nourishment, health care, shelter and physical security, etc. just like we do. This is a secure bet. Of course we cannot preclude the possibility that human beings will transform radically in the future into some other kind of species with very different types of basic functionings. But this possibility is so remote and speculative that it is unproductive in relation to thinking about our obligations to the future. Anyhow, in practical terms we can only bequeath resources to the *next* generation, not to the far future. If humans change radically, this will probably be a long-term process which may lead intermediate generations to adapt the mix of man-made and natural capital to respond to these changes.

A more serious problem is that we do not know which resources may fulfil these stable human functions in the future. Even if we know that future people may require health care, we do not know which plants we need to preserve to tackle future diseases (think of new diseases, or the development of technology to extract medicines from plants). We provide for our basic functionings with a

highly specific mix of resources, which is itself variable both diachronically (changes over time due to innovations) and synchronically (subject to cultural differences between societies). We always and necessarily impose on the future a specific mix of man-made and natural capital. The only thing we can safely say is that a society which determines its mix on the basis of its own preferred way of realizing (current and future) basic functions leaves to the future the possibility of basic functions being satisfied in that very same way. Our actions should not completely foreclose future possibilities of finding *other* goods to fulfil the same functions. It is open to future generations to try to do so. However, they will have to do so within the confines of what they have received from previous generations – our actions unavoidably create a path dependency, both in man-made capital (our laws and institutions, the state of technology and our cultural values, etc.) and in natural capital (what we conserve and how). Even if we could avoid this, it is unclear whether a mandate would be required. We normally judge it legitimate for parents to acquaint their children with all kinds of ideas, habits and values, so long as they leave them to lead their own lives once they are grown up. In the same way, we may try to convince future generations that we have found valuable ways (capital mixes) to satisfy our basic functions – on condition that we leave it open to them to find other ways to satisfy theirs.

This discussion of substitutability leads us to the conclusion that man-made capital may be substituted for natural capital only to the extent that the substitute is equally well able to satisfy future generations' basic human functions. Given the specificity of these functions and the specificity of the natural capital that we now use to satisfy our basic functions, sustainability in a CTJ can be expressed as follows:

> *Capability Principle*: the stock of natural capital (either the current stock or an equivalent one) that is necessary to satisfy the set of basic human functions needs to be preserved.

5 Ecological approaches

The capability principle is still quite abstract; how can it be further specified? In this section I will present two of the best-known ecological approaches to sustainability, which both have in common a focus on the preservation of specified amounts or types of natural capital (in contrast to Solow's and Rawls' theories). These are the ecological space approach and Daly's resource rules. I will argue that a capability theory must endorse a modified and combined version of these approaches. Some present these resourcist approaches as rival metrics to the capability metric (Page 2007; Vanderheiden 2008, 452). Instead, I argue that they are the best expression of its normative commitments.

The aim of the ecological space approach is to make sure that the aggregate level of ecological space available on earth is not exceeded. The guiding thought is to consider the ecological burden that production and consumption impose

upon the earth's ecosystems. When that burden becomes too heavy, this will cause damage to future generations by way of ecological degradation and natural disasters, etc. The prevailing way of thinking about climate change is one example of this approach. The available ecological space for carbon emissions can be defined in terms of a maximum number of (yearly) emissions that the earth's atmosphere can absorb, given predictions that exceeding this maximum will presumably cause dangerous temperature rises which will lead to harms to future generations. Converting all ecological pressures on earth to a common denominator and aggregating them gives us a maximum ecological burden that man can put on the planet before this will have severe detrimental effects upon the planet's ability to sustain human and animal life. The ecological footprint is the best-known aggregate indicator which expresses all ecological activities in terms of acres of land use. Using this indicator, we can derive the following 'ecological ceiling principle':

> *The Ecological Ceiling Principle*: (a) the maximum ecological space (acres per year) available on earth should not be exceeded; and (b) faced with previous violations of (a), ecological space should be underused to the extent necessary to compensate for these violations.

Three remarks are in order. First, ecological space is defined in terms of a spatio-temporal indicator. Human interactions with the environment can be split into two parts: inputs and outflows. Economic processes use natural resources as input and dump waste or pollution as output in natural sinks. Nature renews resources and absorbs pollution at certain rates. Not overusing the available ecological space means not using resources and sinks at a higher rate than nature can compensate for. Violation of this prescription results in a situation of ecological *overshoot*: economic activity overburdens the ecological space, with potentially harmful consequences for future generations.[6] Second, a (prolonged) situation of historical overshoot will have to be compensated for by using less than the available ecological space, up to the point at which ecological equilibrium is restored (see (b) above). This can be compared to a situation in which a person aims to have a certain level of savings in his/her account (say, €10,000) as a buffer in year one, spends €5,000 in year two and then saves €5,000 in year three to get back to the target level. Third, this says nothing about the distribution of ecological space among the current population. Tim Hayward and Steve Vanderheiden have used the concept of ecological space in several publications as an alternative to standard metrics for discussing the distribution of ecological burdens among contemporaries (Hayward 2006, 2007; Vanderheiden 2008, 2009). I remain agnostic about this question. For simplicity, the global society is treated as one unit which must not overshoot ecological boundaries.

A second ecological approach to sustainability is given in ecological economist Herman Daly's guidelines for resource management. His rules prescribe how every single resource or sink on earth should be treated. He formulates them as follows:

> Output rule: waste outputs are within the natural absorptive capacities of the environment (nondepletion of the sink services of natural capital).
>
> Input rules: (a) For renewable inputs, harvest rates should not exceed regeneration rates (nondepletion of the source services of natural capital); (b) For nonrenewable inputs the rate of depletion should be equal to the rate at which renewable substitutes can be developed.
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> (Daly 1995, 50)

Let's refer to these as Daly's 'constant resource principles'. These resource principles disaggregate different forms of natural capital, whereas the ecological space approach is an aggregate indicator. This key difference explains why we need to combine both of them from the perspective of a CTJ. The constant resource principles are necessary because a capability theory's focus on preserving specific functions requires the preservation of those *specific* resources which are necessary for that goal. Under the ecological space approach, we would be allowed to overuse resource A if we compensate for this by underusing resource B so that we stay within the prescribed maximum resource use. Such trade-offs are not allowed under Daly's resource principles: each resource is to be preserved separately. This is why the ecological space approach cannot be sufficient on its own. Resource A might be vital to a prescribed functioning. We therefore need a focus on specific resources that are necessary to realize basic functions. The resource principles make room for such a focus.

However, we need to modify the formulation of these principles slightly, for in their present formulation they pertain to all resources indiscriminately, while a CTJ is only concerned with resources whose preservation is necessary from the standpoint of its own capability-oriented prescriptions. Therefore, we have to add to the (non-)renewable inputs the qualifier 'necessary to realize basic functions'. The consequence is that natural resources (if there are any) that are not necessary for this goal may be used unsustainably. Similarly, we need to add to waste outputs the qualifier 'in so far as their depletion threatens basic human functions'. These modifications are in line with the spirit of Daly's principles. The demand for substitution of non-renewable resources in Daly's second input principle clearly presupposes a concern with preserving specific functions. The additions remain necessary, however, for the underlying function may or may not be necessary from the perspective of justice.

A second qualifier is the element of constancy. Daly's principles are similar to the economic constant capital principle in that they prescribe that currently available stocks of natural capital should be preserved at constant (non-declining) levels. There is no concern with the absolute level of each of these resources or with whether that level is enough for (current and/or) future generations to meet their basic capabilities. We saw how Rawls' principle recognized this problem. Similarly, a CTJ needs to adapt Daly's resource principles. If, due to historical overuse, a present stock of resources is insufficient to meet current and future capabilities, then rates of current use (depletion and/or pollution)

need to be more stringent than the ones which only keep the resource at current levels. This addition functions as a rectification of past injustices.

With these modifications in place, the resource principles are the first component of a CTJ's operationalization of duties to future generations. They need to be complemented, however, with the ecological ceiling principle, because the resource principles on their own may not be enough. This can be seen when we reflect on the distinction between the source side and the sink side of our relations with the natural environment. On the source side, adherence to the input principles for each resource taken separately automatically leads to an aggregate situation which remains within the global ceiling. On the sink side, however, we can imagine a situation in which a global sink (such as the atmosphere, or the oceans) is overpolluted, despite the fact that this sink would be able to absorb pollution from each form of waste output taken separately. In other words, the acceptable rate of pollution for each form of waste output needs to be adjusted depending on the existence of other forms of waste for the same sink. If this is not done, then we might face a situation of global overshoot despite the resource principles being honoured on the micro-level.

Thus, a combination of Daly's resource principles for resource management, and a global ecological space approach is the most promising as an operationalization of the abstract idea of justice for future generations in terms of a set of basic capabilities. These principles give content to its abstract requirement of sustainability: we have to preserve a stock of natural capital (either the current stock or an equivalent one) that is necessary to satisfy a set of basic human functions.

6 Conclusion

In this chapter I have considered what a capability approach to justice would say about the problem of ecological obligations to the future. The capability approach differs from standard Rawlsian and economic approaches to sustainability mainly because of its commitment to normative, in contrast to factual non-substitutability. An important insight here is that rejecting full substitutability implies a commitment to something like a concept of human functionings, which is the core of the capability approach. I have shown how a capability approach would endorse a combination of macro- and micro-ecological approaches to sustainable resource management. This does not solve concrete policy issues concerning ecological sustainability, but hopefully gives a clear sense of the direction in which a capability approach would point for approaching those issues.

Notes

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2 I do not consider Nussbaum's theory. She merely states that Rawls' theory provides an adequate answer for the intergenerational context (Nussbaum 2006, 23). For the inadequacy of that position, see Watene (2013).
3 This is equally true for other non-resourcist theories, e.g. utilitarians can no more maximize well-being or the preference satisfaction of future generations directly than capability theorists can realize their capabilities.
4 Here, I interpret Rawls as not differentiating between different types of capital. This leaves open whether his approach, and the just savings principle, are compatible with such a differentiation. One might then argue that Rawls is unclear about the matter, but such a differentiation is not necessarily 'un-Rawlsian'.
5 Note that there may be limits to factual substitutability in the economic approach as well. This is because at some point substitution of natural capital by man-made capital may no longer be able to preserve the same level of well-being. This limit may allow for more sacrifice of natural capital than any limits dictated by preserving a range of specific functions, but it is still a limit.
6 One could also formulate the principle as a threshold (instead of ceiling) concept: we have a situation of overshoot when on the aggregate there is too *little* natural capital available. This seems to fit better with the other sustainability indicators: it is about having a sufficient level of natural capital (the threshold concept brings out the sufficientarian nature of the principle).

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