

On Bioabilities

A new approach for ecological thinking and action

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Abstract. The paper submits the notion of bioability as a new lens for ecological theorization and eco-criticism. Bioability can be defined as the subjective counterpart to biodiversity: it consists of all action potentials that increase the flourishing of living others, both human and non-human. The bioabilities approach intersects the philosophy of biology, biosemiotics, environmental ethics, and the social science, revealing how such capacities have emerged in evolutionary development, but also how they can be further cultivated by subjects who become aware of them. We review how phenomena like symbiosis, the holobiont, ecological development, and plasticity all resonate with bioabilities. Ultimately, the bioability notion is made possible by a consideration of the biosphere as a crucial domain of social life. Expanding on these ideas, bioabilities can be revealed as also having ethical and political import. Notably, an ethical perspective grounded in the bioabilities approach is demonstrated here to be compatible with contemporary evolutionary theory. In terms of ecological action and sustainability research, bioabilities enable us to intertwine more deeply agency, ethics, well-being, and the practices of coexistence.

Keywords: Bioabilities; Biodiversity; Ecological Sustainability; Environmental Ethics; Societal challenges; Ecological Transition

Résumé. Cet article introduit la notion de bioabilité comme une nouvelle perspective pour la théorie écologique et la pensée écologique critique. La bioabilité peut être définie comme le pendant subjectif de la biodiversité : elle comprend tous les potentiels d'action qui favorisent l'épanouissement des autres êtres vivants, humains et non humains. L'approche des bioabilités recoupe la philosophie de la biologie, la biosémiotique, l'éthique environnementale et la science sociale, révélant comment ces capacités écologiques ont émergé au cours de l'évolution biologique, mais aussi comment elles peuvent être activement cultivées par des sujets qui en prennent conscience. Nous examinons comment des phénomènes tels que la symbiose, l'holobionte, le

développement écologique et la plasticité font tous écho aux bioabilités. La notion de bioabilité est rendue possible par la considération de la biosphère comme un domaine crucial de la vie sociale. En développant ces idées, les bioabilités peuvent également être révélées comme ayant une importance éthique et politique. Il convient de noter qu'une perspective éthique fondée sur l'approche des bioabilités s'avère compatible avec la théorie évolutionniste contemporaine. En termes d'action écologique et de recherche sur la durabilité, les bioabilités nous permettent d'entrelacer plus profondément l'action, l'éthique, le bien-être et les pratiques sociales de promotion de la coexistence.

Mots clés : Bioabilités ; Biodiversité ; Durabilité écologique ; Éthique environnementale ; Défis sociétaux; Transition écologique

Thinking through the ecological question

The ecological and climate crisis is arguably the key moral and political question of the present time. It is indeed the contemporary global social challenge par excellence, given that it places all of us in a position of radical interiority: to believe one can be unconcerned, or unscathed, is simply delusional. The intractability of this challenge is also notorious. As global warming, climate disruption, biodiversity loss and ecological damage become increasingly manifest in all their brutality, a terrestrial politics *à la hauteur* of the present stakes has not yet seen the light of the day. The issue, however, is not simply one of action vs inaction – it also concerns, more deeply, epistemology. We believe that a whole new mode of thinking is called forth before a more fruitful approach to ecological action can be envisaged. While the rich countries, petro-monarchies, gas oligarchies and fossil-fuel giants are either dragging their feet, or straightforwardly opposing any global measure to rein in climate change, it is, on the other hand, not sure that what is currently presented as ‘climate action’ – and which inherits all the presuppositions of the ‘activationist’ framework underpinning the post-1945 Great Acceleration – can provide us with an ecologically enabling alternative. Not only is inaction catastrophic, but ecological action in its current format, i.e. premised upon the continuation of a growth ideology and the sheer addition of ‘green markets’ to the game, is also deeply flawed. We can see these predicaments, not only globally, but across all levels of governance, of political and civic action. That is why we believe that current debates concerning anthropogenic climate change and the ecological challenges of the coming decades urgently require new vocabularies and a new imagination to enable pathways of ecological thinking and practice.

The political and technological issues raised in all attempts to make human civilisation compatible with the planet Earth cannot, we argue, be successfully tackled unless we also come up with new visions of the problem itself. As is increasingly apparent, humans have reached a civilisational impasse, where the limits of the modern narrative are being put to an ultimate test (Wagner 2024). The collective dependence on economic growth and fossil fuel consumption is not simply a technical matter of path dependence caused by existing infrastructures, rather, it acquires the contours of a veritable *social addiction*. While we know that endless economic growth is incompatible with planetary limits, there is no restraint motif in the dominant economic model, namely capitalism, in all its regional (more liberal or more authoritarian) variants. Put simply, we are *en route* for disaster. Far from impacting humans

only, human-made ecological devastation negatively affects all other forms of life. It is already admitted by now that the +1.5°C global warming target set in Paris in 2015 is lost, while current predictions identify the +3°C scenario as the most likely (Wiegandt ed. 2024), and some models even suggest that, in a worst-case scenario – not entirely unrealistic – the whole biosphere could be destroyed by a frightening runoff effect reached at +7°C (Lynas 2020). The sheer possibility of such a nemesis of the hubristic modern attitude places heavy responsibilities upon our shoulders.

Understandably, awareness of these facts has been associated mostly with feelings of despair, such as solastalgia and ecological grief, but also, at the opposite extreme of the spectrum, rejection, contempt and denial. There are many ways of burying one's head in the ground. Today, the problem of the environment equates with the problem of the future – that is, the problem of its very possibility. During the period of the Great Acceleration (post-1945), Western societies have functioned, ecologically speaking, 'as if there was no tomorrow'. Now the current prospect of 'no future' can only be tackled meaningfully by considering that the issue of posterity, of the future inhabitants of this planet, quintessentially concerns *the present* – for, as the English-American economist Kenneth Boulding (1966: 10) long ago put it: 'a society which loses its identity with posterity and which loses its positive image of the future loses also its capacity to deal with present problems, and soon falls apart'. Thus, the issue calls for an honest clarification of *which type* of present we are able and available to inhabit.

Here, we suggest that the notion of *bioability* may prove of some assistance to advance ecological thinking and practice. The audience we address in this text encompasses social and natural scientists, and hopefully extends to practitioners and activists: this explains why we have refrained from excessively technical jargon, keeping the discourse as fluent as possible. Basically, we understand bioability quite broadly as the capacity a given being possesses to make life prosper – not only and not particularly one's own life, but also and especially the life of the other creatures who are co-present within shared ecological ensembles. As we devise it, bioability is directly related to biodiversity. The latter is generally defined as the degree of living variety on Earth recorded at global, regional, or local scale. In parallel, with bioability we could indicate the capacity to contrast biodiversity loss, correlating with the expansion of manifold expressions of life, or, in more formalised terms, with the onset of positive-sum games within the biospheric ensemble holistically conceived. More specifically, and in line with the capabilities approach in social philosophy, bioability

focuses on the actors and their practical capacities. In this sense, as we clarify below, it can be said to provide the subjective analogue of biodiversity.

Before advancing on this point, it is worth clarifying why we define bioabilities as a set of capacities owned by *a subject*. We are aware that disciplines such as the contemporary philosophy of mind, political philosophy, biosemiotics, and so on, have come to favour the terminology of *agency* over that of subjectivity. In addition to its greater interspecific inclusiveness and its coherence with the evolutionary paradigm, the term agency has the merit of emphasising the spontaneous action potential possessed by living organisms. On the opposite side, notions of subjecthood have been charged with bringing back a narrow, rationalistic vision of humans, or at least certain philosophical-anthropological conceptions pivoting around the allegedly superior cognitive capacities of humans. Our choice to use the term subject to characterise the bioable agent is, however, linked to the need to reconnect the notion of bioabilities to traits such as symbolic imagination, verbal language, and the capacity for cooperative decision-making. Although such capacities have traditionally been grounded in theological or spiritualist models – up to the secularised version of Kantian ‘pure reason’ – and, accordingly, unrelated to evolutionary dynamics, numerous elements have recently emerged in favour of a re-naturalisation of the subject as a social creature capable of given cognitive performances. Accordingly, we can reassign to the term ‘subject’ the positive traits conveyed by the concept of agency (including spontaneity, naturalness, and interspecific openness) while at the same time attend to the specific potentials for human beings in conceiving themselves through novel symbolic keys. In sum: many non-human agencies are bio-able in the sense outlined by this paper, but the import of the notion becomes more cogent as soon as we consider what it means for humans to develop and strengthen their species-specific capabilities. It is not, we believe, a case of ‘human exceptionalism’, rather, an attempt at expanding naturalism starting from the very positionality of human communication (i.e., our own).

Consequently, in this article we seek to flesh out an eco-epistemological approach focused around bioabilities, pondering how it could be developed and further deployed across the natural and the social sciences to tackle the current ecological problems and the climate issue at large.¹ In section 2, we review the natural genesis of bioability by glimpsing

¹ In this vein, the paper is meant to contribute to the current reflection and debate in political ecology concerning sustainable transitions, social-ecological resilience, nature conservation, ecological governance, ‘Gaiapolitics’ and the collective mobilisation for the climate (Bennett 2005; Lorimer 2015; Latour 2017; Wakefield 2020; Geels and Turnheim 2022; Gandy 2024; Gonin *et al.* 2025).

into biological phenomena of symbiosis and the holobiont. In section 3, the notion of biodiversity is unpacked to make the constitutive dimensions of bioability more explicit. This preparatory work enables us to expand, in the following section, on how symbiosis, holobiont and bioability can provide us with a constellation of notions that contribute to the ongoing renewal of evolutionary theory. Subsequently, section 5 proceeds, through some poignant examples, to a clarification of the potentials of what we call ‘the bioabilities approach’. Such potentials, in our view, hint at a pragmatist-inflexed consideration of the set of capacities and attitudes that might coalesce into richer ideational frames for ecological coexistence. In the conclusion section, we restate our *Fragstellung* and summarise the advancement on the topic. Throughout, we draw from different sources across the humanities, social and natural sciences. It seems to us that most of these connections have not yet been established, and, well aware as we are that there might as well be areas of contradiction between these bodies of literature, we still believe that an attempt at interlocution deserves to be made.

Symbiosis, holobiont, and flourishing as instances of bioability

Far from being exclusively human, bioability appears to be quite a common phenomenon across the living domain. Consider, for instance, the ‘holobiont’, i.e. living formations where different species congregate through association and complex, prolonged interaction. The holobiont is often illustrated, in microbiology, by evoking how we are associated with our gut bacteria and brain bacteria – the so-called microbiome. Instances of holobiont show how different living species can make other closely associated species prosper (Margulis and Fester 1991; Gilbert, Sapp and Tauber 2012). The holobiont encompasses biological individuality and ecological community, usually understood as compounded of a host organism and its symbiotic biome (Suárez and Stencel 2020). Lynn Margulis (1998), the American evolutionary biologist who pioneered this approach, suggested that natural evolution itself can be studied considering how the symbiotic and endosymbiotic relationships that characterise organisms have been forged. As the philosopher Donna Haraway has argued with reference to Deleuze and Guattari’s (1980) concepts of *assemblage* and *multiplicity*, holobionts are not just the union of a host with its symbiotic organisms, but rather can be seen as:

symbiotic assemblages, at whatever scale of space or time, which are more like knots of diverse intra-active relatings [*sic*] in dynamic complex systems, than like the entities of a biology made up of preexisting bounded units (genes, cells, organisms, etc.) in interactions that can only be conceived as competitive or cooperative. (Haraway 2016: 60)

Put differently, holobionts cannot be conceived of as individual entities are, but should be regarded as veritable instances of ‘multiplicities’ or ‘manifolds’, emergent systems of complex interactive ties that substantiate the interconnectedness of the composing parties. The holobiont perspective emphasises that organisms themselves are constitutively heterogeneous, grounded in the self-organising interaction of their components. This means that organisms do not fundamentally differ – in organisational terms – from ecosystems; rather, the difference lies in the degree of connection and integration. A similar insight into diversity-in-continuity, which can be retrieved from the ‘continuist’ philosophy of late-19th-century French theorist Gabriel Tarde, as reprised in the 20th century by the philosopher Gilles Deleuze with his notion of ‘multiplicity’: the distinction between organism and environment can be seen as grounded in the higher level of coherence and integration that contradistinguishes the organism vis-à-vis its environment, rather than in any inherent special quality or substance of the former.

Holobionts are made possible by the specific bioabilities of at least one of their connected participants, which the other participants feel as beneficial and, accordingly, further encourage. In this sense, the successful persistence of a given holobiont can be explained as grounded in actions that stimulate the prosperity of other associates. It is a clear example of how, in the natural world, living beings, ecological entities, and territories, are fundamentally entangled. The action of each organism in the holobiont has vital consequences for the surrounding lifeforms. Of course, organisms do not necessarily always help one another; on the contrary, they can also thwart the growth and life of those they consider to be dangerous adversaries. Famously, Friedrich Nietzsche saw in the trees of a forest (expressly, he referred to ‘a jungle’) a manifestation of the *will to power* –given that, potentially, each tree is struggling for light and water to the detriment of others. Unless, of course, with ‘will to power’ we understand, not the capacity to subtract or steal resources from others, but the capacity to *feel more fully* one’s own co-mingling with the world.² In this

² ‘For what do the trees in a jungle fight each other? For “happiness”? – For *power!*’ Nietzsche (1968[1887-8]: 375). In contemporary philosophy, a reinterpretation of Nietzsche’s view on power has been carried out

precisely Nietzschean sense, actions oriented towards broadly supporting life are revealed as relevant, both epistemologically and ethically. Below, we return to the implications of the bioabilities approach for the revision and enlargement of evolutionary theory; for now, we are keener to remark how the ability to increase and strengthen the life prospects of other living beings represents a fundamental factor in nature. Plants offer an excellent example of this. The notion of ‘flourishing’, for instance, has been elaborated by the neo-Aristotelian plant Austrian philosopher Angela Kallhoff, who has described it as:

the measure of good life of all beings that have a soul, where a ‘soul’ is the principle of life. Living beings as diverse as humans, animals, and also plants have souls, and each of these beings possesses a distinct range of innate capacities. (Kallhoff 2018: 51)

Earlier on, and in the same vein, the philosopher Michael Marder pointed out in his *Plant-Thinking* (2013) that plants flourish in a hetero-temporality often disrupted by the extractive rhythms that capitalism imposes upon all forms of life. Flourishing designates an ethical perspective on botanical species that can improve the moral and political approach to the environment from various viewpoints. Plants offer a clear example of living forms that flourish thanks to their deep interconnection with other lifeforms. It is precisely the interconnection that expands both their own and their associates’ abilities to perform and act in the environment. Already from a morphological point of view, the plant expands into its milieu and tends to maximise its contact surfaces in a subtle chemical dialogue made of absorption, filtering, release, homeostasis (Thom 1988). To exemplify this general condition, we can also consider the case of mycorrhizal networks. The mycologist Martin Sheldrake (2020) has highlighted the central function of fungi in vegetal communication and the search for nutrients, water, and other crucial living features of these organisms. Fungi amplify many vital functions of other botanical species, making the latter more resilient and energy-efficient. As evinced in the dynamics of mycorrhizal networks, fungal bioabilities allow whole ecological niches to live and prosper more fully.

Even for the non-human world, bioabilities (or lack thereof) can be read through the lens of ethics. Notably, Yogi Hendlin (2015), a German environmental philosopher, has made this point while elaborating what he has called an ‘inter-species ethics’ (*Interspezies-Ethik*). Hendlin proposes to evince the ethical significance of both intra- and inter-species

by, among others, Michel Foucault (1971) and Gilles Deleuze (1962), who stressed the crucial link between power and the capacity to feel more and nourish more affects.

relationships, regardless of the intentional or unintentional quality of such interactions. Since every living being can improve or worsen the lives of other associated organisms, we can consider non-human bioabilities just as pivotal for sustaining the ecosystems as well as biodiversity at large. This also reveals that there are several types and degrees of bioability in non-humans, in a range that stretches from usefulness for bare survival to enabling the full flourishing of life. In other words, we can interpret all the actions aimed at positively affecting the life of other organisms in terms of a bioability deployment, while at the same time we can recognise that these effects come in degrees and have, consequently, different levels of importance and vital significance.

In this sense, the lens of bioability offers a tool for theorising the epistemic and ethical status of living beings, highlighting the role played by given organisms in preserving and amplifying the surrounding web of life through their action, that is, through active cooperation in the flourishing of others. This explains why, as suggested above, bioability can be said to have an epistemological and ethical content, not just from a human-centric perspective, but in a broader sense that embraces the needs and requirements of all living beings in their capacity to express life at their fullest. In this vein, for instance, the biosemioticians Jonathan Beever and Morten Tønnessen (2015) have argued that the capacity of an organism to fulfil its specific semiotic capacities – in other words, to flourish – can be taken precisely as the ground for extending an ethical status to all living beings. The bioability notion reinforces Beever and Tønnessen's claim by focusing on nature's cooperative presuppositions, detailing the various bioabilities at the species level.

Yet, it is important to recall that variability in bioabilities occurs not only across species: in fact, bioabilities may also differ from population to population, from group to group, from individual to individual within a species, and from time to time within the same individual. Recognising such variations enables us to better unpack the central point of our proposal. On the one hand, bioabilities, understood as the enforcement and enablement of others, are part of the evolutionary pathways of the majority of living beings. As said, admitting this fact is important in order to overcome an understanding of life as uniquely focused on competition. On the other hand, we argue that human bioabilities must be examined in their historical context if one wants to refine them, and devise them more effectively. In other words, as we acknowledge that bioabilities are grounded in the biological history of our species, and that this propensity to co-act is shared with other forms of life, we also invite to be sensitive to the variables, the conditions and the loci influencing development. It is in the

entanglement of nature and culture, and in the contingency of social contexts, that bioabilities can be enforced, evolved or, on the contrary, hampered and suppressed.

The existence of empirical variations is what distinguishes the notion of bioability from other psycho-ecological notions, such as for instance the 'biophilia' notion (Wilson 1986), the 'ecopsychology' approach (Fisher 2013[2002]), or the 'synergistic hypothesis' (Corning 2003). Biophilia, as developed by the American naturalist Edward O. Wilson, presupposes that humans are, at some fundamental level, instinctively led to relate in a positive way to the rest of nature. In ecopsychology, devised since the 1960s by a group of American psychologists and environmentalists, the emotional bond between humans and the Earth is similarly posited as primordial and self-evident. In synergism, a perspective proposed by the evolutionary biologist Peter Corning, cooperation is posited as a fundamental cosmic force operating since the first instants of the universe after the Big Bang. The bioabilities approach does not make such bold, but also, to some extent, unwarranted assumptions. In particular, we do not wish to assume that bioabilities always necessarily come easy, or feel natural – for this would lead to fatally underestimate the ethical and political global challenges of the present, which we have already recalled at the beginning. Factual variability also means that bioabilities can only be ascertained through empirical investigation; and, in this sense, the notion is informed by some variant of philosophical empiricism.³ Actions directed at enhancing other lives are not mechanistically dictated by 'the genes', nor can they be taken as a fixed heritage of certain living species or given cultures. Lastly, variability also means that, from a practical perspective, bioabilities can be cultivated and further expanded through a variety of means. In our conception, the bioabilities approach also draws from a pragmatist sensitivity (see, in particular, Peirce 1878), to the extent that the latter invites to assess beliefs and actions by looking at the consequences these concretely engender – here specifically, consequences in entangled ensembles of living entities and agents existing within shared environments.⁴ In the next section, we try to deepen the bioabilities approach through a comparative discussion of biodiversity, so as to subsequently engage in a more direct discussion of subjecthood and subjectivity that bioabilities can illuminate.

³ Although there is not enough space here to elaborate on this point, we are hinting to that brand of empiricism Gilles Deleuze (1968: 186) once called 'superior', or 'transcendental', i.e., an empiricism that overcomes common sense, not only in its substance, but also in its form (while Kant's transcendental rationalism breaks with the former, but not with the latter).

⁴ As Peirce (1878: 265) put it, '...there is no distinction of meaning so fine as to consist in anything but a possible difference of practice'. A view of theory as inquiry and practice also subtends Hume's philosophy.

Biodiversity and the bioabilities approach

Above, we have framed bioability as that subjective capacity for action, biologically grounded although not genetically determined, that correlates with multispecies flourishing and, consequently, with the preservation and the increase of biodiversity. Now, it is important to recall that biodiversity itself is a complex and multifarious notion, which applies at different scales to different referents. Indeed, biodiversity can be measured deploying various metrics – such as, for instance, the numbers of species, their phylogenetic diversity, or alternatively, measurements of biomass and/or metabolic activity (Díaz and Malhi 2022). Biodiversity, Díaz and Malhi clarify, can be referred to either the degree of diversity within a species, or to comparative variation across species; likewise, it can be predicated at the level of a single location, or niche, as well as across different locations. At the level of the single species, biodiversity is usually taken to measure the genetic and phenotypic variability of a living population, whereas *across* species, it is meant to record the variability in the taxonomic features of living creatures. In parallel, *within* locations, biodiversity refers to the number and abundance of species coexisting *in situ*; while *across* locations, it enables comparisons between different ecosystems in terms of their biological richness, thickness, and resilience. The apparent paradox is, of course, that the materials compounding an ecosystem are only partially alive (i.e., biota) in the strict biological sense, and yet still all indispensable to support the unfolding of life.

While the biodiversity notion may be (and sometimes has been) criticised for having turned into a ‘mixed bag’, we think that its plurality is significant in itself, highlighting the fact that an environment is always necessarily a collaborative undertaking. As a correlate to biodiversity, the bioability notion seeks to stake out precisely the forms and the modes of such manifold collaborations unfolding among living beings. This allows us to better place humans in an ecological context, assessing their effects and capacities both evolutionarily and historically. On the one hand, it appears that the human presence on Earth has induced biodiversity loss nearly since its inception. Although complete causal models are not (yet) available, the spread of hominids and early humans from Africa, between about 1M and 100K years ago, seems to be significantly correlated with the decline and the extinction of wild large mammals (the so-called megafauna), to the point of suggesting direct causation

(Sandom *et al.* 2014). On the other hand, however, humans have also – at least locally and within given geohistorical niches – proved able to enhance biodiversity, as seen for instance in various types of traditional habitat and land stewardship, with their rich and varied cultural landscapes, where a mixture of domesticated, semi-domesticated and wild species and varieties have thrived. By contrast, since the onset of the industrial epoch, the record has turned more sombre: extinction rates are now higher than at any previous time since the Late Pleistocene (Andermann *et al.* 2020). Undoubtedly, the environmental impact of modern humans has been largely detrimental to ecosystems integrity: current estimates put nearly one million living species (about one in eight) at threat of extinction within a couple of decades (Urban 2015), and recovery times in the order of millions of years (Davis, Faurby and Svenning 2018). It is clear that, in order to revert such a negative anthropic relation to the biosphere, restraint from causing further harm, while necessary, is insufficient.

We can speculate about why modernity has produced the ecological devastations we are now facing. The causes might be diverse and compounded; yet certainly ideas of fitness and competition that spread in the disciplines of economics and biology during the 19th century, have played a role. Biological fitness corresponds to an organism's attempt at increasing one's own stock, notably in terms of offspring. A most 'fitting' species is, from an ecosystem perspective, in accordance according to Gause's law of competitive exclusion, an invasive one. Eventually, of course, an impoverished environment lashes back at the supposedly 'fittest' animal, who cannot survive alone. That is why bioability is not to be understood as a manifestation of naïve vitalism: to develop bioabilities calls for a nuanced understanding of ecological dynamics. To the extent that each living thing is imbricated in larger patterns of coexistence, bioability can be measured by those actions fostering a richer, more robust and more diverse ecosystemic balance. In it, multiple equilibria points can be attained in sequence, so that the temporary loss of equilibrium does not lead straight to catastrophe.

Within this frame, bioability may also include a capacity to *resist* certain manifestations of life, yet in a way that still *does not* turn into extermination. As hinted above, studies into the ecological history of our species seem to confirm that humans have, in many situations, effectively functioned as an invasive species. It is difficult to draw a unanimous assessment, though. For instance, Gordon *et al.* (2024) suggest high regional and variability in how human land management practices impacted floristic diversity during the course of the Holocene. Besides that, humans are certainly not the only invasive species: whenever humans retreat or abandon the land, we see that other invasive species set in. Biodiversity,

in other words, may not necessarily increase with sheer human withdrawal, and the most fruitful cases seem to be those contradistinguished by a certain looseness in multi-species arrangements. Dahlström, Iuga and Lennartsson (2013), for instance, have suggested that hay meadows – ecosystems that are neither entirely anthropic, nor entirely natural – are particularly biodiversity-rich. An adequate assessment of bioabilities must, in this vein, proceed through a more accurate understanding of how each living thing is imbricated in natural patterns over time. Bioability benefits, in the first place, ecosystems, not single species; and the ‘service’ one bio-able organism renders to the others must be evinced from a plurality of indicators. Both quantity and quality, both impact and nuance are needed to appraise bioabilities in action.

A more extensive discussion concerning how to entertain, spur and further strengthen one’s bioabilities may prove fruitful in developing substantive contributions towards actively redressing ecological damage and restoring biodiversity. But considerations of bioability can also be applied to ecosystems of ideas. Gregory Bateson (1972) called such an encompassing mode of ecological thinking an *ecology of the mind*. As hinted above, bioabilities can be either unconscious or conscious, since a given being can be more or less aware of its own actual bioabilities. That is why bioability can designate a natural phenomenon *and*, at the same time, an ethical, cultural, moral and political attitude. In this vein, bioability may be taken as one of the crucial notions for the development of a nature-based ethics. Ethically and politically, the interest of the concept lies in the empowerment it confers to actors as soon as they become aware of their own environmental capacities, and as they determine themselves to deploy such forces more purposefully.

To enquire into bioabilities, as well as rehearse them at their fullest, requires a clarification of the scale of analysis and the scale of action of (either deliberate or emergent) concerted practices endowed with an overall direction – i.e., that look like projects. Thus, as hinted above, the advantage of adopting the subjective perspective on bioabilities (as referred to the psycho-social-ecological dimensions of action) rests with the chance of training and sustaining them.

Evolutionism through and beyond competition

The theoretical import of the concept of bioability is, as considered in section 2, linked to the opportunity it offers to highlight the spontaneous, proactive capacity of living beings: it invites the observer to pay attention to the collaborative capacities of lifeforms. In this section, we focus on the possibilities that open up whenever human subjects recognise their bioabilities and, therefore, their potentialities as enablers and enforcers of non-human life, linking this perspective to a shift in evolutionary theory. We have already underlined – and return to this point below – how the adoption of the bioability perspective can stimulate a type of ecological and environmental thinking that is not dominated by the sad passions of eco-anxiety, ecological grief (Pihkala 2022), solastalgia (Albrecht *et al.* 2007; Albrecht 2019: 28-62), and deprivation (Louv 2008; Louv 2009), nor by the ‘heuristic of fear’ proposed by the philosopher Hans Jonas (1985: 26-7; 202-3). The bioability perspective, in other words, rejects the view that the only motivational source for an ecological transformation of lifestyles is the fear of extinction of the human species.

Not that we dismiss or discount such feelings: before the climate emergency and ecological degradation, they are absolutely understandable, even legitimate. We are not in denial of the existence of such feelings and emotions, and we do not mean to belittle them, those who experience them, and their significance. In the first place, they signal the inception of a crucial sensitivity towards the natural environment as a crucial component of life. Yet, in our view, fear and mourning, in themselves, are not able to ignite the type of societal change that is needed for a truly terrestrial politics to set in. To the contrary, there is a risk that they turn into paralysing emotions that invite ruminations of melancholia, resentment, disenfranchisement, and withdrawal. Fear and mourning, we believe, can be the first, preliminary step towards a more encompassing philosophy of ecological existence and action, a philosophy that must overcome them.

Our idea here is to understand the symbiotic and eco-sustainable transformations of human activity as *an opportunity* to explore a new imaginary of life forms, as opposed to the reluctant acceptance of high levels of existential self-limitation, or the outcome of traumatic experiences. In other terms, the transition towards eco-sustainable action can be understood as form of active valorisation and expansion, through learning and teaching, of bioabilities themselves, rather than as a form of renouncement to spontaneity. The eco-sustainability model and the line of action that emerges from the eco-fearscape are of a privative type – a sort of list of activities that are no longer permitted and skills that must be renounced (such as building with concrete, travelling extensively by plane and by car, as

well as hunting, fishing, and potentially conducting any professional or leisurely activity that implies a massive impact on the ecosystem).

In respect of this, the bioability approach invites an attitude of enquiry, whereby pre-existing bioabilities are rediscovered and valorised, while always new bio-abilities are invented and experimented in a multiplicity of formats and forums. The transition to a new kind of environmentalism focused on the creative exploration of bioabilities, instead of the reluctant limitation of previous modes of life, can be supported by different lines of argument. The pragmatism that is required for environmental thinking as an applied ethics does not force us to accept the philosophy of utilitarian consequentialism. The inclusion of other living beings in the sphere of human moral consideration can go beyond the (already desirable) limitation of the suffering of sentient beings. It can proceed in the direction of recognising the inherent value of all forms of agency for which the question, 'How can I promote the good for a shared manifold?', starts to make sense.

The current prevalence of negative feelings of eco-anxiety, ecological grief, solastalgia and deprivation can be countered, in environmental-psychological terms, by notions such as *Funktionslust* (Bühler 1924: 454-8), the joy deriving from one's pure activity. The early-20th-century German psychologist Karl Bühler originally introduced the funktionlust idea to remark the autonomously gratifying character of activities such as nourishment, play and artistic enjoyment, against the Freudian interpretations of such activities as a kind of cover-up of hidden mechanisms of psychological repression or sublimation. In a similar vein, the Dutch cultural historian Johan Huizinga (1938) advanced the famous image of *homo ludens* to pinpoint how crucial experiences of gratuitous play and fun are to human experience at large (and, interestingly enough, Huizinga already cultivated what today would be called a 'more-than-human' perspective in social theory, suggesting that humans have learnt from animals several modes of playing). What we need today, reinterpreting Bühler's and Huzinga's legacy, is to focus on the spontaneous capacity of human beings to derive pleasure and an increased sense of being alive from bio-able interaction within the biodiverse milieus in which the actors interrelate.

The moral and psychological promotion of bioabilities must face the challenge of the dominant approach to the relationships between living species, which remains embedded in evolutionary individualism. This idea emerged in late-19th-century as an interpretation of Darwin's evolutionary theory and, in the 20th century, gave rise to the vulgate known as social Darwinism. Until relationships between species are imagined through the lenses of a

ruthless struggle for survival of each one species to the detriment of the others, and, within a species, of each one individual (conceived of as a sheer ‘optimiser’ of the transmission of the species-specific genome) to the detriment of the others, all psychological and moral arguments will be affected by a weighting problem: they will appear as edifying exhortations to modify, almost by *fiat*, underlying conditions that have persisted since the beginning of time and that constitute the very substratum of animal life, with little chance to change. In other words: to the extent that evolutionary individualism remains centred around the trope of the ‘survival of the fittest’ considered as the sole driving factor of life, symbiotic bioabilities – however much they can be recognised as morally desirable, and perhaps even capable of ensuring better mental health – will always appear fragile and provisional accomplishments, belonging more to the pious realm of what ought to be, rather than to the harsh reality of what actually is – with David Hume starkly admonishing us that every jump from the one realm to the other is illegitimate!

According to Diane Paul’s (1988) reconstruction, the expression ‘survival of the fittest’ was coined by Herbert Spencer in 1864, after reading the first edition of Darwin’s *The Origin of Species* (1859). To Spencer, the expression meant ‘that which Mr. Darwin has called “preservation of favoured races in the struggle for life”’ (Spencer 1864: 444-5). Spencer saw ‘favour’ (which today we would call ‘evolutionary advantage’) as resting with a species’ competitive fitness, while he tended to frame cooperation as a risky gamble as well as, ultimately, a waste of energy. Only in a second moment did Darwin himself adopt Spencer’s phrase, precisely since the fifth edition of 1869 – apparently, out of frustration with the misunderstandings generated by his previously preferred expression, that of ‘natural selection’.⁵ In the late 19th century, enthusiastic Darwinists, like the biologist and anatomist Thomas Henry Huxley (informally known as ‘Darwin’s bulldog’), made extensive use of the survival-of-the-fittest rhetoric, often in connection with the related notion of ‘struggle for life’ (nature, Huxley famously said, is nothing but a ‘gladiator show’).

An at least partial counterweight to Spencer’s and Huxley’s emphasis on competition, struggle, and elimination, came, at the turn of the 20th century, from the Russian anarchist geographer and philosopher Pyotr Kropotkin. Kropotkin (1955[1902]) was among the first

⁵ See also Schutt and Turner (2019: 361), who remark how, curiously, Spencer did not use quite extensively his survival-of-the-fittest notion in his own sociological writings; more specifically, in the context of sociological analysis spanning the 1870s and 1880s, he never applied the notion at the level of competitive survival of the individual within a given society, but only in the description of warfare between different societies, each of which he understood as non-competitive wholes.

evolutionary theorists to underline the frequency of biological phenomena of symbiosis and collaboration. Kropotkin's pioneering work provided the already evoked Lynn Margulis with the appropriate ground to develop her insights into the holobiont. As reported above, Margulis found that various forms of cooperation, co-optation and symbiosis even between organisms of different phyla (plants, fungi and bacteria in the root biome in a forest, for example) are more effective evolutionary methods than the suppression and elimination of other species through competition. Today, the research field on symbiosis has expanded to consider phenomena such as multiple horizontal gene transmission, which, although on a smaller scale than in bacteria and archaea, is shown to be common also among eukaryotes (Li *et al.* 2024, Wang *et al.* 2024), and well attested even in the human genome (Huang *et al.* 2017). In parallel, the range of organisms concerned by the phenomenon has also expanded: certain multicellular animals are now known to be able to host, with mutual advantage, algae and other photosynthetically active cells – such as the kleptoplastic marine slug *Elysia chlorotica*, which establishes an intracellular symbiosis with other chloroplasts it 'steals' from the alga *Vaucheria litorea* (Mujer 1996; Rumpho 2001; de Vries 2014), or the jellyfish *Mastigia papua*, which, thanks to the symbioses with zooxanthellae algae, can switch between autotrophic (i.e., photosynthesis-based) and heterotrophic metabolism (Djeghri 2021).

Symbiotic phenomena should not be idealised. Symbiosis does not equate with uninterested self-sacrifice on the part of one organism to the exclusive benefit of another. Most often, evolutionary solutions expand the joint use of available resources, within the constraint of a positive energy balance between the consociated organisms and the environment in which they operate. Such an energetic budget constraint remains unchanged for both competitive and cooperative species. What has turned out to be more varied than expected are, rather, the ways adopted to keep the balance positive. Without discarding the objective consideration that, at some point, living species are *also* in competition with each other for resources, we can now better appreciate how competition itself can take multiple shapes, also leading to collaborative patterns of stabilised interaction among species. This way, dominance and subjection can no longer be seen as the overarching paradigm for all ecological interactions. After the 'symbiotic turn' in evolutionary studies, ruthless competition can no longer be assumed as the default mode of interspecies relationship, nor can it be set as the inevitable destiny for the human species in its relationships with non-human living beings – least of all, between humans.

Accordingly, we suggest that it is possible to make bioabilities morally relevant in a way that is compatible with natural evolutionism, once the latter is integrated and expanded beyond the survival-of-the-fittest trope. This is precisely what thriving research programmes such as ecological evolutionary developmental biology have been trying to do, pointing towards a revision of the modern synthesis that accommodates discoveries in the fields of epigenetic inheritance, plasticity-driven adaptation, niche construction and symbiont-driven evolutionary processes (Gilbert, Bosch and Ledón-Rettig 2015). Recognising that living formations are underpinned by self-constituting processes, shifts the emphasis from selection towards emergence. In the second half of the 20th century and the early 21st century, work conducted in biological complexity science by authors including Adolf Portmann, Conrad H. Waddington, Brian Goodwin, Stuart Kauffman, Mae-Wan Ho and others, has elaborated extensively on the trope of emergence. In various ways, their work has paved the way towards a more holistic vision of the dynamics of life; in particular, the expansion of research into epigenetics has pushed beyond a genocentric or genocentred biology – for instance, with the shift of emphasis from DNA to chromatin, and more generally towards a more flexible view of organisms as exhibiting environmental plasticity and ‘impressionability’ (Meloni 2019). Within such a framework, the bioability notion contributes to work to lay out a *natural morality* that integrates the competitive and selective moments with the areas of symbiosis, holobiont, and epigenetic emergence. Particularly in the context of the current ecological crisis, it is helpful to pursue a vision of human beings as animals capable of proactively imagining new forms of enriching eco-systemic bioabilities, without contravening to some supposedly Darwinian law of nature that would condemn any anti-competitive commitment to failure. In sum, bioability indicates that there is *already* a natural alternative to violence.

The ethics and politics of the bioabilities research agenda

So far, we have analysed the bioability concept from several angles: its biological roots, its link to biodiversity restoration and enforcement, and the role it can play in changing our conception of evolution. We have also suggested that bioability can turn into a tool to assess the positive contributions humans can bring, in the present ecological scenario, to the well-being and the flourishing of other lifeforms. We now turn to the discussion of the ethical and

political consequences of these assumptions. The bioability approach resonates with a Spinozist ethic, where the question to be asked is not, as in other classical moral theories, 'What should I do?', but rather, 'What am I capable of?'. To this aim, the bioability notion can be mobilised to develop a global *savoir-faire* that is much needed in the unfolding of ecological encounters. The latter are always localised and singular, not overseen by any pre-existent protocol, nor predetermined outcome. In his reading of Spinoza, Deleuze (1981) once remarked the importance of the verb *occurrere* and the word *occurſus* in the work of the Dutch philosopher: these are Spinoza's terms for *the encounter*. A meeting, is the space where, for the good or for the bad, living beings become present to one another, affecting others and, in turn, being affected by them. Bioability can be fleshed out starting precisely from similar situations of deep co-presence, keeping in mind the emotional palette that accompanies them. At the same time, in the conception we propose here, bioability embodies, not just a way of acting and practising, but also a mode of perceiving, thinking, and imagining. Indeed, the current global threat to biodiversity is matched by a major threat to subjective bioabilities as imaginational capacities. The helpfulness of cultivating ways of thinking that are supportive of, and conducive to, further bioabilities is thus revealed as even more cogent for the present time.

The French garden designer Gilles Clément developed an idea of 'moving garden', where the gardener does not so much design forms as much as s/he collaborates with the forces of nature, helping plants to attain their flourishing stage (Clément 1994: 12). In order to do so, a faculty of attentive observation must be trained: as noticed also by the philosopher Maria Schörogenhumer (2018), botanical species can communicate their needs, if someone just pays sufficient attention. Reading plant signals and interpreting them displaces the gardener from any privileged position. Contrary to the idea that the non-human world is essentially passive vis-à-vis conquest and subjugation by humanity, the perspective of bioability seeks ways for a radical re-balancing of the powers to feel and act, regarding them as redistributed across the living nexus. Gardens, as imagined by Clément (2014), can be places for rekindling bioabilities, where creatures can collaborate against an illusory anthropocentric domination. Recognising plant signals through intent observation and responding to them in a way that increases their life potentials widens the chances for an extended ecological mind based on the co-perception and co-imagination of multi-species futures. All forms of stewardship and taking care of someone are clear examples of bioability – whether they refer to a child, a companion animal, or a plant. Bioability is the realisation

that that one can only truly prosper if the other prospers, too. At the bottom of the relation to a significant other, whose life one strives to preserve, the question of the shared environment is revealed as key.

Conceived of as an ethical and political category, bioability resonates with what the early green activist Alexander Langer (1996) once dubbed 'ecological conversion'. Throughout the 1980s and early 1990s, Langer's approach to ecological politics explicitly rejected eco-dictatorship and punitive approaches to green politics, in order to focus on the creation of new desires in subjects who become conscious of the environments – ultimately, the biosphere – in which they live. An act of conversion, in Langer's view, cannot be mandated, nor coerced, and remains a priori unpredictable (Brighenti 2023). The bioabilities approach similarly accepts such margins of unpredictability, and zooms in onto the implementation stage: it offers a simple tool to make explicit the gaps and the mismatches between what we want, and what we our actions actually beget. Once a teleological perspective is picked up from naturalistic perspective, bioabilities can be deepened and expanded, according to specific lines of enquiry: what is required is a careful, if painstaking, process of learning, not simply through textbook knowledge, but through protracted experimental practice and the training of skills, accompanied by enhanced reflexivity about the deployments and the entailments of capacities that are both personal and collective, and may become effective in shared environments.

The specific potential of bioability as a political notion relates to the inherently empiricist, pragmatist and pluralist framework of the approach. Knowing bioabilities calls for the development of adequate measures and assessments. Here, one important indication for contemporary ecological politics that derives from the bioability notion, is the avoidance of one-metric approaches. As suggested at the outset, in recent years we have seen the onset, and by now near-hegemony, of a model of climate action entirely obsessed with carbon emissions. Far from suggesting that carbon dioxide is an irrelevant issue for contemporary ecology, we contend that the application of a single metric to assess the whole of ecological politics and practice, inevitably leads to the reification and ossification of the debate, losing sight of the more articulated relations that subtend the multidimensional flourishing of life within ecosystems. Carbon metrics do not really contest the epistemological foundations of the current civilisational predicament, and are instead fully functional to a reductionist vision that prolongs the myth of economic growth, failing to question the deeper causes of the present predicament.

The fetishisation of carbon metrics has led, not only to the dangerous illusion that a few technological fixes will drive all our ecological problems away (or, even, the aberrant persuasion that we are allowed to tinker with even more Gargantuan technologies, such as large-scale carbon capture machines) but also to counterproductive developments such as carbon credits markets which, by creating the big swindle of ‘offsetting’, have cut but a farcical figure of what a terrestrial politics for the present should look like.⁶ That is why we believe that bioabilities should not be measured by carbon metrics – or, at the very least, that carbon emissions should be only *one among many measures* to be mobilised. The key point is that each bioability should be appraised through its own specific logic and through the eco-psycho-social dynamics that are more proper to reveal its full import. The inherently pluralist approach we are exploring here begins with the acceptance that there is no single pre-determined way – no single correct way – of appreciating bioabilities. To the extent that bioability is an empirical notion, it inevitably calls for measures to be deployed in order to be evinced in given concrete contexts – still, the aim of measuring bioabilities in adequate ways must proceed with constant vigilance vis-à-vis the ideologies of increase and maximisation that dominate the current civilisational pattern.

Conclusions

This contribution started from the epistemic and practical predicaments of ecological thinking and action in the face of the climate crisis. Due to its breadth, gravity and complexity – including the complexity deriving from the diversity of the worlds of experience in which the subjects needed to tackle it cooperatively live – the crisis looks like a huge machine that, on the one hand, is too large to be grasped synoptically and, on the other, seems to be self-propelling, leaving increasingly less hope as it advances. Even the ideological component of the crisis – the alleged naturalness of the competitive-selective growth model – does not seem to be counterbalanced by a capacity for critical thinking and critical imagination capable of sketching out viable alternatives.

⁶ A recent study by the Berkeley Carbon Trading Project has found (quite unsurprisingly, to our eyes) that most carbon credits handed out by one of the leading companies in the market to other capitalist giants (typically operating in the Global South) never had any real positive impact on the climate. Most offsetting measures were, since the start, but misleading and worthless schemes (Probst, *et al.* 2024).

In order to gain a decent grasp of the situation, the notion of bioability has been laid out here as the capacity possessed by living beings to support the life of *other* beings who are co-present within shared environments. Bioability can function both as a theoretical construct and as a practical tool for ecological thinking and action: theoretically, it includes, and valorises, the widespread symbiotic, synergetic and collaborative capacities that pervade the living domain – an inclusion that integrates and corrects the vision of evolution as a merciless battlefield in which only the strongest survives; practically, it covers of all action that opposes the trend towards the loss of biodiversity. An increased awareness that each of us possesses a range of bioabilities can thus be helpful in overcoming the paralysing ‘sad passions’ that have dominated the ecological debate, such as solastalgia, climate anxiety, and (heuristic) fear. Practices of bioability may range widely, from growing gardens to partaking in the observation of animal life. They all go in the direction of a better coexistence of humans and non-humans. In addition, practising bioabilities is an actual source of pleasure, not only in aesthetic and recreational terms, but also functionally: it is the pleasure arising from an amplification of a natural capacity through semiotic and ethical enquiry.

Promoting the intertwining of vital relationships, bioabilities do not proceed naively: in order to be effective, bioable practices require a careful study of lifeforms and the integration of scientific knowledge (botanical, ethological, ecosystemic) with a ‘probiotic’ imagination. The fact that bioable humans necessarily rely on advanced cognitive capacities and scientific skills (including the scientific process of data collection, hypothesis making, modelling etc.) does not reduce bioability to just another instance of ‘human exceptionalism’. This objection misses the mark, insofar as these capacities are not the expression of an abstract rationality, but rather, if correctly understood, are themselves instantiations of biodiversity in action. In other words, bioability addresses the inner biodiversity of the human species as an exploratory one, whose curiosity is naturally enhanced and made more complex by symbolic language, but remains radically embedded in nature. The mental biodiversity of human beings does not mean that they are exceptions among the living beings – as Spinoza once put it, humans are not ‘a kingdom within a kingdom’. This is true in general, but even more so with reference to the cognitive activities that support the exercise of bioabilities, rooted as they are in ecosystemic co-belonging with other species. The flourishing of the living can only be attained through such outreaching activities.

In this article, we have not ventured into specifying which bioabilities can compound a given personality, an individual biography, or a social and cultural milieu. The bioabilities approach shares some similarities with the process of *inspiration*: never amenable to mechanical explanation, inspiration is akin to a medium *through which* the existing reality acquires new significations and can express its own vitality to higher degrees (Brighenti 2026). In a similar way, bioability may open up fields for research, experimentation and empowerment in renewing and enlarging the vocabulary of ecological thinking and action, in the context of a naturalistic evolutionary philosophy, since, as pointed out, bioability finds its plausibility within evolutionary theory, once the latter is integrated and expanded with its most advanced revisions. Rehearsing and cultivating bioabilities can become an exercise in personal and collective imagination, reflexivity, and concrete ecological commitment.

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