



## Methods

## The economic valuation of biodiversity as an abstract good

Yves Meinard <sup>a,b,\*</sup>, Philippe Grill <sup>b</sup><sup>a</sup> REHSEIS, Université Paris Diderot, Paris VII, Paris F-75000, France; CNRS, UMR7219, Paris, F-75205, France<sup>b</sup> Groupement d'Economie Quantitative d'Aix-Marseille, Centre Forbin, Faculté d'Économie Appliquée, Aix-en-Provence F-13627, France; CNRS, UMR6579, Aix-en-Provence F-13627, France

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## ABSTRACT

The notion of an economic valuation of biodiversity raises major philosophical and practical challenges, especially due to the fact that biodiversity is an abstract good. Insights from political philosophy and philosophy of language can help to clarify the reliability and scope of the current economic methods that can be used for the purpose of valuing it. The analogy with another abstract good, justice, indeed shows that thinking about abstract goods is a very specific exercise. If they do not take account of this specificity, applications of hedonic and contingent valuation methods can hardly claim to be relevant to value biodiversity. Rawls' theory of justice provides for the conceptual tools to overcome this problem. A reinterpretation, based on the theory of counterfactuals, allows generalizing this account of justice to outline a theory of thinking about abstract goods. This new framework emphasizes the importance of the institutional context in determining the reliability of thinking about abstract goods. It points toward substantial reforms of the methodology of economic valuation. Specifically, it suggests reinterpreting valuation as a dynamic expressive process, where initial steps aim at reinforcing the reliability of later steps through an institutional transformation and stabilization of preferences for abstract goods.

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## 1. Introduction

The economic valuation of biodiversity is certainly one of the most exciting and difficult challenges economists and conservationists will have to face in years to come (Heal, 2004; Sinclair-Desgagné, 2005). Since the 1980s, conservationists and functional ecologists have been unequivocal in unveiling more and more alarming evidence that: (1) biodiversity undergoes an unprecedented erosion due to human activities (Heywood and Watson, 1995; Wilson, 2002), and (2) measures of biodiversity can be correlated with measures of the functioning of ecosystems (Cardinale et al., 2006; Hooper et al., 2005), especially in terms of productivity and stability, which in turn are necessary conditions for human societies to properly function and for human wellbeing to be secured (Naem et al., 2009). There are therefore unmistakable very strong prudential and ethical reasons to collectively strive to protect biodiversity.

The debate rages on between environmentalists over the proper motive that should be underlying this protection of biodiversity (anthropocentric (Norton, 1995) vs. intrinsic value (Larrère and Larrère, 2009), deep ecology (Naess, 1984) vs. land ethics (Leopold, 1949), etc.) and between environmentalists and non-environmentalists over the relative priority that biodiversity preservation should be given when other important economic, societal and political goals (national security,

poverty alleviation, economic development, etc.) are also to be pursued. But for all their disagreements, there is one point on which all the protagonists must agree: quantitative comparisons are sometimes needed to help to make wise decisions. This is all the more undeniable when practical questions arise, such as when—subject to a given budget constraint—different amounts are to be allotted to various preservation and development projects (Weitzman, 1998): this is where an economic valuation of biodiversity can be very useful.

But once this point is accepted, it is necessary to ask what kind of features this economic valuation must have if it is not to preempt or defeat the very ethical motives that underlie the projects to be compared. A widespread criticism of economic valuation methods however holds that economic methods in fact reduce all values to a single preexisting metric of “demand value” (Norton, 1987), whose source is said to be the “felt preferences of individuals” (Sarkar, 2005). Critics are prone to point the narrowness of such a perspective—that risks obliterating issues of fairness, dignity and incommensurability between various goods, resources or practices for people from different cultures (Maris and Béchet, 2010; Norton, 2005). But some economists seem to be willing to acknowledge these limitations: economic methods are based on these normative assumptions indeed, but at least granting them allows making positive valid quantitative calculations (Chevassus-au-Louis, 2009; Perrings et al., 2009)—or so, the argument goes.

In this article we argue that this whole debate has embarked on wrong tracks. Current welfare economic methods are much less reductionist than this argument claims, but still they fall short of providing a sound positive

\* Corresponding author at: Institut für Evolutionsbiologie und Umweltwissenschaften, Universität Zürich, Winterthurerstrasse 190, Zürich, S-8057, Switzerland.

E-mail address: [yves.meinard@gmail.com](mailto:yves.meinard@gmail.com) (Y. Meinard).

valuation of biodiversity, because of a very specific feature of the latter: the fact that it is an abstract good. This notion of abstraction will be central in this essay, but it would be counterproductive to delve too deeply into the associated philosophical intricacies. For our purposes here, the following definition (based on the thorough characterization provided by Ricœur, 2005) will be sufficient. A good, an attribute or a characteristic will be termed “concrete” when it can exist and be identified on a single relevant object. For example, a chocolate bar is a concrete object, the number of bathrooms in an apartment and the number of species in an ecosystem are concrete characteristics of the corresponding objects. Conversely, an “abstract” good cannot exist on its own and cannot be identified without observing and interpreting a wide variety of relevant objects. In this definition, concrete and abstract are not without intermediaries, and are rather two poles of a continuum. We will see that biodiversity lies near the abstract pole.

Along the concrete–abstract axis, economic analysis often proceeds in a bottom–up fashion, starting with the most concrete objects and peeling them off stepwise of their concrete characteristics. In this way, starting with choices between bundles of concrete goods, the analysis can end up accounting for choices between uncertain future bundles of goods. But this bottom–up procedure does not provide for an access to all kinds of abstract goods, as we shall see. The origin of the shortcomings of current valuation methods is that the underlying conceptualization of valuation does not account for the specificity of thinking about abstract goods. Challenging this conceptualization involves taking a much broader perspective on valuation issues, striving to get hindsight vis-à-vis the technical details of the current methods and underlining fundamental connections between various epistemological problems. But we suggest that it is worth delving into these intricate issues because rethinking the economic valuation of abstract goods in the light of philosophical insights helps to figure out how to improve standard valuation methods to turn them into more effective, more practical and more value-neutral tools capable of helping to make wise economic and political decisions on biodiversity-related issues.

## 2. Biodiversity as an Abstract Good

At first sight, it might seem as though “biodiversity” referred to a concrete characteristic of ecosystems or natural areas (in the definition of “concrete” outlined above). According to the original definition, it stands for the diversity, or variety, of all living things, appraised at different scales (from gene to species to ecosystems) along morphological, phylogenetic and functional dimensions (Wilson and Peters, 1988). However, the twin problems of the proper formal definition of biodiversity and of its measurement are notoriously difficult and suggest that the concreteness of the notion is more disputable. Indeed, various measures of biodiversity have been suggested (Purvis and Hector, 2000; Schleuter et al., 2010), and the ecological literature abounds with more or less informal arguments emphasizing the qualities and drawbacks of many of them (Fleishman et al., 2006; Petchey et al., 2004). The notion of diversity has even been formally analyzed by axiomatic economists (Gravel, 2008; Nehring and Puppe, 2002; Weitzman, 1992), but a conclusion that can be drawn from their results is that the cluster of ideas intuitively associated with the notion of diversity (and encapsulated in the axioms) is unstable and context-dependant (Aulong et al., 2005). If biodiversity were a concrete measure or property, it would be a very fragile one.

Epistemological studies however draw a subtler picture (MacLaurin and Sterelny, 2008). They show that scientific practices actually never directly make use of the concept of biodiversity, but are rather based on surrogates for biodiversity. The latter are the relevant scientific concepts used to track and analyze the causal features ecologists and conservationists are interested in, that are captured by the various measures, like species richness, functional type richness, Shannon's index (Shannon, 1948) or more complex indices, like

“phylogenetic diversity” (Faith, 1992) or “functional diversity” (Petchey and Gaston, 2006). The concept of biodiversity proper is almost exclusively used to introduce problems, to articulate conclusions, to suggest applications, to formulate general prescriptions and the like. In other words, biodiversity is not a biological concept in the ordinary sense (in the sense in which, e.g., species richness or primary productivity are), it is not a technical concept but a more general and abstract concept used to ask broad questions pertaining to ecological theory, associated practices (e.g. conservation management and policies) and their ultimate significance. We argue elsewhere that this definition can be made more precise (Meinard, 2011), but for the purpose of the argument here the only relevant point is that it is decidedly abstract; other more famous attempts at defining biodiversity, like Sarkar's approach, according to which biodiversity is an emergent property of a conservation algorithm (Sarkar, 2002), or Norton's “policy-relevant” definition (Norton, 2008), are also abstract in our sense, and hence they could perfectly fit in our rationale. Now, if biodiversity is indeed this kind of abstract notion, playing this abstract role in ecological reasoning, does it make sense to conceptualize it as a good with an economic value? If “good” is understood as a synonym for “concrete object”, the answer is obviously: “no”. But the notion of a good can be conceived of much more broadly (while still being limited to an economic and not an ethical meaning), as being a theme or an entity that potentially motivates action on the part of agents or groups of agents. In that sense, one can, e.g., talk about churches or religions as being cultural goods, not reducible to the concrete objects and matter they contain or are associated with. In this broader sense biodiversity can be conceived of as an abstract good as well: an abstract good that potentially motivates action, among other reasons because some economic agents think it has intrinsic value and/or because ecological functioning and processes have a quantitative impact on the economic functioning of societies. But, just like a religion or a cultural practice, this abstract good is reducible neither to a set of objects nor to a measurable bunch of matter. In order to identify the proper method to value that kind of abstract goods, let us start by examining the various current available methods and some reasons to doubt that they could capture the value of such goods.

## 3. Clarifying the Debate on the Current Methods

One can identify two broad families of methods that are generally used to value environmental goods: one can call them by the umbrella names “hedonic methods” and “contingent valuation methods”. Both encompass important methodological variants, but their epistemological underpinnings are homogeneous enough to treat each one as a consistent family. Other methods, like replacement cost and production function methods, are also used to value ecosystem services (Freeman, 2003; Heal et al., 2005), but the valuation they provide, from the “production” side, only makes sense when they can fall back upon demand side data concerning output products of the services they study, for which hedonic methods and contingent valuation are the only methods available.

Hedonic price methods (Rosen, 1974), travel cost analyses, hedonic wage analyses and other attribute based analyses of market behavior (Taylor, 2003) all aim at unraveling the demand for a particular good or attribute for which there is no explicit market by studying consumers' behavior on markets for other goods that include the good or attribute or characteristic (Lancaster, 1966) to be valued. One can therefore bring them together under the generic heading of “hedonic methods”. For example, the demand for the environmental quality of neighborhoods can be deduced from the study of housing markets in neighborhoods of various environmental qualities: in such a context, the housing markets include an implicit market for environmental quality (Palmquist, 2004). Hedonic methods are not predicated on any form of hedonistic or experiential utilitarianism (Kahneman and Sudgen, 2005; Tännsjö, 1998). They do make use of

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