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Response: Commentary: Is the Focus on “Ecosystems” a Liability in the Research on Nature’s Services?

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A Commentary on

Commentary: Is the Focus on “Ecosystems” a Liability in the Research on Nature’s Services?

by Borrero-Echeverry, F., and Rincon, D. F. (2019). *Front. Ecol. Evol.* 7:79. doi: 10.3389/fevo.2019.00079

In their recent commentary, Borrero-Echeverry and Rincon (2019) argue that some of the points made in our earlier article (Baveye et al., 2018) are “counterproductive, not only to the research on nature’s services, but also to the ongoing struggle to shift to a more sustainable development.” We welcome the opportunity that their commentary affords to clarify our perspective. Apparently, whether it be because of a problem of language or because of our writing style, Borrero-Echeverry and Rincon (2019) do not seem to have understood what we were trying to explain. It might therefore be useful to reformulate our rationale in simpler terms in order for it to be easier to grasp.

Regardless of preferences in writing style, it seems that it would be hard to interpret what we wrote originally to be an argument in favor of a “paradigm shift in terminology toward ‘nature’s contributions to people’ (NCP),” as Borrero-Echeverry and Rincon (2019) write. Not only do we describe the NCP as a “controversial notion,” but we also point out that differences between the NCP and the ecosystem services framework (ESF) “remain very fuzzy” at this stage, in part because the concept of ecosystem continues to constitute the foundation upon which the NCP are predicated, as is the case also with the ESF. That reliance on ecosystems, against which we raise three different objections, was precisely the focus of our original article (Baveye et al., 2018). We made it clear that our proposal to address these objections cannot be reduced just to a question of terminology. What is at stake is how to overcome operationally the set of limitations that stem directly from the use of the concept, and not merely the term, of ecosystem.

The first key issue we raised in Baveye et al. (2018) is that, in virtually all of the literature on “ecosystem services,” the strict understanding of an ecosystem as “a community made up of living organisms and non-living components such as air, water and mineral soil” (e.g., Smith and Smith, 2012), explicitly requires the presence of something living, be it a plant, animal, or microorganism. This constraint is problematic in the context of the preservation of important natural resources because some of the benefits that humans derive from nature do not result directly from the presence or activity of any living being (other of course than the humans at the receiving end). For example, when a soil provides physical support to a building or a parking lot, or serves as raw material to construct houses, its initial biodiversity, or indeed whether it hosts any living organism at all, is of little relevance. In this context, we feel that societal debates about the sustainable use(s) of nature by human populations would likely be severely hindered if, from the onset, some of the possible uses cannot be mentioned explicitly simply because no living organism is involved (see, e.g., further discussion in Baveye et al., 2016).

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The second key point is that reliance on the concept of ecosystem may cause serious difficulties for the measurement of some of nature's services to humans. For example, the measurement of any physical process occurring in a system requires in general the ability to monitor closely what enters the system and what goes out of it. Nature's services are no exception in this respect. In a forest ecosystem, this condition may be satisfied for the service of timber production, but would be hard to satisfy in practice for other services, like groundwater recharge, or filtration of contaminants, if the limits of the forest do not coincide with those of a watershed or catchment. In this respect, it would definitely help if in the research on nature's services, we could focus from the start on regions of space where the measurement of the largest number of services would be feasible. Borrero-Echeverry and Rincon (2019) consider our concern about the measurement of nature's services to be "moot." However, in the last couple of years, a steadily growing number of researchers has come to recognize that measurements represent the Achilles' heel of the ESF, and that, if progress is not made in this area in the near future, including in terms of cultural services, it may prove operationally difficult to account for nature's services explicitly in the sustainable management of our environment (Grêt-Regamey et al., 2014; Andersson et al., 2015; Baveye et al., 2016; Baveye, 2017).

The last argument against linking the concept of ecosystem too closely to an analysis of nature's services, is that some stakeholders may tend not to associate the concept readily with their day-to-day reality. It is difficult at this juncture to determine how prevalent this attitude is. A reviewer of this article found in his/her own research that farmers find the term of ecosystem services much more intuitive than that of nature's services, arguably because "nature" creates a tension between conservation ("nature") and farming. Our own experience is different. For the vast majority of farmers with whom we have interacted, the term "ecosystem" does not carry much practical meaning at all. Their unit of management is a field or a cadastral unit. Therefore, in order for the communication with them to be most effective, it makes sense to try to stick with terms that are more directly relevant to their reality. That does not mean that farmers should

consider only their field and not the wider environment of which they and their farm are an integral, intimately-connected part. On the contrary, such a wider viewpoint is essential to prevent environmental deterioration (e.g., surface water eutrophication resulting from poor fertilizer management) and to achieve sustainable practices. But we disagree with Borrero-Echeverry and Rincon's (2019) viewpoint that this broader perspective imperatively requires a discourse centered on ecosystems. It does not.

As a last remark, we fully understand that the concept of ecosystem has occupied a central position in training programs in ecology over the last 80 years. Therefore, for some ecologists, any suggestion to downplay its importance must be akin to blasphemy, and give them the very unsettling impression that one wants to pull the rug from under their feet. This may explain the strong-worded characterization of our proposal as "irresponsible" by Borrero-Echeverry and Rincon (2019). However, our suggestion, and the rationale that we offer to justify it, could perhaps serve instead as an opportunity to revisit earlier criticisms of the concept of ecosystem (e.g., Golley, 1991; Blew, 1996; Berkes and Folke, 1998; Blandin and Bergandi, 2000; O' Neill, 2001; Jørgensen et al., 2007; Miller, 2008; Gignoux et al., 2012; Tassin, 2012; Silvertown, 2015; Van der Meulen et al., 2016; Scholes, 2017), and to eventually realize that, as argued by Westman (1977), himself an ecologist, it may be preferable to talk simply about "nature's services" rather than to insist that these services be tied formally to ecosystems. In situations where the term of "nature" may be counter-indicated, perhaps, as an alternative when it is appropriate, it would make sense to concentrate on a part of nature. We could refer, e.g., to "land services" or "soil services," again leaving the concept of ecosystem aside. This is what soil scientists, by and large, have done for the last 60 odd years, in their literature on what they call "soil functions," which encompass soil services (e.g., Baveye et al., 2016).

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All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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