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Strong sustainability, critical natural capital and the capability approach

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ABSTRACT

This article is an attempt to conceptually improve the notion of strong sustainability by creating a rapprochement between its core concept, critical natural capital, and the capability approach. We first demonstrate that the capability approach constitutes a relevant framework for analysing the multiple links between human well-being and critical natural capital. Second, we demonstrate that the rapprochement between critical natural capital and the capability approach can form both the normative basis and the informational basis for a deliberative approach to human development which embraces a strong sustainability perspective. This conceptual rapprochement, as illustrated in our case study, opens up avenues of research towards the practical implementation of human development projects from a strong sustainability perspective.

1. Introduction

In recent years, a number of articles have examined the pros and cons of a rapprochement between sustainability and the capability approach (CA) (see among others Ballet et al., 2011, 2013; Rauschmayer and Leβmann, 2011; Martins, 2011; Polishchuk and Rauschmayer, 2012; Scerri, 2012; Griewald and Rauschmayer, 2014). However, none of these articles has established a connection to the notion of critical natural capital (CNC), a notion that lies at the heart of strong sustainability (Ekins et al., 2003; De Groot et al., 2003; Neumayer, 2003). The role of CNC is to highlight the very limited substitutability of the functions and services provided by natural capital as concerns their unique contribution to human existence and well-being (Ekins et al., 2003). Identifying the critical aspects of natural capital implies that we are in a position to address the issue of the multiple links that exist between the natural environment and human well-being. Duraiappah (2004), along with Polishchuk and Rauschmayer (2012) have started to show that the CA can help resolve this issue.

Authors working on strong sustainability (Ekins et al., 2003; De Groot et al., 2003; Chiesura and de Groot, 2003; Brand, 2009; Dedeurwaerdere, 2014) note that in addition to "objective" ecological criteria (safe minimum standards, minimum ecosystem size, maximum sustainable yield, ecological footprint, etc.), societal values and perceptions, and ethics and attitude to risk also play a decisive part in determining what aspects of natural capital should be considered "critical". So the definition of CNC relies not only on our capacity to supply factual knowledge about socio-ecological systems, but also on discussions about the values that underline our use of natural capital (Dedeurwaerdere, 2014). Therefore, the identification of the critical elements of natural capital requires both the relevant factual knowledge about the interactions between natural capital and human well-being, and a normative basis for the assessment of the sustainability of these interactions. As long as there are multiple value judgments involved in the definition of the critical elements of natural capital, and given the irreducible uncertainties of complex socio-ecological systems, public deliberation and stakeholder participation (Van den Hove, 2000) would appear to have an input to make towards the definition of the criticality of natural capital (De Groot et al., 2003; Dedeurwaerdere, 2014).

The goal of this paper is twofold: (i) it demonstrates that the CA represents a relevant framework for analysing the multiple links between human well-being and natural capital, and so for specifying the elements of natural capital that could be critical for generating well-being and (ii) it demonstrates that the combination of the CA and CNC can form both a normative basis and informational basis for a deliberative approach to human development which embraces a strong sustainability perspective.

This paper is structured as follows: Section 2 first describes the differences between weak and strong sustainability. It then presents the concept of CNC, links it to ecosystem services and concludes by examining how public deliberation contributes to the definition of criticality. Section 3 presents the main features of the CA with an emphasis on the role this approach confers to public deliberation when dealing with the assessment of well-being. Section 4 addresses the multidimensionality of the interconnectedness that exists between human well-being and natural capital through the lens of the CA. The last section (Section 5) demonstrates,

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through a case study, how a combination of the CA and CNC can form both a normative basis and an informational basis for a deliberative approach to human development which embraces a strong sustainability perspective.

2. Strong Sustainability and Critical Natural Capital

This section first presents and characterises the two main types of sustainability: weak sustainability and strong sustainability. It then goes on to identify the relationship between CNC and ecosystem services before investigating how public deliberation contributes to the definition of criticality of natural capital.

2.1. Weak Sustainability Versus Strong Sustainability

The notion of natural capital was introduced by a number of ecological economists at the beginning of the nineties (Ekins and Max-Neef, 1992; Costanza and Daly, 1992; De Groot, 1992). Given the suitability of natural capital for depicting the socio-economic uses of the environment and for pushing environmental issues into economic thinking and decision-making, it was rapidly adopted for sustainability studies (Arias-Maldonado, 2013).[1] In the field of ecological economics, natural capital is defined as a set of complex systems, consisting of evolving biotic and abiotic elements, that interact to determine the capacity of an ecosystem to directly and/or indirectly provide human society with a wide array of functions and services (Noël and O'Connor, 1998; Ekins et al., 2003; De Groot et al., 2003; Brand, 2009).[2] This emphasis on natural capital allows us to make a distinction between weak sustainability and strong sustainability.

The weak sustainability approach assumes that natural capital and manufactured capital are essentially substitutable and that there are no essential differences between the kinds of well-being they produce (Ekins et al., 2003; Neumayer, 2003, 2012). The only thing that matters is the total value of the aggregate stock of capital, which should be at least maintained, or ideally added to, for the sake of future generations (Solow, 1993; Neumayer, 2012). From this standpoint: "*it does not matter whether the current generation uses up non-renewable resources or dumps CO_2 in the atmosphere as long as enough machineries, roads and ports are built in compensation*" (Neumayer, 2003, :1). With this type of approach we can logically compensate the degradation of natural capital by the estimated equivalent amount of manufactured or financial capital. In weak sustainability, technological progress is assumed to constantly generate technical solutions to the environmental problems that are caused by the increased production of goods and services (Ekins et al., 2003; Sébastien and Brodhag, 2004).

In contrast to weak sustainability, some authors have formulated a strong conception of sustainability (see among others Noël and O'Connor, 1998; Ekins et al., 2003; Chiesura and de Groot, 2003; De Groot et al., 2003; Neumayer, 2003). For the proponents of this strong sustainability approach, a distinction must be made between natural capital[3] and manufactured capital. First, natural capital is characterised by the phenomenon of irreversibly (for example, the extinction of a species is irreversible) and the threshold phenomenon (for example, above a certain threshold of concentration of pollutants, the auto-depuration process of water of aquatic ecosystems is overloaded: if the concentration of pollutants continues to increase, the functioning of the ecosystem is disrupted). Moreover, the amount of manufactured capital can be increased or decreased, whereas natural capital can disappear if the prior deterioration and continued diminution of this capital have been too excessive to enable it to replenish itself and hence supply essential services for human well-being. Finally, manufactured capital requires natural capital for its production, so manufactured capital cannot be a complete substitute for natural capital. To sum up, there is a qualitative difference between manufactured capital and natural capital (Ekins et al., 2003). Second, natural capital is multifunctional i.e. in certain situations it can provide several services simultaneously. For example, the flow of water in a river can provide biological services (the reproduction of fish), economic services (the fish can be caught or the flow can be used to produce hydroelectricity), and recreational services (bathing in the river). This multidimensional aspect of natural capital means that it is unlikely for manufactured capital to act as an appropriate substitute. Natural capital, manufactured capital and other forms of capital (for example, human and social capital) instead have to be seen as complementary in producing human well-being (Brand, 2009). Third, due to our lack of knowledge about how natural systems function, we cannot know for certain what the effects of destroying natural capital will be on human well-being (Dietz and Neumayer, 2007). This uncertainty adds to the irreversibility phenomenon and should theoretically ensure that we adopt a precautionary principle in our use of natural capital (Jonas, 1984). Fourth, as is stated by several authors (see among others Toman, 1992; Dedeurwaerdere, 2014), an increase in future consumption is not an appropriate substitute for the loss of natural capital. The following quote illustrates this argument: "*Today's generation cannot ask future generations to breathe polluted air in exchange for a greater capacity to produce goods and services. That would restrict the freedom of future generations to choose clean air over more goods and services*" (UNDP, 2011: 17). And consequently the fundamental issue of intergenerational justice enters the debate.

To sum up, by building on these four arguments, the strong sustainability approach assumes that the substitutability between natural capital and other forms of capital should be strictly limited to the circumstances where the use of the services provided by natural capital does not lead to the irreversible destruction of this capital because its depletion cannot be compensated for by investing in other forms of capital (Neumayer, 2012). Therefore, the strong sustainability approach holds that certain elements of natural capital are "critical" due to their unique contribution to human well-being (Ekins et al., 2003; Dedeurwaerdere, 2014). These potentially "critical" elements to human existence and well-being can be conceptualised as ecosystem services provided by natural capital (Brand, 2009). We will now explain the notion of ecosystem services and explore their relations with CNC.

2.2. Critical Natural Capital and Ecosystem Services

The Millennium Ecosystem Assessment (MEA) (2005) broadly defines the concept of ecosystem services as the benefits people obtain from ecosystems. It identifies two main types of ecosystem services: "supporting" and "direct".[4] Supporting services represent the internal functioning of natural systems (nutrient cycling, primary production, evolving processes, soil formation, water cycling, production of

[1] Nevertheless, we acknowledge that this interpretation of "natural capital" is questionable and that it has been faulted for being too anthropocentric. Even if we acknowledge that the concept of natural capital cannot be considered as an absolute category and is open to criticism, the point of our paper is not to develop this aspect. For further information, see Foster and Gough (2005).

[2] The word "function" is used, namely to indicate some capacity of the ecosystem to do something that is potentially useful to people (Haines-Young and Potschin, 2010), and "ecosystem services" are understood here as aspects of ecosystems that are utilized (actively or passively) to produce human well-being (Fisher et al., 2009). For the sake of simplicity we will focus on ecosystem services, which means that we will address natural capital through its role as a provider of services that enhance human well-being.

[3] We must acknowledge that the use of the term "natural capital" should reflect the fact that naturalness is not an absolute category and therefore we need to take into account the general process of hybridization between society and nature in the production of human well-being (Arias-Maldonado, 2013). Consequently, natural processes do not need to remain untouched to provide key services for human well-being. They can be altered, amended and brought into play, thereby remaining critical without remaining fully natural (Arias-Maldonado, 2013). We will not develop this point further. For more information, see (Arias-Maldonado, 2013).

[4] Authors writing about CNC mainly refer to the ecological functions provided by natural capital; the MEA speaks in terms of ecosystem services. Ekins et al. (2003) distinguish between the function "*of*" natural capital and the function "*for*" human beings. The concept of the "supporting service" used in the MEA clearly reflects the function "of" natural capital, and the concept of "direct services" popularised by the MEA directly echoes the "function for" human beings. For the sake of simplicity, we will not go any further into the distinction between functions and services here, and will only refer to ecosystem services.