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Is transplanetary sustainability a good idea? An answer from the perspective of conceptual engineering

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Research Article

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Abstract

Is our current concept of sustainable development too focused on our planet? Do we need a new conception of sustainability? The recent call for an 'ethics of planetary sustainability' by A. Losch may be understood as promoting an affirmative answer to this question. This essay analyses and assesses the introduction of a new concept of sustainability from the perspective of conceptual engineering. The central question is whether this new concept, which I call 'transplanetary sustainability', may improve our thinking, and, indirectly, our practices. I argue that a new notion of transplanetary sustainability advantageously points to considerations that matter from a moral point of view. It may also help us to be more exact and consistent in our moral thinking. At the same time, there are serious doubts as to how fundamental the concept of sustainability as such is from a theoretical perspective since it does not figure in prominent moral theories. Furthermore, in view of possible extraterrestrial beings that deserve to be taken into account from a moral point of view, the proposed revision of the concept may reach less than required. Nevertheless, since sustainability has had an impressive career in international politics, it is practically speaking important that sustainability be conceived such that outer space is taken into account.

Introduction

So far, the notions of sustainability and sustainable development have often been used with a focus on our planet. The UN resolution 'Transforming our world: the 2030 Agenda for Sustainable Development (UN, 2015)' is supposed to be '[…] a plan of action for people, planet and prosperity' (preamble, p. 1)[1] and as '[…] a charter for people and planet in the twenty-first century' (article 51, p. 12). As far as the planet is concerned, the preamble explains (ibid, preamble, p. 2):

'We are determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.'

This Earth-centred notion of sustainability is in tune with the self-understanding articulated in Article 59 (ibid, p. 13) '[…] that planet Earth and its ecosystems are our common home.'

Recently, however, the focus on our planet in our thinking about sustainability has been challenged. Losch (2018*a*) calls for an 'ethics of planetary sustainability' that takes into account the space around our planet too (p. 1). He refers to NASA's 'Vision for Planetary Sustainability', which includes a '[…] multi-planetary society, where the resources of the Solar System are available to the people of Earth' (NASA, 2014). In a blog post, Losch (2018*b*) goes as far as to call for a new, 18th sustainable development goal, 'Our Space Environment.'

At first glance, Losch proposes to change our concept of sustainability. He uses the term 'planetary sustainability' to refer to a notion of sustainability that is meant to be different from the more traditional one in a crucial way. Otherwise, why would we need a new term?

The question of this paper is, very roughly, whether the proposed re-conception of sustainability is a good idea. Here, 'idea' is taken to mean a concept. I assume that the proposal is to replace the current, Earth-bound notion of sustainability with a new one. My aim then is to assess the proposed conceptual change. For this purpose, I assume that concepts are tools that we need in our thinking. I take the perspective of conceptual engineering, which is a systematic attempt to improve these tools, by e.g. reshaping and replacing existing concepts or

[1]Here, the people are meant to be humans, and prosperity is human prosperity (UN 2015, preamble; p. 2). Quite generally, the wording of the resolution is sometimes overly general (for instance, the aim is set 'to end poverty and hunger everywhere', ibid, Introduction; p. 3), but when the general ideas are spelt out in more concrete terms, the focus is entirely on humankind.

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developing new ones. It is often hoped that this allows for better theories, which in turn promotes progress in social practices.

In what follows, I refer to the extended concept of sustainability as 'transplanetary sustainability.' The aim is to make the proposed extension more explicit with the qualification '*trans*planetary.' 'Planetary sustainability' (as e.g. used by Losch, 2018*a*, but see Losch, forthcoming) is a misnomer for a perspective that transcends the viewpoint of our planet. Note though that 'trans' in 'transplanetary' is not supposed to imply that our own planet is not an issue any more; it is included.

This essay begins with a brief overview of central tenets of conceptual engineering ('The perspective of conceptual engineering' section). I then turn to the notion of sustainability in 'The (traditional) concept of sustainability' section. The aim of the section 'Transplanetary sustainability' is to clarify the proposed reconception. 'Discussion' discusses the pros and cons of the extension. I draw my conclusions in 'Conclusions'. Throughout this essay, the terms 'notion', 'concept' and 'conception' are used interchangeably as stylistic variations.

The perspective of conceptual engineering

This essay takes the perspective of conceptual engineering. But what exactly is this perspective? Let me explain what I mean by conceptual engineering. Although I will roughly follow well-known approaches, I will also take the liberty to regiment the understanding of conceptual engineering a little for the purposes of this essay.

In a recent book, Cappelen (2018, p. 3) defines conceptual engineering as the '[…] critical/constructive enterprise of assessing and improving our representational devices.' He traces the term back to Blackburn (1999, p. 2), although it is not clear whether Blackburn's description of conceptual engineering is even roughly equivalent to Cappelen's characterization. Be that as it may, the project of conceptual engineering is much older than the term. One founding father is Carnap (1950/1962, Ch. 1), who proposed a method that is now taken as crucial for conceptual engineering, viz. explication. Carnap defines explication as the '[…] transformation of an inexact, prescientific concept, the *explicandum*, into a new exact concept, the *explicatum*' (p. 3). The explicatum is subject to the following desiderata: it is supposed to be similar to the explicandum, exact, fruitful and simple (pp. 5–7).[2] An illustrative example given by Carnap is the modification of the concept of fish in zoology (pp. 5–6). This modification can be described as a replacement for a prescientific concept by a new one, which Carnap calls 'piscis.' While fishes include all animals that live in the water, the concept of piscis is narrower since it is restricted to animals living in the water which are cold-blooded vertebrate, and which have gills.[3] Thus, whales are fishes but do not instantiate the concept of piscis. The concepts of fish and piscis are still quite similar. Nevertheless, the introduction of the concept of piscis took the costs of deviating from the established pre-scientific notion to make progress regarding fruitfulness. The concept of piscis is more fruitful because it allows for more generalizations (whales and examples of piscis do not share many important traits).

For another example, Cappelen refers to work by Haslanger (2000), who engages in a 'revisionary' project (e.g. pp. 32, 34) to answer the questions of what race and gender are. What is most striking about Haslanger's accounts of women and men is that women are assumed to be subordinate to men (pp. 42–43). It is arguable that this subordination is not part of our everyday concepts of women and men. To the extent to which it is not, Haslanger's proposed account has a stipulative component, which is supposed to point to certain phenomena of injustice (e.g. p. 36). Haslanger's aim is ultimately to help fight injustice (p. 36), and she hopes for days in which there are no women (in her sense), but only females (p. 46).

In what follows, I will focus on the replacement of one concept by another one (arguably, Cappelen's definition of conceptual engineering is broader since representational devices include, e.g. models). I will stick to Carnap's terms 'explicandum' and 'explicatum' and will assume that the desideratum of similarity with the explicandum has considerable weight, but that there are other desiderata that can outweigh similarity.[4] That concerns of similarity can be overbalanced sets conceptual engineering apart from conceptual analysis, for which descriptive accuracy concerning the current use is the only requirement. In this essay, I will mostly consider desiderata that help improve a concept for our thinking. I will use the desiderata mentioned by Carnap but also be open to others.

At this point, readers may wonder what a concept is. There are several philosophical answers to this question (see e.g. Margolis and Laurence, 2014 for an overview), but for our purposes, it is most prudent to remain neutral on the controversy about which view is correct. It suffices to note that concepts are not words or linguistic expressions, but rather what is meant by them. Thus, some linguistic terms denote, or stand for, concepts. Note that there is no one to one relationship between terms and concepts; some linguistic expressions, e.g. proper names ('John Rawls') do not stand for concepts; two terms (e.g. 'love' and 'amour') may denote the same concept; and, conversely, certain terms are ambiguous, which is to say that they denote different concepts, depending on what the context is and what the speaker intends. For instance, 'life' sometimes refers to the entirety of all living beings, and sometimes to life as lived by an individual. Note further that every concept has an extension, which is the entirety of things that instantiate the concept.

The (traditional) concept of sustainability

To assess the proposed conceptual change, we need first to be clear about the concept that is supposed to be replaced. How then is sustainability understood so far?

According to a common complaint, there is 'definitional chaos' (Marshall and Toffel, 2005, p. 673) or 'conceptual chaos' (Vallance *et al.*, 2011, p. 342) about sustainability. The reason is that many definitions of the notion have been proposed, partly in scholarly work (see e.g. Bañon Gomis *et al.*, 2011), partly in declarations from international institutions and in similar documents. Most proposed definitions have a stipulative component, which is motivated by specific concerns. For instance, Bañon Gomis *et al.* (2011) propose a definition that is supposed to ground sustainability in ethics.

[2]Carnap (1950/62, pp. 5–7) speaks of 'requirements' instead of 'desiderata', but the latter term is more appropriate because it allows for various degrees of satisfaction. At least the similarity to the explicandum, fruitfulness and simplicity matters of degree.

[3]I here follow Carnap's account of the concepts and bracket the question of whether the concepts are appropriately described and related to each other.

[4]I thus understand conceptual engineering as does Brun (2016, p. 1212) when he defines it at 'methods of concept formation that introduce a concept which is both similar to an existing concept and useful for some given purpose.'

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For this paper, it is most useful to consider two often quoted definitions of sustainability. For our first example, we consider the definition given in the 'World Conservation Strategy' by the IUCN (IUCN, 1980, Introduction, 3):

'For development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long term as well as the short term advantages and disadvantages of alternative actions.'

Our second example is the definition proposed by the so-called Brundtland Commission:

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UNWCED, 1987, Ch. 2, paragraph 1).

It is also useful to keep in mind the relevant ordinary language meaning of 'sustainable', which is given as '[a]ble to be maintained at a certain rate or level'[5] (Oxford Dictionaries).

Let us discuss the definitions and note some common traits. First, both definitions given by international institutions do not characterize the property of sustainability in general; rather, they define sustainable *development*. So either way, it is development that is assumed to have the property sustainability. True, sustainability is sometimes ascribed to other entities, e.g. to agriculture or technology (see Bañon Gomis *et al.*, 2011, p. 174). However, from an ethical perspective, the focus on single domains such as agriculture can be problematic first since they do not exhaust broader human values, e.g. well-being, but also because the various domains are interconnected. For example, the domain of technology has a huge impact on agriculture. In what follows, I will thus focus on sustainable development and use the terms 'sustainability' and 'sustainable development' interchangeably, unless otherwise noted.

Second, note that 'sustainable' is a 'thick' ethical term (see e.g. Väyrynen, 2017 for thick ethical terms). This means that it has two components, one being normative, meaning that, at least other things being equal, a development is better if it is sustainable than if it is not (see Bañon Gomis *et al.*, 2011, p. 175 for testimony). The other component is not evaluative, but merely descriptive, implying, for instance, that sustainable development takes future generations into account.

Third, already the canonical bearer of sustainability, viz. development, is supposed to be a process that is in some respect good. For instance, the Brundtland report characterizes development as involving 'progressive transformation of economy and society' (UNWCED, 1987, Ch. 2, 3) and as aiming at the 'satisfaction of human needs and aspirations' (Ch. 2, 4; see the IUCN, 1980, Introduction, 3 for a similar view). The idea seems to be that we are interested in progressive development in any case and that it becomes even better if it is sustainable. As a consequence, sustainable development is a package that combines two components that are each valuable in certain respects.

Fourth, what seems primary is an ungraded notion of sustainability: a development is either sustainable or not, depending on whether a particular constraint is adequately fulfilled. This is particularly clear from the everyday notion of sustainability: a development is sustainable if it can be maintained. The same is true about the definition provided by the IUCN and the Brundtland Commission. All this does not exclude that we define grades of sustainability, e.g. by taking a distance from ideal sustainability. According to the definition by the Brundtland Commission, the extent to which a development is sustainable would depend on the degree to which the needs of future people can be fulfilled.

Apart from the common features, there are differences between the two 'official' definitions mentioned above. The first one stresses various factors that should be taken into account. One of them concerns long-term as opposed to short-term interests. Additionally, there is an orthogonal distinction between three dimensions of ecological, social and economic aspects. These aspects are often shown in viewgraphs.[6] The second definition, by contrast, characterizes sustainable development in terms of a constraint that the future generations do not lose their ability to meet their needs. What this means is later spelt out for renewable and non-renewable resources (UNWCED, 1987, Introduction, 11 and 12). In view of the ordinary meaning of 'sustainable', we may say that development tries to (increasingly) meet the needs of humans, and it is sustainable if this development can continue.

To conclude our section about the current understanding of sustainable development (or sustainability) it is worth mentioning that the UN General Assembly has set 17 sustainable development goals in 2015 (UN, 2015). These goals can only be understood if we consider the aspects of both progressive development and sustainability (which does not mean that both aspects can always be neatly separated). Some of the goals describe the idea of a (progressive) development, e.g. when they require abolishing poverty (first goal) or establishing gender equality (fifth goal). The absences of poverty and gender inequality too are goals for a development that is deemed progressive. Already the Brundtland commission had defined development to include the abolishment of poverty (UNWCED, 1987, Ch. 2, 4) . As far as the specific aspect of sustainability is concerned, 11 out of the 17 goals explicitly mention sustainability, e.g. because they require sustainable agriculture (second goal) or 'sustainable management of water and sanitation for all' (sixth goal, p. 14).

Transplanetary sustainability

As mentioned in the Introduction, it is now suggested that sustainability should have a transplanetary dimension. The idea is that not only our planet needs to be taken into account when we consider sustainable development, but also outer space and the objects that are there.

However, what are the reasons for the proposal to consider transplanetary aspects of sustainability? From Losch (2018*a*, pp. 4–5), we can extract the following considerations in favour of the proposal:

Outer space contains many resources that may be used by humans. The most salient examples are material resources such as, e.g. metals found on other planets. Yet, we can also think of the space around our planet as a resource: it can be used by satellites. These days, space debris threatens this resource: space is filled with debris, collisions with which can significantly damage satellites. A sustainable way of dealing with resources is undoubtedly an important aspect of sustainable development. Nevertheless, it would be artificial not to consider resources from outer space when we think about sustainable development. If sustainable development requires the protection of our planet, then other planets should be protected too to the extent we can hope to obtain resources from them.

[5]The Oxford Dictionaries defines 'sustainable development' as '[…][e]conomic development that is conducted without depletion of natural resources.'

[6]See e.g. https://www.forestry.gov.uk/forestry/edik-59fmzf (last accessed June 2018).

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This argument may be reinforced by the observation that our planet may cease to provide us with the resources that we need, e.g. due to a collision with an asteroid (see Losch, 2018*a*, p. 4). In such a situation, we would be forced to use resources from outer space even to grant the future of humanity, which is a very basic demand for sustainable development. Thus, depending on the circumstances, the resources from space may become a dominant concern for humans.

Losch also mentions ethical questions that arise in the context of the exploration of outer space and its objects: should we protect other planets to the extent to which we have to protect the Earth? Do we have an obligation to spread life in the Universe? It may be hoped that such questions can be addressed in an ethics for which the notion of transplanetary sustainability is basic (an ethics of transplanetary sustainability, for short).

In his article, Losch (2018*a*, pp. 4–5) discusses contamination. The latter is first and foremost an issue in astronautics as far as the contamination of the Earth is concerned. The threat is that, for example dangerous bacteria or viruses from outer space enter its atmosphere, e.g. when a spacecraft from the Earth returns from its mission. Still, to discuss such threats, we do not need a new notion of transplanetary sustainability. After all, our planet and its protection are already at the centre of every ethics of global sustainability. This is different when it comes to the contamination of other planets. Such contamination may threaten human development too, for instance, if it impedes the use of resources from such planets. This problem cannot be discussed under the label of sustainable development if sustainable development is entirely concentrated on the Earth. The point of the proposal under investigation, therefore, must be to properly take into account certain goods or resources that come from outer space, and that have been neglected thus far. By contrast, events in outer space that causally interfere with the resources of our planet do not urge a new way of thinking.

How can we otherwise characterize the proposal to think sustainable development from a transplanetary perspective? What would its implications be?

In some way, the proposal looks like an extension of our previous thinking about sustainable development: regions of the Universe that haven't been considered so far, need to be taken into account. But from a logical point of view, the proposal does not yield an extension. This would only be so if the extension of the concept was increased, i.e. if the set of sustainable developments became larger once we switched from the former notion of sustainability to transplanetary sustainability. However, the set of sustainable developments does not increase in this way, at least not necessarily. By taking into account outer space, sustainable development becomes in some sense more restrictive: we need to consider additional aspects of our actions when thinking about sustainable development. For instance, we may not be able to neglect certain consequences that our actions have on outer space. As a consequence, to some extent, the proposal leads to further restrictions on development since our duties to protect our resources now extend to some parts of outer space too. At the same time, the proposal facilitates our householding with resources. For instance, minerals from outer space may compensate a shortage that we would otherwise face. The background is that outer space opens up new options to secure sustainable development.[7] As a consequence, certain developments that did not qualify as sustainable so far (e.g. one in which a particular type of mineral is exhaustively mined on Earth) may become sustainable in a transplanetary way. For the choice of actions that promote sustainable development, the impact of a switch to transplanetary sustainability depends on the case at hand: it may lead to new restrictions or set aside existing ones.

The proposal under consideration is arguably related to a new self-understanding of humans, according to which we do not have to forever be the inhabitants of the Earth: the Earth may have been our home until today; moreover, it may be our homeland in that it is there where we have originated. However, the Earth need not stay our home forever, and we may move somewhere else. Of course, so far, we do not have the means to live somewhere else, but this may change in the future.[8]

Discussion

Let us now discuss the proposal to 'widen our horizon', as far as sustainable development is concerned, as suggested.

A first question is whether the proposal actually leads to a new concept of sustainability, or of sustainable development. Can we say that a new concept of sustainable development substitutes an old one according to the proposal?

The answer depends on what exactly the previous concept of sustainable development was like. Taken literally, the definitions quoted above do not exclude that, for instance, resources from outer space are considered – there is only general talk about the 'resource base' in the explanation of the IUCN definition (IUCN, 1980, Introduction, 3). It may thus be argued that the transplanetary aspects were already implicit in our previous concept. This argument is compatible with the concession that we have not yet recognized these aspects so far.

However, it is also arguable that, as a matter of fact, our previous thinking about sustainable development was in fact centred on our planet and that the definitions do not fully capture this, because the terms used to define sustainability were implicitly understood in a restricted, Earth-centred way. The more theoretical question in the background is how the meaning of a concept or a term is fixed as a matter of fact. This question leads into very muddy terrain, which we cannot enter here. Let us thus suppose that we are talking about a proposal for real conceptual change because the previous notion of sustainable development has neglected outer space.[9]

How recommendable then is the proposed replacement of one concept with another one? From the perspective of conceptual engineering, this is a matter of various desiderata on concepts.

For Carnap, the first desideratum on a new concept is the *similarity* between the new and the old concept. Since we assume that there is a difference between sustainability understood so far and transplanetary sustainability, there is at least some dissimilarity between the concepts under investigation. However, since it was unclear whether the existing concept of sustainability does, in

[7]Strictly speaking, most of these options only become available through technical innovation. For example, minerals from other planets become only resources for us, and can only help to secure sustainable development, if we have the technical means of mining them.

[8]There are other interesting innovations in our thinking about sustainability, e.g. the planetary boundaries approach (see Rockström et al., 2009), but these innovations are unrelated to the one under consideration here.

[9]Below, I will briefly consider an alternative view according to which our previous concept of sustainable development was unclear about the question of whether outer space should be taken into account. The point of the proposal would then be to clarify the concept of sustainability in favour of including outer space. The question then is how sensible this is in comparison with excluding the consideration of outer space.

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fact, exclude transplanetary considerations, there is no strong case for there being a large dissimilarity. Note further that similarity as such cannot play a significant role in our setting. The reason is that, when we ask whether we should replace a concept by another one, similarity does not provide an answer; the degree to which both concepts are similar specifies how far both concepts are apart and how they are related to each other in this respect. After all, this relationship as such does not give us any reason to think that one concept is better than the other. Similarity can only become an issue indirectly, for instance, if the concept used so far is very entrenched and if it takes considerable costs to replace it with a dissimilar one. In this way, the extent to which two concepts are dissimilar has an impact on some reasons to replace one by the other, but it does not provide a reason of its own. I will therefore not treat similarity as such as a desideratum. We will further assume that the old and the new concept are quite similar.[10]

Carnap further includes *exactness* in his desiderata. There are in fact several ways in which Carnap thinks about exactness (see Brun, 2016, pp. 1221–1222). For one thing, a concept is supposed to be more exact if, and only if, it is less vague, i.e. if there are less particular cases for which it is unclear whether the concept applies or not (see Carnap, 1962, p. 5). In this sense, the extended notion of sustainability is more exact than the previous one if it clarifies whether a development is sustainable or not in a case, in which the old concept did not do so. It is arguable that this condition is fulfilled for cases in which outer space was involved. For instance, it may be argued that it was not clear whether a sustainable development may lead to the 'pollution' of outer space with space debris because it was not clear whether outer space would matter for sustainable development. However, whether this argument is sound depends on what our former concept of sustainability was, and since we have stipulated that the previous concept of sustainable development does exclude concerns related to outer space, we cannot argue for advancement of exactness at this point. Another idea behind the desideratum of exactness is that the new concept can be defined in scientific terms (Carnap, 1962, p. 7). Now, the only difference in the definition of the existing notion of sustainability and the new one is that there is a restriction to Earth in the first one (although this restriction is not explicit and does not appear in the wording of the definition). This does not make a big difference in terms of exactness of the definition. The only possible problem with a restriction to our planet is that it is not entirely clear where to draw the line between our planet and outer space. This problem is avoided with the new, extended notion of sustainability.

As far as *simplicity*, another of Carnap's desiderata, is concerned, a concept counts as simpler than another one for Carnap (1962, p. 7), if its definition is simpler and if its connection to other concepts can be spelt out in simpler terms. Here, the second aspect can better be discussed under the desideratum of fruitfulness. Regarding the definition, I have above argued that the wordings of existing definitions of sustainable development do not explicitly exclude consideration of the outer space. Therefore the wording of a definition of transplanetary sustainability does not need to change if we understand the terms used in the definition appropriately.[11] Accordingly, there would not be a difference in the simplicity of the definition. Alternatively, we may say that the existing notion of sustainability would need a definition that explicitly mentions a restriction to our planet. If this restriction is dropped in the definition of transplanetary sustainability, we gain in simplicity. Yet, the gain would be insignificant.

To provide an intermediate summary then, we can say that similarity as such is not an issue in our setting and that transplanetary sustainability does not fare significantly better regarding the desiderata of exactness and simplicity. What remains to be discussed with regards to Carnap's desiderata is *fruitfulness*. For Carnap, a concept is more fruitful if it allows for more generalizations (1962, p. 7). We may add that broader generalizations are a plus too. Carnap (ibid) mentions scientific laws and logical theorems, but sustainability is primarily a term used in moral discussions, so the central question must be to what measure the extended notion of transplanetary sustainability is more fruitful for our moral thinking than is the existing notion of sustainability and to which extent it allows us e.g. to find more appropriate moral principles. If we view Carnap's account of explication in the context of the development of a theory (as does e.g. Brun, 2016 and as is certainly reasonable), a decisive question is whether the new notion is fruitful for building a suitable moral theory. Here, a moral (or an ethical) theory is, very roughly, a set of interconnected ethical principles with at least the two following tasks. It first allows us to infer moral judgements about particular cases, e.g. about what is morally right in such cases (provided, of course, we have some knowledge about the cases). In this way, such a theory can guide our decisions and actions. Second, a moral theory is supposed to explain why certain actions have the moral features they have, e.g. of being right (see e.g. Tännsjö, 2006, p. 213 or Hurka, 2011, p. 18). In this way, moral theories yield what may be called moral understanding. Examples of ethical theories comprise several versions of utilitarianism. Kantian ethics may be reconstructed as a theory too.

Let us thus discuss to what extent adopting the notion of transplanetary sustainability may be fruitful for our moral thinking and moral theory building.

As an obvious reason in favour of the new concept of transplanetary sustainability, we may note that the previous concept of sustainability was missing aspects of our actions that concern outer space, e.g. goods located there. Such goods can make a significant difference to progressive human development. Conversely, the 'pollution' of outer space with debris may have a lasting impact on human welfare. So the new concept of transplanetary sustainability points us to something that matters from a moral point of view. The decisive requirement in the background is that our moral thinking should fully take into account what matters morally and that our actions should be informed by every consideration that is morally important.

When Carnap thinks of fruitfulness, then he is primarily concerned with generalizations. This raises the question of whether the notion of transplanetary sustainability allows for generalizations that the existent notion does not, and *vice versa*. Now since the notion of transplanetary sustainability forces us to take into account options and aspects of options that otherwise are neglected and that matter from a moral point of view, generalizations using the concept of transplanetary sustainability have a

[10]It is worth noting here that our setting differs from Carnap's: his focus is on the question by which concept we should replace an existing one. By contrast, our question is whether we should replace one concept by a specific different one.

[11]What is interesting here from the perspective of conceptual engineering is that it is natural to replace several concepts that are interconnected, at the same time.

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better chance of being appropriate.[12] For instance, the principle that we should strive for sustainable development does not generally hold for a notion of sustainability that disregards important options or aspects of options.

The consideration of other resources under the term 'transplanetary sustainability' raises the question of whether such resources should be treated as are resources from the Earth. If this is the case, then ethical principles can generalize about all sorts of resources. To evaluate whether this is appropriate a substantial moral argument is needed. It might result upon further reflection that resources from outer space allow for, or even require, a different treatment than those from our planet. For instance, as far as minerals from other planets are concerned, we may perhaps think of them as a gift that we can take when we need it and the permanent supply of which we are not responsible for. This would not be a problem for the imperative to strive for sustainable development since the idea behind the latter is likely to include that all resources are to be taken into account in the way in which they deserve it. The question is rather whether all resources taken into consideration under the label of 'sustainability' deserve equal treatment. If the answer to this question is no, then we may object to introducing the concept of transplanetary sustainability, because it puts together things that do not belong together. By contrast, if the answer is yes, then the notion of transplanetary sustainability helps us to think consistently about all kinds of resources. Moreover, it is likely that the answer is yes, because why should some resources *qua* resources deserve different treatment than others? Of course, one possible reason in favour of making a difference is that other (extraterrestrial) beings hold a legitimate claim on some resources. However, considerations of this type can be incorporated in a notion of sustainability, for instance, if the notion of progressive development is suitably extended to other beings (see below for this). The conclusion then is that the notion of transplanetary sustainability likely helps us to think consistently. This is significant since consistency is an essential theoretical virtue (see e.g. Kuhn, 1977 and Lacey, 1999, Ch. 3, for such virtues).[13]

In this argument, I have used resources as an example, but analogous points should apply to other things the consideration of which is included in the notion of transplanetary sustainability, but not in the Earth-centred sustainability.

Another advantage of switching to the notion of transplanetary sustainability may be that it helps us to answer moral questions better that arise in relation to the exploration and use of outer space and its objects. As mentioned before, outer space opens options for acting that we would not otherwise have. This raises the questions of whether we should choose the new options and how they may be evaluated from a moral perspective. Here are some concrete moral questions that relate to the exploration and use of outer space: can either single human beings or states appropriate celestial bodies or regions of space? What rules should govern business with, and within, outer space (see e.g. Livingston, 2003)? What ethical constraints are there for space settlement (Fogg, 2000)? Should we preserve traces of the human exploration of space as part of the human heritage (Barclay and Brooks, 2002)? How should we deal with extraterrestrial living beings? Also, as our actions have consequences for outer space, the question arises what this means for our moral evaluations. The hope may then be that the notion of transplanetary sustainability proves fruitful if we wish to address moral questions about the exploration and use of outer space and its objects.

How much does the notion of transplanetary sustainability in fact help us to answer such questions? In some regards, the ideal of sustainable development has clear implications on how we should deal with outer space. The problem of space debris is a clear point in case (see e.g. Rex, 1998 for technical aspects of space debris): these days, the use of satellites, e.g. for telecommunication is instrumental to progressive development. Space debris is a threat to the proper functioning of satellites, so we have to avoid and to remove space debris. Otherwise, the use of satellites cannot be maintained in the long-term future.

Still, we should also be clear that the proposed replacement of our previous concept of sustainable development does not help us to address *all* ethical problems that arise with the exploration and use of outer space. Consider, for example, the contamination of possible objects of research. The fear is that possible objects of scientific interest are contaminated with, e.g. bacteria from Earth and that they cannot be investigated any more. This is a problem of research ethics. But is it a matter of sustainable development? We can grant that the advancement of scientific research, in general, is part of progressive development. Yet, it would be an exaggeration to say that the advancement of every specific research discipline and the investigation of every particular scientific problem is part of progressive development. From the perspective of human development, the loss of the possibility to investigate a particular object may be compensated by other aspects of progressive development. As a consequence, sustainable development does not imply that particular objects should not be protected from contamination as possible objects of research (although, maybe, they should be protected in this way in a different role).

Nevertheless, the research on certain extraterrestrial objects is valuable. How valuable it is depends on the circumstances, for instance on the question of how vital an object is for current theories – it may significantly increase the rational confidence that we have in such theories, or it may help falsify them. Considerations of this kind escape concerns about sustainable development. Thus, to the extent that sustainable development does not cover research, an ethics of sustainable development cannot deal with ethical issues that arise from research. I agree with Losch (2018*a*) that the exploration of outer space raises intricate issues, but it is not clear that all of them are being adequately addressed in an ethics of transplanetary sustainability.

If my argument is sound, there is a more general problem about the postulate of sustainable development. Progressive human development (the continuation of which is the central point of sustainable development) arises at a coarse-grained level of description as a result of weighing various concerns. Human development may well be progressive overall even if there is no progress or even regression in some respects.[14] Lack of progress, or even regression, in some respect, may nevertheless pose a serious moral problem that needs consideration. The notion of sustainable development is too coarse to address such problems.

There is another problem with the notion of sustainability in relation to space ethics: so far, the ethics of sustainability was at

[12]I here speak of appropriate rather than of true generalisations since it is controversial whether ethical judgements or principles can be true, strictly speaking.

[13]Quite generally, we may define fruitfulness as the tendency to allow for theories that instantiate theoretical virtues.

[14]Beckerman (1994) shows that a demand for sustainability becomes 'morally repugnant' (p. 191) if all trade-offs are excluded. We are talking about so-called weak sustainability if trade-offs are allowed (see e.g. Gutés, 1996).

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least compatible with an anthropocentric outlook on ethics. In effect, the focus was on progressive human development[15]; the idea roughly was that the development could continue. This is not to deny that the ethics of sustainable development may be articulated from a different viewpoint, say, from a pathocentric perspective under which all sentient beings need to be taken into account in matters of morality. Yet, this is at least not what has typically happened. Very likely, the success of the concept of sustainable development in the circles of transnational politics is to some extent due to the fact that the focus was on humankind. In this way, our thinking about sustainability was coherent in the following way: the moral focus was on humankind, Earth was considered as our habitat, and the ethics of sustainability advised us to protect this habitat carefully. Now as other planets and space more generally come into focus with a shift to transplanetary sustainability, this coherence is threatened. The questions arise how we should deal with possible living inhabitants of other planets and whether, and if so, what, we owe to them, as far as their habitats are concerned. Intuitively, it seems plain wrong to risk the contamination of the habitats of extraterrestrial living beings with bacteria or viruses from Earth, since this poses a threat to their lives. This assumes that life on other planets bears some intrinsic value. But even if we deny this value, we are not free to act on living extraterrestrial beings in arbitrary ways, if these beings turn out to have their own well-being or if they qualify as rational agents. If some such condition is fulfilled, they have a moral status, i.e. they need to be taken into account from a moral perspective. What exactly the condition for a moral status requires is a matter of disagreement between moral theories. In any case, requirements that derive from the fact that extraterrestrial living beings have a moral status do not fit well in an ethics of sustainability that focuses on human development.

The point is that, as we open the perspective to include possible resources from outer space, we should also take into account the interests of other beings that may have a privileged claim on these goods. Broadening our perspective on resources is harmless only as long as we are just talking about additional things that may causally affect our well-being, but not if we encounter beings that have an ethical standing, not unlike our own.[16] The precise moral status of possible extraterrestrial living beings needs of course further scrutiny, but it seems clear that an ethics of sustainable development is not the place for such scrutiny.

One may object that the notion of progressive development and thus the notion of transplanetary sustainability can be broadened to include the interests of extraterrestrial beings. This point is true, but such an extension may be resisted because the resulting notion of sustainability becomes too dissimilar from the previous one. Further note that just using a broadened notion of sustainability does not really address the moral questions, we may face. To see this, consider the question of whether communities of beings of a specific kind have a specific moral claim on the habitat in which they have originated and how far that claim extends. Answering this question needs significant moral thinking. We can try to 'anticipate' the result in a notion of transplanetary sustainability by saying that the latter requires us to adequately take into account all claims on habitats on which living beings have originated. Still, this would not settle an answer to the question of what these claims are.

So far, I have been arguing about moral thinking quite generally without taking into account moral theories extensively. We may thus ask more specifically how the notion of transplanetary sustainability can help us to improve our moral theories. The idea here is that 'transplanetary sustainability' may serve as a theoretical term that helps us make theoretical progress. In scientific theories, theoretical terms are expressions that do not correspond to observable entities or properties but are rather introduced to systematize or to explain the observed phenomena (see Andreas, 2017 for theoretical terms). In moral theories, theoretical terms may likewise be understood as referring to unobservable entities, properties or relationships that help us explain why certain options are, e.g. morally right. However, the prospects for making theoretical progress by referring to transplanetary sustainability are dim. Note first that the term 'sustainability' (however it is understood or qualified in detail) does not figure in the most prominent moral theories. The formulations of such theories include theoretical terms such as 'utility' and 'welfare' (utilitarianism), or 'generalizable maxim' and 'worthiness' (Kantianism), or 'beneficence' and 'justice' (the principles by Beauchamp and Childress, 2009), but not 'sustainability.' At least for utilitarianism and Kantian ethics, this does not mean that concerns of sustainable development are neglected. That the needs of future generations must not be compromised in favour of meeting the needs of the present generation (to take up the definition of the Brundtland Commission) is a consequence of utilitarianism and Kantianism: both moral outlooks do not make any principled difference between the present and future generations. From similar observations, Beckerman (1994) argues that the notion of sustainable development is not useful because it is 'logically redundant', once it is well understood (p. 191). Additionally, prominent moral theories are open to consider resources or extraterrestrial beings, because these theories articulate moral concerns at such an abstract level that such resources or extraterrestrial beings may be included. The outcome is that an extended notion of transplanetary sustainability does not make a positive difference for moral theories, first, because 'sustainability' is not a theoretical term in prominent moral theories, and second, because such theories have no problems to address outer space. This is of course not to say that they can offer appropriate solutions to practical problems concerning outer space.

So far, there are good reasons to doubt that the extended notion of transplanetary sustainability will make a positive difference due to its fruitfulness. However, to some extent, this result is only due to the fact that we have not yet discussed the role of the concept of sustainability in political discourse. Indeed, the notion of sustainability is hugely popular in international politics. With the decision on the sustainable development goals, sustainability has become an official aim for the politics of the United Nations. If the states and international institutions make significant progress in this direction, then the notion of sustainable development may prove beneficial, not so much because it has improved our thinking, but rather because it has helped to popularize important moral concerns and thus helped to pave the way for getting closer to sustainable development. Put succinctly, we may say that it has helped us to act in a better way. Given this 'success story', it is crucial to conceptualize global sustainability in such a way to include moral concerns that are important, and to make sure that it is clear and well-understood. An extension to transplanetary sustainability is very healthy in this regard

[15]See footnote 1 for justification.

[16]It may be argued that our ethical thinking about sustainable development is already incoherent as long as we do not treat animals and possibly even plants as having value in themselves. This is undoubtedly an important criticism against an anthropocentric notion of sustainable development, but we cannot consider it here.

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because it reminds us of pressing concerns that are related to outer space. It is further arguable that it leads to a conception that is simpler and more exact, which in turn is advantageous for the realization of the global development goals.

Keep in mind though that the evaluation of a switch to transplanetary sustainability has a number of consequences on the political level. For instance, from this perspective, it may be reasonable to require that the new concept of sustainability does not drastically differ from the old one simply because the concept of sustainability is very entrenched and has helped to achieve some progress (in this respect, similarity may become indirectly relevant).

However, one may object to the replacement of our previous concept of sustainability from different angles too: for example, it may be argued that the reference to resources from outer space is just a distraction. It may point our attention to problems that are not as serious as many other problems that we have concerning sustainability. I cannot discuss this issue here in depth, because its analysis would need to draw on empirical findings that are beyond the scope of this philosophical essay.

Conclusions

Where then does our discussion leave us? Is it a good idea to replace our current notion of sustainable development by one that takes into account outer space and thus is transplanetary?

There are reasons in favour of this move, but they should not be exaggerated. It is not clear whether our previous conception of sustainable development was restricted to the Earth. Although it is true that political declarations and similar documents have focused on our planet, the 'official' definitions did not explicitly exclude e.g. resources from other planets or asteroids. If we assume that the previous notion of sustainability was not clear on this count, then replacing it by the notion of transplanetary sustainability produces benefits in exactness. If the consideration of outer space had explicitly been excluded, the replacement would produce gains in simplicity. As far as fruitfulness is concerned, taking into account outer space in our decisions is certainly important. However, it is not clear how fruitful a switch to transplanetary sustainability is otherwise. This leads to the substantial question of whether it makes a moral difference if e.g. resources come from our planet or outer space. Further, the notion of sustainability is not prominent in moral theorizing, and there are legitimate doubts as to whether an ethics of sustainability can appropriately deal with all moral questions about the use and exploration of outer space. In particular, an ethics of sustainable human development may not be appropriate for the interaction with extraterrestrial intelligent beings that have a moral status. The consideration of resources etc. from outer space under the notion of transplanetary sustainability may only go halfway towards revising our thinking that the consideration of outer space calls for: not only do we need to take into account additional resources and additional consequences of our actions that have an impact on human welfare. Instead, if there is extraterrestrial life with an appropriate status (e.g. rational beings, sentient beings, conscious beings), it needs to be taken into account too. Given the successful political career of the notion of sustainability though, it is a good idea to include a transplanetary dimension in sustainability and to consider related aspects when dealing with outer space.

In more practical terms, it is therefore reasonable to add an 18th sustainable development goal 'space environment', because e.g. space debris is a significant problem that should be addressed by humankind. However, this should not detain us from deliberating more fundamentally about sustainability and its requirements.

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