Chapter 16
On the Impossibility and Dispensability of Defining “Biodiversity”

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Abstract  The impressive success of the concept ‘biodiversity’ in the last decades, in particular in the arena of politics, is in a large part due to its power to amalgamate facts and values: the fact that living beings show variety on every level of their existence, and the assumed values that are associated with this variety. These values are far from obvious or objective, they are rather normatively prescribed. They are already at work in the process of selecting the level of analysis, e.g. the level of genes, species, or ecosystems. The concept thus ties together many different discourses from the fields of biology and bioethics, aesthetics and economy, law and global justice. One important consequence of the concept’s integrative power is the impossibility of its general definition. Just as ‘life’, ‘time’ or ‘world’ the word is an “absolute metaphor” or “non-concept” in the sense of Hans Blumenberg: it cannot have a fixed meaning just because it mediates between various contexts and disciplines. Any attempt to define ‘biodiversity’ in general terms is thus futile and does not capture the role it fulfills in contemporary discourse. Rather than trying to define the concept, reconstructing the interaction of its various contexts is a more promising approach. These include, besides the obvious reference to biology and nature conservation, ancient narratives about divine creation, paradise and Noah’s ark as

The complexity of the biodiversity concept does not only mirror the natural world it supposedly represents; it is that plus the complexity of human interactions with the natural world, the inextricable skein of our values and its value, of our inability to separate our concept of a thing from the thing itself. Don’t know what biodiversity is? You can’t.

David Takacs (1996, p. 341)
well as political ideas of pluralism, egalitarianism and non-hierarchical representation of individuals, or the values of market economy. In order to understand the current success and discursive role of the concept, I will analyze some of the underlying ideas, especially with respect to the representation of biodiversity in images.

16.1 The Integrative Power of ‘Biodiversity’

In order to understand why ‘biodiversity’ has become such a successful term in the last decades it is necessary to look beyond biology to the broader socio-cultural and political contexts in which diversity became an important issue. From a merely biological point of view or from the standpoint of conservation biology it is not obvious that diversity should be more important than other abstract properties of biological systems such as stability, resilience or wilderness; or, to be more practical, the protection of one particularly endangered species or of an ecosystem. For the purpose of understanding why we now live in the “decade of biodiversity”, as declared by the United Nations in 2010, it is not enough to point at increased biological knowledge in the modern age or at the crisis of mass extinction. It is necessary to focus on cultural and political values present in scientific issues—or at least in the public understanding of scientific issues.

The parallels between cultural and biological diversity are underlined by two conventions of the United Nations (Heyd 2010): The Rio “Convention on Biological Diversity” of 1992 explicitly calls for the protection and use of “biological resources in accordance with traditional cultural practices” (UNEP 1992). And the 2001 UNESCO “Declaration on Cultural Diversity” claims that “[a]s a source of exchange, innovation and creativity, cultural diversity is as necessary for human-kind as biodiversity is for nature” (UNESCO 2001).

At least on a rhetorical level, ‘diversity’ functions as a versatile concept bringing together diverse fields. It can be linked to economic considerations: to plants and animals as entities providing “ecosystem services” regarding the supply of food, fibres or pharmaceuticals, or for the regulation of climate, water balance, etc. (Millennium Ecosystem Assessment 2005). At the same time, the term maintains its strong non-instrumental ethical dimension: it expresses a non-anthropocentric value of plants and animals. With this in mind the Holy Father, Pope Francis, in his 2015 encyclical Laudato si’, referred to biodiversity and ascribed intrinsic value to non-human creatures (Pope Francis 2015, no. 118; 140). Finally, ‘biodiversity’ has the dignity of a scientific term, as it seems to refer to something objective and measurable.

‘Biodiversity’ obviously forms an efficient basis for the integration of heterogeneous discourses and their public communication. Yet, by putting many things together—ethics, religion, science, business and politics—the term has an undifferentiating effect. On a political level this effect has also been welcomed because to be politically effective a term should not only describe a natural state of affairs but declare it as an important and good thing.
The main strength of the term seems to be that it does not take sides in fundamental ideological dichotomies such as scientific/emotional, profane/sacred or utilitarian/intrinsic value. It remains neutral and thus can be used in either position. And, surprisingly, considering its integrative power and ideological neutrality, ‘biodiversity’ seems not to be abstract: It refers primarily to concrete individuals and species – well-liked species for the most part, the so-called “charismatic megafauna” such as polar bears, lions and elephants. These tangible references make ‘biodiversity’ a much more attractive concept, than, for example, ‘stability’, ‘ecosystem services’ or ‘sustainability’. This suggestive concreteness is, of course, a huge advantage in the communication with the general public; it is a potent instrument for connecting nature and people (Díaz et al. 2015).

In addition to its integrative function and its concreteness, ‘biodiversity’ fits very well into our pluralistic present because the concept renounces an overarching, universally valid (world) order and expresses a de-hierarchization and pluralization of perspectives. It refers to the heterogeneous interests and intrinsic worth of every single individual. With respect to human and non-human living beings the concept of diversity is successful, because it conveys respect and responsibility, tolerance and pleasure of heterogeneity. Since the 1980s, ‘diversity’ has become a central concept in social emancipation movements. It emphasizes cultural difference and includes a critical reflection of one’s own cultural-relative standpoint. But, again, ‘diversity’ functions by integration because it refers not only to current concerns but has also a deeply rooted historical dimension leading far back to the very first written texts of mankind (see Sect. 16.3). The story of biodiversity has been so successful because it is related to some deeply rooted ideals about the world, not least the idea of paradise: for one essential characteristic of the Garden of Eden is that it is full of plants and animals of different species coexisting in a joyful and peaceful manner.

Its ongoing scientific usage and at the same time latent connection to ancient cultural-religious ideas (such as paradise) makes ‘biodiversity’ a powerful concept for mediating between science and the broader public. It is a paradigmatic example of what has been called “post-normal science”, where “facts are uncertain, values in dispute, stakes high and decisions urgent” (Funtowicz and Ravetz 1992, p. 138). This characterization applies particularly well to the status of ‘biodiversity’: First, the investigation of biodiversity has to cope with uncertainties on the factual as well as the axiological or ethical level. We simply do not know enough about the amount and function of biological diversity; we do not know, for example, whether there are currently three or 100 million species of animals on earth, and we do not know how they contribute to the stability of our ecosystems. Second, we do not know how we should evaluate biodiversity: instrumentally or intrinsically. Third, stakes are high because we are currently facing a loss of biological species probably on the level of one of the five mass extinction events in earth history. Finally, decisions are urgent because this is an irreversible loss and we do not know whether there will be a tipping point when things get worse at an increased speed and scale.

Furthermore, biodiversity studies are paradigmatic for post-normal science because they examine a field where laypersons are becoming experts. Big data provided by
millions of people taking part in observation surveys particularly for birds and insects is an important basis for decision-making in conservation biology. These extended peer communities with their socially distributed expertise are especially important for the knowledge of local conditions.

These factors have transformed biodiversity studies from the old paradigm of scientific discovery (‘Mode 1’), characterized by the hegemony of theoretical and experimental science, to a new paradigm of knowledge production (the ‘Mode 2’), in which knowledge is “socially distributed, application-oriented, trans-disciplinary, and subject to multiple accountabilities” (Nowotny et al. 2003, p. 179). The investigation of biodiversity is a post-normal Mode 2-science because it is “issue-driven” and “mission-oriented” rather than theoretical and driven by curiosity. In situations of Mode 2-science experts are incapable of providing conclusive answers to the associated problems. They can provide their views but decisions have to be made in public forums such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Being immersed in issues of philosophy, cultural history and economy, biodiversity is not being a merely scientific problem anymore, but rather one where science and politics meet. As an object of public attention and a focal point of conflicting interests, ‘biodiversity’ concerns the management of an issue rather than the solution to a problem.

16.2 On Defining ‘Biodiversity’

As the concept of ‘biodiversity’ is vague or versatile, it still has to be defined to be of any value in public or scientific argumentation. In the mid-1980s ‘biodiversity’ was explicitly introduced with a non-scientific, but political intent. The term was coined in preparation of the National Forum on BioDiversity, which took place in September 1986 in Washington, D.C. The American botanist Walter G. Rosen who was involved in preparing the conference explained how he came up with the term in a later interview: Creating the term, he said, was “easy to do: all you do is to take the ‘logical’ out of ‘biological’” (Rosen 1992, in Takacs 1996, p. 37). Linguistically speaking it was an easy task: Rosen simply used ‘biodiversity’ instead of ‘biological diversity’ which was already a well-established technical term in biology. His aim was, as he said, to create room for “emotion” and “spirit”.

And this is the situation we are in now: ‘Biodiversity’ is a term full of emotion and spirit, expressing an ethical concern following the mass-extinction of species due to human actions. Compared to this strong ethical pulse, the explicit definitions of the term that have been given after the conference in Washington are rather weak. Most of them given by biologists, for example, are very broad. In one of the first explicit definitions of ‘biodiversity’ formulated by the US Office of Technology Assessment (OTA) in 1987, it is defined as “the variety and variability among living organisms and the ecological complexes in which they occur” (OTA 1987, p. 3). A few years later, Solbrig’s much cited definition explains the term as “the property of living systems of being distinct, that is different, unlike” (Solbrig 1991, p. 9). The
Convention on Biological Diversity from 1992 sees it as “the variability among living organisms from all sources” (UNEP 1992, art. 2). In one of the implicit and open definitions Sarkar explains biodiversity as “what is being conserved by the practice of conservation biology” (Sarkar 2002, p. 132), and a few years later, Norton demands that any definition must be rich enough to capture “all that we mean by, and value in, nature” (Norton 2006, p. 57).

From these definitions it is obvious that the term was designed to be open, versatile, polyvalent and adaptable to changing situations (Casetta and Delord 2014, p. 251). It has been characterized as an “umbrella concept” encompassing the entire field that has formerly been called “nature protection” or “nature conservation” (Potthast 2014, p. 132). Because of its oscillation between scientific and non-scientific contexts Gutmann sees it as a “pragmatic concept” or “metaphor” (2014, p. 66). Regular movements across discoursive borders allow the concept to touch upon and somehow integrate many diverse aspects of nature and its use by humans. This mediating quality depends on the term’s “performativity” by mobilizing attitudes and reactions in diverse contexts (Casetta and Delord 2014, p 251). For this performativity to be effective, the multifarious character of ‘biodiversity’ is essential; it allows for the fact that “[i]n biodiversity each of us finds a mirror for our most treasured natural images, our most fervent environmental concerns.” (Takacs 1996, 81).

Thus, ‘biodiversity’ is exactly what a politically successful concept ought to be: sufficiently open in order to be meaningful to many people and powerfully employed in political processes. It amalgamates scientific and political developments, public concern and cultural changes in society.

16.3 Representing Biodiversity

Apparently, the success of ‘biodiversity’ as a concept in the public discourse results, at least in part, from its reference to political and social concerns about diversity in non-biological contexts. Another reason for its power in social discourse might be that it brings into play ancient formats of representing the multitude of things. Representing biodiversity—understood as species’ inventory—starts with the beginning of writing, roughly 5000 years ago. In the world’s earliest examples, which are lists from Mesopotamian cultures, a huge variety of trees, domestic animals, fish and birds appear alongside lists of goods which have been traded, as well as other inventory-like lists of things in the world: metals, vessels, official functions, and geographic places (Veldhuis 2014). The early list of bird species in proto cuneiform from around 3000 BC featured more than 100 entries, including ravens, which presumably were of no direct use or benefit to humans. The lists seem to be inventories of species or of kinds of things in the world regardless of their utilitarian value.

Since Mesopotamian times, such lists have been used by natural historians to log, check and order species of living beings. Linnaeus’ Systema Naturae is basically still a list; in its tenth edition of 1758 it contains about 4200 species on 800
pages. Today’s records of diversity are also organized as lists, for example the *Encyclopedia of Life*, the largest online database of systematic biology.

The discovery of biodiversity could be seen as a science of lists—*Listenwissenschaft* as Assyriologists have called the presentation of knowledge in this form in Mesopotamian cultures (Schneider 1907, p. 368). The list’s essential logic is paratactical: lists do not primarily explain, as hypotactical theory-centered science does, but they first of all describe and arrange things on the same level. Lists are apt devices for the egalitarian, non-hierarchical presentation of things.

Biodiversity images put this logic into the visual sphere by showing an egalitarian representation of diverse living beings. Paradigmatic images of this type appear in the Flemish still life of the late sixteenth and seventeenth century, for example in the work of Joris Hoefnagel or Jan van Kessel the Elder. The scattered arrangement of decontextualized animal bodies, a “strewn pattern image” (Schütz 2002, p. 66), shows what biodiversity essentially is: a state of difference. Biodiversity is the sum of different individuals with different lifeforms and lifestyles. They are presented according to the principle of addition, a colorful diversity that does not manifest a closed totality or a system of interaction. Central to this depiction is that there is no top or bottom, no hierarchy and no evaluation within one set. The principle of representation is a paratactic egalitarianism, the line-up of individuals with an equal standing, a juxtaposition of forms.

In the popular visual culture of our days you can find many examples of images that follow this paratactic, egalitarian logic. One example is a photo project by nature photographer David Liittschwager: In *A World in One Cubic Foot* he took a bright green metal cube—measuring precisely one cubic foot—and set it in various ecosystems around the world, from Costa Rica to New York Central Park (Liittschwager 2012). He documented what moved through that small space in a period of 24 h and photographed the plant and animal life he encountered in that period of time. An image of local biodiversity was then created by compiling all these photographs according to paratactic logic. In another example, Christopher Marley arranged his photographs of beetles in a kind of biodiversity mosaics (Marley 2008). This resulted in holistic figures such as squares or circles. No mosaic stone here resembles the other, and no element may be missing for the whole to be complete.

There is a striking parallel between the iconic logic of contemporary biodiversity pictures and some seventeenth-century Flemish still lives. The still lives, however, do not visualize ethical concerns about extinction of species, but refer to their creation. Their reference point is natural theology: the animals are considered immediate manifestations of God’s will and thus provide access to God’s plan equal to the Holy Scriptures. Although the modern concern with extinction and the late seventeenth-century focus on creation are rather distinct, they have one essential thing in common: the emphasis on and evaluation of individuals and species. In biodiversity images it is individuals and species that are appreciated in the first place, whereas their interactions with their environment and each other are pushed into the background. This decontextualizing, egalitarian logic, “specimen logic” as Jenice Neri has called it (Neri 2011, p. xiii), is essential for understanding our conceptualization and appreciation of biodiversity.
In the last decades, this specimen logic, the paratactic order of individuals, has become a dominant mode of presenting animals. It is manifest in installations at natural history museums such as the Hall of Biodiversity in the American Museum of Natural History in New York or the Wall of Biodiversity in the Museum für Naturkunde in Berlin. Without further explanation, these installations group together a great variety of stuffed animals that do not naturally occur next to each other in the same location. The installations are not about explaining and understanding, but about creating astonishment and amazement by this variety. The focus is on the aesthetic quality of the individual objects and on the feeling that each species is threatened by humans. Thus, questions of nature conservation and ethics are addressed. In parallel with older biodiversity images, the museum installations are characterised by the fact that (1) they stress the individual character of different species by presenting them in an extremely naturalistic way, (2) they decontextualize each species by displaying only one individual devoid of its ecological setting, and (3) they arrange the specimens in a non-hierarchical, egalitarian order. In contrast to earlier forms of presentation in natural history museums, biodiversity installations abandon showing causal, functional or systemic relations. The rationale of this form of presentation is that the mere sequence of different animal bodies is intended to be free of ideological or cultural preconceptions.

In these museum installations, the individuals play the central role: Each specimen not only represents the living organism its parts once belonged to, but, as there is only one specimen for each species, each specimen also represents its entire species. In these representations biodiversity is an ethic not for individuals in the first place but for species; it is about the moral dignity of species. The installation exemplifies yet another form of representation, a political representation: If the showcase of the installations is seen as a kind of parliament then each species has one vote in it; there is an equal representation for each species.

Interpreted in this way, the representations of biodiversity in natural history museums correspond, of course, to the normative discourse of egalitarian pluralistic democracies. Accordingly, it may be seen in terms of political iconography: as an expression of pluralistic social and political ideas. In short, it displays political ideals in the guise of nature.

However, the non-hierarchical, paratactic logic of presenting animals not only corresponds to liberal ideas of an egalitarian society, it also corresponds to the store-aesthetics of the market economy where the consumer can choose among the many products of equal value offered to him as being different. The increased attention to diversity can thus also be interpreted as having been influenced or enforced by capitalist economy. Moreover, it has also been argued that the origin of the dominating “taste for colorful diversity” lies in “the market”: “It is the taste formed by the contemporary market, and it is the taste for the market” (Groys 2008, p. 151).

The aesthetic of diversity thus has many different roots. It can be found, amongst others, in the very old history going back to the Mesopotamian Listenwissenschaft, the general pleasure in the manifold of Western culture (poikilia in Greek, varietas in Latin; Grand-Clément 2015; Fitzgerald 2016), the social emancipatory movements of the second half of the twentieth century, capitalist market economy, or just
postmodern taste. Just as ‘biodiversity’ refers to a multitude of perspectives that cannot be reduced to one coherent system there is no master-narrative for the explanation of its current success.

16.4 The Hybridization of Facts and Values in ‘Biodiversity’

The various new and old traditions of diversity have in common that they are not merely descriptive but place value on variety and variability. The intersection of fact and value in the representation of diversity is particularly evident with respect to biodiversity. In the Judeo-Christian context four fundamental scenes are connected to biodiversity: scenes of Creation, of Paradise, the naming of animals by Adam and the animals boarding Noah’s ark. As these are well-known religious scenes in a particular ethical context, their effect is placing values on diversity, charging it positively. This evaluative stance is also evident in Christopher Columbus’s first letter from the New World (addressed to the finance minister at the Spanish court, Luis de Santángel, who supported Columbus) in which reference to the biodiversity he encountered—trees and birds of “a thousand different kinds” (de mil maneras)—forms an essential element of his praise of the promising land he discovered.

A more explicit appreciation of diversity can be found in Christian authors such as Augustine of Hippo who used reference to the huge diversity of animal species (“tantas diversitates animalium”) for the praise of God: “how great all these things are, how magnificent, how beautiful, how amazing! And he who made them all is your God” (Enarrationes in Psalmos, 145, 12; transl. by Boulding 2004, p. 411). In a similar vein, Thomas Aquinas wrote: “Although an angel, considered absolutely, is better than a stone, nevertheless two natures are better than one only; and therefore a universe containing angels and other things is better than one containing angels only; since the perfection of the universe is attained essentially in proportion to the diversity of natures in it, whereby the diverse grades of goodness are filled, and not in proportion to the multiplication of individuals of a single nature.” (Scriptum super Sententiis, lib. I, dist. 44, quaest.1, art 2; transl. by Lovejoy 1936, p. 77).

Similar views are expressed in the writings of Leibniz, who weighs one man against the whole species of lions, and writes, by the way, that he is not sure whether God would actually prefer the individual human (Essais de théodicée, 1710; Lovejoy 1936, p. 225). In this understanding of diversity, human beings are co-ordinated with the other species of living beings; they do not inhabit an absolute and excellent position, but compete eye-to-eye with other species. Value is placed not (only) on the intrinsic qualities of each single being but on the state of being different from others. This evaluative stance towards diversity as such can be seen as a prefiguration of the modern concept of biodiversity as an “epistemic-moral hybrid” (Potthast 2014, p. 138); it is a kind of biodiversity avant la lettre.

On the basis of these prefigurations it was an easy task for concerned biologists in the late twentieth century to propagate ‘biodiversity’ as an important issue by
taking out the ‘logical’ from ‘biological diversity’—which was taken to be a biological term—, and putting in “emotion” and “spirit” instead. This strategic reenchantment of a (supposedly) biological concept made the term very useful for the political sphere. Being full of concern and sufficiently vague, open to many ideas, even contradictory ones, the term became an effective instrument for politics.

However, in recent years the intrinsic value and hybrid character of ‘biodiversity’ came under attack. It has been doubted that biodiversity is a useful basis for decisions in nature conservation (Morar et al. 2015; Santana in this book). For in many cases we are not interested in the diversity of things as such. Nature conservation is often concerned not with protecting as many species as possible, but only very specific, typical or rare ones. In some cases, we are trying to limit genetic diversity, for example in cases where it leads to functional disorders, or we are trying to eradicate pathogens. Diversity in itself is not always a good thing, but only the right measure of it, so it has been argued.

Accordingly, one problem of the concept is the unconditionally positive evaluation of diversity. Another problem is that the evaluative charge of the term ‘biodiversity’ makes it impossible to distinguish between scientific knowledge as such and the process of evaluating this knowledge. Morar et al. (2015) argue that we should decide in an open democratic discourse which diversity we want where. The amalgamation of the two steps of gaining and evaluating knowledge into one, as the hybrid concept ‘biodiversity’ does, obscures the need for separating scientific facts and public review of its results: “the role of [political] judgments is obscured when decisions are presented as following automatically from empirical evidence” (Morar et al. 2015, p. 25).

This criticism problematizes exactly that aspect of the concept, which was responsible for its success: the hybridization of descriptive and normative dimensions. Obviously, the comprehensive success of the rhetoric of biodiversity was bought at no small price. Its power to hybridize makes biodiversity a useful political concept but it also stands in the way of any precise argument. Good intentions and positive effects connected to the concept cannot replace differentiated ethical reasoning. The important integrative function of the concept needs to be complemented with arguments in which the hybridization of facts and norms, of science and values, of knowledge and wonder is carefully separated again. Not scientists and their concepts but the democratic society as a whole has to decide which diversity it desires, one that includes genetic disorders, the polio virus or the Anopheles mosquito – or not.

16.5 Conclusion: Biodiversity as an Absolute Metaphor

Because of its involvement in various ancient traditions, and correspondingly hybrid and multifarious character, ‘biodiversity’ can be understood as an “absolute metaphor” or “non-concept” (Unbegriff) in the sense of Hans Blumenberg. Just as ‘life’, ‘time’ or ‘world’ the word cannot have a fixed meaning because it mediates
between various contexts and disciplines. Aspects of the term can be defined within each separate context. Biology, for example, has provided many mathematically precise definitions of biological diversity as an index for measuring species richness and evenness in their distribution (but, already at this level diversity has been called a “non-concept” because it can be measured in very different ways; see Hurlbert 1971).

However, this technical understanding of biological diversity is distinct from ‘biodiversity’ as it functions in public debates. In these debates the concept functions as an absolute metaphor the meaning of which cannot be exhausted in any context of its use and proves “resistant to terminological claims and cannot be dissolved into conceptuality” (Blumenberg 2010, p. 5). It therefore seems that any attempt to define ‘biodiversity’ in precise terms is futile and does not capture the role that the word fulfills in contemporary discourses. Its interdiscoursive function depends on not having a clear-cut definition but being an open concept. ‘Biodiversity’ not only refers to the variety and variability of the natural world but also to our conceptualization and valuation of it. This complexity is the reason for the vagueness and at the same time the power of the concept: “le plus vague est le plus puissant” (Bachelard 1947, p. 184).

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