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Artículos

La comprensión de la biodiversidad desde una perspectiva relacional

Understanding Biodiversity from a Relational Viewpoint

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Resumen

La biodiversidad suele reconocerse en diferentes disciplinas como un valor universal. Ésta apunta a la heterogeneidad de las propiedades que caracterizan al mundo biológico. Sin embargo, a pesar de su uso común, el análisis crítico de la literatura filosófica pone en evidencia cierta dificultad a conceptualizar la biodiversidad, dada una aparente dicotomía entre los elementos normativos y descriptivos del término mismo. En este artículo se sostiene que es necesario considerar el aspecto relacional de la biodiversidad con el fin de resolver esta dicotomía. Esto significa que para ser un valor, cualquier diferencia en el mundo natural que sea definida en términos de biodiversidad implicará, a nivel conceptual y explicativo, la relación intrínseca entre lo que tenga en común con las entidades y lo que sea específico de éstas. De esta manera la biodiversidad será un concepto explicativo por sí mismo. Una visión relacional de la biodiversidad también hace reconocer el carácter multidimensional de dicha noción, lo que ha probado ser realmente útil en diferentes contextos, pudiéndose caracterizar propiamente en términos de "riqueza" implicada por el concepto de la biodiversidad.

Palabras clave: biodiversidad, explicaciones biológicas, riqueza, valores ambientales, valores éticos y conservación biológica.

Abstract

Biodiversity is commonly acknowledged as a universal value in different disciplines. It indicates the heterogeneity of properties that characterizes the biological world. Despite its common use, however, a critical analysis of the philosophical literature shows a difficulty in its conceptualization given by an apparent dichotomy between the normative and the descriptive features of the term itself. In this paper we argue that, in order to overcome such tension, the relational aspect of the biodiversity concept should be acknowledged. That is, any difference in the natural world, which is defined in terms of biodiversity, conceptually and explanatory entails the intrinsic relationship between what is in common and what is specific among entities, to be a value. This makes of biodiversity an explanatory concept in its own right. Through a relational account of biodiversity it is also possible to acknowledge the multi-dimensionality of the notion of biodiversity, which has shown to be really useful in different contexts and better characterized in terms of the "richness" that biodiversity concept entails.

Keywords: Biodiversity; Biological Explanations; Richness; Environmental Values; Environmental ethics; Conservation Biology.

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1. Introduction

The term "biodiversity" entered the lexicons of science and everyday life around 1988, once Conservation Biology emerged in the United States as an organized academic discipline between 1985 and 1987. During the organization of the 21-24 September 1986 National Forum on BioDiversity held in Washington DC under the auspices of the U.S. National Academy of Sciences and the Smithsonian Institution, the term was initially

intended "as nothing more than shorthand for 'biological diversity' for use in internal paperwork" (Sarkar, 2002, 131).

However, as Sahotra Sarkar well points out, from its very birth, the term biodiversity "showed considerable promise of transcending its humble origins. By the time the proceedings of the forum were published […], Rosen's neologism –though temporarily mutated as 'BioDiversity'– had eliminated all rivals to emerge as the title of the book" (Sarkar, 2002, 131).

Even if the aim of this new term –inherited by the neologism, which was invented a few years before by Walter G. Rosen– was to describe an organismic feature, the use of the term "biodiversity" acquired a more practical goal very soon. Its aim became to steer human choices towards environmental preservation. As Sarkar highlights, by linking the concept of biodiversity and its descriptive dimension to the discipline of conservation biology, the purpose was unavoidably to highlight the normative dimension of the concept: "In surveys conducted in the mid-1990s, Gaston and Takacs found little agreement among conservation biologists about what the scope of "biodiversity" was or even whether a precise definition was necessary" (Sarkar, 2014, 1-11).

In the present paper we want to overcome a narrow interpretation of the idea of biodiversity arguing that, in order to grasp the explanatory character of biodiversity, we have to discuss the relational aspect of this concept, both in terms of ecological and epistemological relationality. Such relational aspect emerges from an analysis of its definitions and their contexts and allows reframing the relationship between properties and values.

We proceed as follows. In Section 2 we start going through different definitions of biodiversity and its evolution, trying to clarify different conceptual aspects. In Section 3 we focus on the philosophical literature on biodiversity and ask whether biodiversity should be primarily considered a natural property or a value, highlighting its ecological dynamism and disentangling the epistemic and ontological dimension that biodiversity's account as a phenomenon rooted in place implies. These first analyses will allow considering (Section 4) the explanatory relevance of biodiversity. A relational account of the normative and explanatory components of the idea of biodiversity highlights the intrinsic relationship between natural properties and values mediated by a relational understanding of the concept of richness too. The ontological presuppositions of this account of richness in nature can accommodate a pluralistic account of bio-diversities in nature without entailing a relativistic explanation. Finally, we will draw some conclusions on the fecundity of such perspective for future researches on biodiversity. In particular, the relational nature of this concept allows us to appreciate some features of a philosophy of biodiversity, which is able to take into account the multi-dimensionality of the concept of biodiversity, to make

explicit its ontological presuppositions, and to highlight its connection with the concept of richness (not only species richness).

2. Defining Biodiversity, Assessing Biodiversity: The History of an Ambiguous Concept

Although the idea of biodiversity was born in 1985, the first clear attempt to define it came with the UN Conference on Environment and Development (UNCED): in 1992 "Biological diversity" was defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (UN, 1992, art.2). In that year, moreover, Edward O. Wilson wrote "The Diversity of Life", whose aim was to draw attention to the loss of species caused by human activities. In this way the emphasis was clearly on conserving biodiversity, rather than on defining it.

Nevertheless, at this level the concept of biodiversity has remained remarkably imprecise, and its measurement likewise variable. There has been considerable confusion as to what is exactly meant by biodiversity, and its connection to more traditional and evolutionary concepts such as species diversity. There are, indeed, many definitions of biodiversity and most of these are vague, which probably reflects the uncertainty of the concept itself. Some currently consider it to be synonymous with species richness, species diversity, or, even, the "full variety of life on Earth" (Hamilton, 2005, 90). This claim is supported by Sarkar, who remarked that "what makes the definition of 'biodiversity' difficult is that the biological realm –entities and processes– is marked by variability at every level of complexity" (Sarkar, 2002, 136).

At this point two issues emerge from this attempt of conceptualization: the first one is the difference between diversity and variability, where variability seems to be more inclusive than biodiversity; the other is that such variability implies making reference to both entities and processes. Given this multi-dimensionality of the concept of biodiversity, it is not surprising, on the one hand, that it is often used as an all-encompassing term, as a "synonym for nature" (i.e. all of living beings); or, on the other hand, that the inclusion of

"biodiversity" within the official language of science is still a vexed question, insomuch as "it is hard to imagine what in nature does not fall under the rubric of the term" (Väliverronen, 1998,131).

Although at the beginning of the 80s the term "biological diversity" was mainly used to describe species richness, a few years later many scientists began to use this terminology to illustrate a concept that incorporated both ecological diversity and genetic diversity[1]. It is precisely in those years that the concept of biodiversity has been explored at three main levels, i.e., genetic diversity, species diversity, and ecosystem diversity. These three levels worked together to create the complexity of life on Earth and provided a research program to survey and classify all forms of life. Even if there is no generally accepted definition of the term biodiversity, the three-level assessment of biodiversity is nowadays quite common and widespread: the definition of biodiversity as a scientific concept, indeed, seems to bring together three entities or levels of natural systems (genes, species and ecosystems).

Another essential dimension of the idea of biodiversity that emerged in those years is that variety and heterogeneity were essential aspects of the dynamics of life at all the three levels mentioned before (i.e., of genes, species and ecosystems). It followed, thus, an attempt to distinguish between two emerging types of definition for biodiversity: the philosopher and ecologist Bryan Norton distinguished between "inventory definitions" and "difference definitions" (Norton, 2006, 53-55). While, on the one hand, Norton's characterization of inventory definitions –"which identify biodiversity with the sum total of entities that differ from each other, aspire to being additive-one increases biodiversity of a collection by adding elements different from that collection" (Norton, 2006, 54)– was well exemplified by the "standard definition" of biodiversity as something like species diversity, on the other hand "difference definitions […] emphasize the complexities and interrelations among biological entities" (Norton, 2006, 54) and highlighted the relational aspects of the concept itself. Difference definition is obviously a more significant category as it links biodiversity to a "difference" in function, including dynamic aspects of diversity (i.e., relation with the environment, interacting processes, biological creativity, etc.). So Norton continues: "Difference definitions help us to see what is most valuable in diversity at all levels because they reveal the role of diversity in biological creativity. R.H. Whittaker hypothesized that 'diversity begets diversity,' that diverse elements undergoing diverse processes will generate more diversity[2]. This hypothesis also suggests that losses of

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[1] See: Hamilton, 2005, 90; and Sarkar & Margules, 2002, 301.

[2] This is commonly acknowledged in the process of morphogenesis and organogenesis in which tissues are progressively structured through a differentiation

diversity can create further losses: species become threatened as their mutualists become endangered or extinct. Diversity provides options for further creativity –and diversity is important as a contributor to that dynamic" (Norton, 2006, 55).

Difference definitions therefore shift the focus from biodiversity understood as an effect characterized by an intrinsic richness that we should conserve, to biodiversity's causal relevance in the process of biological creativity. The taxonomic character of "inventory definitions" loose in this case of interest for our analysis as it can be considered consequential to the mechanisms and processes that actually allow "difference definitions." Also the above mentioned references of the biodiversity concept both to evolutionary hierarchies and ecological hierarchies can be widely contextualized in the discussion about the causal relevance of positive differentiating feedback mechanisms in a species and among species. This means considering, as we will discuss later, the concept of (bio)diversity as an essentially relational concept, i.e., it has as its center the idea that "relation" (among entities, processes, environments, etc.) is a source of generation and creation, and that such relationships have an explanatory relevance. Ultimately, then, the distinction between difference and inventory definitions seems to be more nominal than substantial, although the former may help, at the conceptual level, to understand better the creativity of each species.

To summarize, we have seen that as a scientific concept, biodiversity ended up functioning as an "umbrella term" (Väliverronen, 1998, 28). Its meaning seemed to combine different disciplines, different perspectives, and different levels of biological research. It served multiple functions, from environmental policy to resources management. In this regard, it seems more appropriate to think at biodiversity not much as a term with only one referent, but rather as a polisemic concept with different and multiple referents. Our analysis, nevertheless, is clarifying how such multiplicity does not end up in a relativistic account of biological richness. It is, in fact, the relational dimension intrinsic to such notion that makes of biodiversity and biological richness a value in its own right.

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process of cells' functionalities. Analogous dynamics of diversity enhancement can be found in the heterogeneity of microorganisms within a colony under optimal conditions. This means that living being tends to explore new functional states and, as a consequence, to present and stabilize different phenotypic features, behaviors. The mechanisms involved can be either evolutionary or ecological in nature depending on the feature scientists are actually focusing on. Whittaker's claim can be therefore understood as a universal and intrinsic feature of biodiversity.

In this regard, even a normative science like conservation biology felt the necessity to make the descriptive content of the concept of biodiversity more rigorous: "The normative goal – conservation– severely constrains how biodiversity should be conceptualized" (Sarkar, 2010, 131). The original relationship between descriptive and normative accounts of biodiversity was nicely reframed by Sarkar, who characterized it as a working concept in scientific practice: "Biodiversity is to be (implicitly) defined as what is being conserved by the practice of conservation biology" (Sarkar, 2002, 132. Our emphasis). This analysis now allows specifying what Norton writes on this regard too: "Defining biodiversity thus require more than a simple act of lexicography. The term, it turns out, must ultimately be defined by the actions of conservationists in protecting biodiversity. It is a term of action, developed to further the normative science of conservation biology. […] Biodiversity is a normatively charged concept, and the science of protecting biodiversity is therefore a normative science" (Norton, 2010, 369. Our emphasis). Our emphasis on how the intrinsic value of the biodiversity concept grounds in the relational dimension that characterized its causal and explanatory relevance in scientific practice, highlights that the original question about the object of the normative aspect of biodiversity moves, in fact, from a descriptive dimension to scientific practice. That is, our understanding of this normative aspect is enriched by the reflection about how we conceptualize scientifically biodiversity as a causal relationship among different things in nature. The question at this point is to clarify which is the object of the normative goal that still seems to escape a unique definition. How can a property like biodiversity be also a value?

3. A Critical Analysis: Biodiversity as a Relational Dynamic Property Rooted in Place

Instead of considering "biodiversity" an unclear and capricious notion, a concept too "wide-ranging and vague" to be of any use, we believe that it is possible to see in it a fruitful multi-dimensionality, which includes the relationship among diversity, variability and processes, stressing the twofold nature of the concept itself (property and value). Both these aspects can be conceived in a relational manner, highlighting that their relational dimension has something to do with two different meanings of the adjective "relational". When talking about properties, we will argue that biodiversity is a relational property since

it deals with the relation among different properties. On the other hand, biodiversity is a relational value since the value itself is always constituted by a relation between the valuer and the thing itself.

Even if a precise definition of biodiversity is still a desideratum, following the analysis in Section 2 we can state that a "relational" perspective seems to grasp more easily even the normative meaning of biodiversity, as the works of both Norton and Sarkar already pointed out. In this regard, Sarkar, in one of his late works, interestingly suggests that it is worthless considering biodiversity merely "as diversity at all levels of taxonomic, structural, and functional organization" because "this definition cannot be operationalized. There is no plausible way in which such a broadly characterized concept of biodiversity can be measured at even a local, let alone a regional or global level"(Sarkar, 2014, 3).

At this point a clarification is in order about which aspect of biodiversity plays the most crucial role in determining its normative power. We should also specify what account of this concept is more adequate to capture the intrinsic relationship between the traditional accounts of biodiversity as a value and a property of the natural world. Let us, therefore, go back to a quite common approach to the definition of biodiversity in order to go deeper in this aspect. Norton thus writes: "[Biodiversity] must […] capture all that we mean by, and value in, nature" (Norton, 2006, 57), and Sarkar critically observes: "'Biodiversity' refers to all biological entities. 'Biodiversity' in effect becomes all of biology" (Sarkar, 2002, 137). This kind of definition seems to be too broad to be simply understood and to simultaneously describe something in the natural world: in this regard, it seems to be more fitting to eliminate the term altogether, as recently proposed by Carlos Santana: "If biodiversity […] is not a useful concept, we should eliminate rather than deflate it" (Santana, 2014). If, on the one hand, asserting "what biodiversity is not" seems to be an easier task, on the other, we still need to discuss the epistemological status of this concept, in order to assess its viability as a normative concept and an explanatory/operational tool in scientific practice. In this regard, recent studies in biodiversity highlight the multidimensionality of the concept (Hewitt et.al., 2010, 1316) and stress in particular the two original dimensions of the concept, i.e., the descriptive and the normative account of biodiversity. These studies also focus on the origins of the concept in biology and in environmental ethics.

3.1 Which property?

In relation to the first kind of definition (the descriptive one), we cannot simply say that biodiversity is an entity, but a property, characteristic of nature, i.e., a paradigmatic feature of living systems, a relational property of multiple organisms or populations. We could affirm that "biodiversity" grasps a dynamic relational property among organisms and links up the discrete and continuous dimensions of biological complexity in an interesting way.

By saying that biodiversity is a dynamic property of the relation between biological entities, we mean that it entails interactive and interdependent ecological processes, which can make biological creativity emerge. In this regard, diversity provides options for further creativity –and diversity is important as a contributor to that ecological dynamism. When we focus on the aspect of dynamism in biodiversity (as a natural property), we are capturing evolutionary processes that support future variations, grasping, at the same time, the evolutionary history of life on earth.

A second aspect grasped by the concept of biodiversity is the fact that many properties depend upon environmental conditions: "Biodiversity is rooted in place, and is similar or different from place to place" (Sarkar & Margules, 2002, 306). This approach is quite common in ecology, since the strong link between organism and environment is a necessary condition to the study of the ecosystem itself[3]. In this regard Arne Næss, the Norwegian father of deep ecology, writes: "Speaking of interaction between organisms and the milieux gives rise to the wrong associations, as an organism is interaction. Organisms and milieux are not two things –if a mouse were lifted into absolute vacuum, it would no longer be a mouse. Organisms presuppose milieu" (Næss, 1989, 56). The dependence of every organism on the environment ("place") originates from the fact that we live in an intertwined set of relationships, which continuously constitute and shape us (Valera, 2014, 648). In this regard, if every place differs from another one depending on the kind of the specific interdependent relationships between the entities, biodiversity varies from place to place, and, thus, biodiversity can be defined as a relational property rooted in place, i.e., in precise points on Earth at definite times, since the relation among different organisms varies from place to place. Or better: biodiversity, as a dynamic property, is already somehow constrained by local features (place) and possibility of human interventions.

A fundamental question that may arise here is: is biodiversity a property or does biodiversity entail a property? Both. On the one hand, it is a property, as it describes and defines the conditions of a certain place (or habitat), shedding light the dynamic

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[3] See: Valera, 2013, 34-36; and: Chapman & Reiss, 1999, 3.

interdependent relationships among all the living and non-living beings in that place. On the other, biodiversity entails a property –richness– which is the result of those interdependent relationships in a definite place.

In these regards, we may more correctly define biodiversity as a metaproperty, i.e., a property that is multiply realizable by first order properties, since it is predicated on the basis of different properties that actually instantiate this property. Biodiversity, thus, entails many first order properties, being a second order property. In summary, we can define biodiversity as a dynamic metaproperty rooted in place.

3.2 Which value?

On the other hand, in relation to the second kind of definition (the normative one), it seems to suggest that biodiversity is to be primarily considered as a value, and this is probably due to the fact that biodiversity is considered an "operational concept". Once biodiversity is characterized as a value, it seems immediately obvious that the speculative level becomes different: we move from philosophy of biology to ethics (and to environmental ethics, in concrete). In this regard, James Maclaurin and Kim Sterenly correctly point out: "There is an important link between environmental ethics and conservation biology. Ideally, the former tells us what to conserve and the latter tells us how to conserve it" (Maclaurin & Sterenly, 2008, 149).

The problem we have to face concerns the second part of the above-mentioned sentence: "Environmental ethics tells us what to conserve". Unfortunately, this aim is next to be never reached, as properly pointed out in a recent book by Donald Maier: "Often, biodiversity is simply presumed to have value with no explicit or coherent account of what biodiversity is, the genesis and justification for any value that it might have, and how this value relates to biodiversity itself. We see this in emotional pleas to conserve biodiversity in order to prevent the 'impoverishment' –a word that plainly embeds a value judgment– of the earth. These pleas leave the meaning of biodiversity to guesswork. […] The value is then directly built into the promotion of this practice to a norm: We are told that it is a practice that we ought to adopt" (Maier, 2012, 8).

To summarize, we have a value without a definition of the value itself. Nevertheless, if a debate on the value of nature is a topic we cannot tackle herein, given the vastness of the subject (See O´Neill, 2003, 131-142), we will only focus on some main "heuristic"

features. The essential question we have to address in this context is: what does the value rely upon? To what extent? Answering these questions also amounts to defining the value as intrinsic or non-intrinsic (See Chisholm, 2005, 1-10), that is, as independent of human valuing or a heuristic tool or a concept with a peculiar epistemological status. Norton clearly states: "Moralists among environmental ethicists have erred in looking for a value in living things that is independent of human valuing. They have therefore forgotten a most elementary point about valuing anything. Valuing always occurs from the viewpoint of a conscious valuer" (Norton, 1991, 251). The mistake often made by most of the environmental ethicists seems to be linked to a misunderstanding of the concept of value: the human being, therefore, is the only living being capable of recognizing the value in nature; the value "affects" the human being, and he/she "does" nothing more than recognizing it. Another objection to this argument here may be: we should assume the existence of intrinsic values since the human being doesn't know in a perfect and appropriate way the whole world of values. But this is senseless: it amounts to saying that it is not possible to be realistic in the theory of knowledge since the human being doesn't know the totality of reality (Vanni Rovighi, 2009, 222-226).

For these reasons, the term "intrinsic" would be "misleading". Holmes Rolston III proposes to replace it with its opposite "extrinsic", since the "ex" would indicate more precisely the "anthropogenic" origin of the value itself: "What is meant is better specified by the term extrinsic, the ex indicating the external, anthropogenic ignition of the value, which is not in, intrinsic, internal to the no sentient organism, even though this value, once generated, is apparently conferred on the organism. In the H-n encounter, value is conferred by H on n, and that is really an extrinsic value for n, since it comes to n from H, and likewise it is an extrinsic value for H, since it is conferred from H to n. Neither H nor n, standing alone, have such value. We humans carry the lamp that lights up value, although we require the fuel that nature provides. […] Humans are the measurers, the valuers of things, even when we measure what they are in themselves" (Holmes Rolston III, 2003, 144).

It seems to follow from these considerations that the value exists since there has previously been a relationship between a human being and another being. When talking about "values", thus, we always denote something that is "for a perceiver": something has value for someone. The value is a relational property (among the subject and the object) and one of the terms of this relationship has necessarily to be "somebody", i.e., an assessing subject (Marcos, 2012, 55). To summarize, the value is an emergent evaluation of a subjectivity. Once highlighted the relational character of value –which is epistemological in nature– it is possible to shed some light on the issue of the intrinsic or non-intrinsic (instrumental) dimension of value. To say that something has intrinsic value is not to say that something has value even without a subject, but that something has value for someone not merely as a mean, but as an end in itself.

Talking about extrinsic values –or about the necessity of a value-perceiver– immediately brings us back to places: When we look at place, describing its level of biodiversity, we are always choosing, for pragmatic objectives, a well-defined world part, implicitly deciding to take no interest in the other parts (See Bertolaso, 2014, 75-92). Observing means somehow always assessing.

3.3 Which relation?

Once clarified the twofold feature of biodiversity, we can go back to the question about the relation between value and property, in order to clarify its potential epistemological fecundity in both the field of environmental ethics and conservation biology. This question cannot be considered as radically new, since it springs from the debate between cognitivism and noncognitivism. The core of the issue is the supervenience (or not) of moral properties (values) on natural properties, i.e.: does the presence of a moral property follow from the presence of a relevant natural property? In the theoretical field of environmental ethics, answering to this question is particularly important, as it can open the possibility to outline a set of principles that can insure the protection of the natural environment, as Holmes Rolston III points out: "In practice the ultimate challenge of environmental ethics is the conservation of life on earth. In principle the ultimate challenge is a value theory profound enough to support that ethic" (Holmes Rolston III, 1998, 141). Unfortunately, the debate about moral properties and natural properties has been carried on by environmental ethicists in a different direction, particularly emphasizing the difference between intrinsic and non-intrinsic values, and, thus, the distinction between objective and subjective values.

The relational nature of value, therefore, helps us to prevent from falling back into a tautology, as Donald Maier highlighted: "The answer to the question 'Is biodiversity good?,' is an essentially tautologous 'yes' –for according to him, good biodiversity is (by operational definition) that which should conserved by virtue of being the output of his algorithm's execution" (Maier, 2012, 8).

To summarize, the strict dichotomy between property and value in the conceptualization of biodiversity seems to affect the possibility to re-evaluate the use of the concept itself at both the epistemological level and in scientific practice. For this reason, we think it should be better considering biodiversity as a dynamic metaproperty rooted in place: this characterization may ground its twofold dimension of relational value. Its rootedness in

place is even essential to define its relational feature: we cannot speak about biodiversity in general, but rather about biodiversity in a place (and of a place), and this will precisely lead us to characterize biodiversity as a metaproperty that entails richness.

4. What Kind of Philosophy for Biodiversity? Diversity begets Differences

Once acknowledged the difference between values and properties, we can go back to the heart of the matter, when talking about biodiversity, thus, which properties are we referring to? A thorough review of the literature shows how, among the others, the properties of richness, heterogeneity, variability and abundance can be considered the most representative of the biodiversity concept[4]. These concepts spring from different epistemic fields: the cause of this fact is probably the twofold origin of the biodiversity concept, i.e., in biology and in environmental ethics.

Among these first order properties, richness plays a central role; but, in order to explain the choice to point at richness as the most important first order property of biodiversity, we have to be more precise about the concept of richness itself; a quite common definition is: "Richness is nothing more than a count of the number of species in an area, value on the richness scale increases with speciation and decreases with extinction but this misrepresents common values" (Santana, 2014). In this regard, such a concept essentially coincides with "richness among species" (i.e. species richness), disclosing not a merely discrete meaning of the term. It can nevertheless be applied to ecological diversity and genetic diversity as well, as pointed out in Section 2.

An even more comprehensive characterization of richness may be found in Arne Næss' works, where the concept itself is explicitly linked to the possibility of surviving and flourishing of different and new species, human beings included. As Deep Ecology Platform points out: "Richness and diversity of life forms are values in themselves and contribute to the flourishing of human and non-human life on Earth. Humans have no right

[4] See: Sarkar, 2010, 127-141; Santana, 2014, Väliverronen, 1998, 19-34.

to reduce this richness and diversity except to satisfy vital needs" (Næss, 1989, 29). At the crossroad of Santana and Næss' definitions arises an interesting point: species richness doesn't simply coincide with diversity of life forms, it implies variation that intrinsically ground on the continuum among different species both in space and time. That is: it covers a larger range of meanings, from species' richness to richness within species, where the latter can be causally considered related to the former. In this sense, when talking about biodiversity as strongly characterized by the first order property of richness, we cannot simply reduce it to species richness, particularly focusing on diversity between species.

Moreover, richness is, more adequately, to be considered as the result of the dynamic interdependent relationship among living and non-living organisms from all sources in a well-defined place; this includes diversity within species, between species and of ecosystems (habitats). In brief, if richness is the measure of "differences" in a well-defined habitat, biodiversity is the level of richness in that habitat (place), where the habitat defines the level of which we are interested in –with reference to conservation.

In this regard richness –and, thus, biodiversity, by which the former is entailed– can be considered a truthfully relational concept from another point of view, which fruitfully matches the evolutionary and ecological levels of living beings, linking time ("dynamic property") and space ("rooted in place"). Recalling the above-mentioned Norton's sentence, richness "reveals the role of diversity in biological creativity" (Norton, 2006, 55).

We can now rephrase Robert Whittaker's motto as: "diversity begets differences", pointing out that diverse elements undergoing diverse processes –within species or among species– will generate more richness. Richness, thus, in one sense provides options for further creativity –and in another sense it is the result of creativity. In this regard, the property and value of richness –understood as a result of diverse processes– should be the most adequate to represent the concept of biodiversity, as it makes come to light biological creativity.

Although the original philosophical interest for biodiversity was acknowledged both in terms of diversities –and thus properties of the natural world– and in terms of values, considering the double dimension linked to the biodiversity concept in terms of cause and effect might shift now the focus on the intrinsic causal relationship that holds its account. Such causal relationship links properties and values up in unified view of the natural world and of its richness, a view that is mediated by the human activity to observe and judge things and events. In this sense, when talking about biodiversity, the dichotomy between properties and values seems to be senselessness: we can consider biodiversity a dynamic property, and this grounds its dimension of relational value. Saying that biodiversity is strongly characterized by the property of richness –understood as more than richness among species, with a clear stress on its relational dimension– may help linking the

biodiversity's twofold feature of property and value, simultaneously justifying its origins in biology and environmental ethics.

Therefore, a further effort in spelling out the ontological presupposition of such relational account of biodiversity is clearly worthwhile. It would require an analysis of how the analyzed concept of biodiversity as strongly characterized by richness is linked with the concepts of heterogeneity and of hierarchical relationships that are context dependent both in epistemological and ontological terms[5].

In this paper, however, we have already clarified the relevance of the explanatory role that biodiversity may play in sciences, once acknowledged its normative feature given by its origins and rejected the deflationary account taken by Sarkar and the aim to radically eliminate the concept proposed by Santana. That is, scientific practice and normative attempts in conservatory biology are strictly linked by the process of identification of relationships among systems (species, genes, etc.), which only the human capability of knowing the natural world can grasp. Such relationships include the discrete and continuum dimension of the ecological richness, and the double causal-effect relationship that characterizes it, and which justify the conservative attitude adopted by the emerging ecological groups and position. What are to be conserved are just not different things but their relationships, which are condition for creative emergence in nature. In this regard, the multi-dimensionality of biodiversity's concept (and even as a metaproperty) should be widened and evaluated not only in epistemological terms –i.e., how we define and put in relation different aspects of the natural world– but also in ontological terms, that is taking into account the nature of the causal relationship that holds differences among diverse things.

The difficulty of understanding the concept of biodiversity –as we have shown above– is probably given, thus, by the wrong approach to the concept itself: when talking about biodiversity, we usually take into account it by a single perspective, which may become all-encompassing. Being biodiversity a multi-dimensional feature and a metaproperty, we should use a multi-level and relational approach, i.e., the richness of the biodiversity concept probably needs a richness of perspectives.

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[5] A philosophical discussion and arguments about how discrete and continuous dimensions of biological complexity are grasped through a relational account of levels and biological processes has been presented, for example, in Bertolaso, 2016, 2013; and in Bertolaso et. al., in press.

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