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Editorial

CIRCULAR ECONOMY BETWEEN BUSINESS AND BIODIVERSITY

The increasing loss of biodiversity is one of the most dramatic consequences of climate change and human impact. Biodiversity provides ecosystem services essential for human life such as food, materials, clean water, climate regulation, and many others. According to IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), the main drivers of biodiversity loss can be found in five main causes: (i) changes in land and sea use (human actions have significantly altered 77% of land and 87% of the ocean); (ii) Overexploitation of species and natural resources (in 2022, humanity was using nature and its resources at rates 1.75 times faster than the planet's ecosystems can regenerate); (iii) Climate change (human actions have warmed the globe by more than 1°C compared to pre-industrial levels); (iv) Pollution (approximately 11 million tonnes of plastic are dumped into the world's oceans each year, affecting more than 250 animal species); (v) Invasion of alien species (since 1980, cumulative records of alien species have increased by 40%, negatively affecting native species) (Ellen Mac Arthur Foundation, 2021).

The circular economy aims at changing the production and consumption systems eliminating waste and pollution to reduce threats to biodiversity, circulating products and materials to give space for the restoration of biodiversity, and regenerating nature to help biodiversity.

Biodiversity and ecosystem services

The definition of biodiversity universally accepted could be the following: "Any kind of variability among living organisms, including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; it includes diversity within species, between species and between ecosystems" (Secretariat of the Convention on Biological Diversity, 2011).

This definition puts the focus on the concept of variability, which can be considered at three different levels: (i) within species, when considering genetic and population-level measures; (ii) between species, when considering the variation of species level; and (iii) within ecosystems, when considering the regional and landscape level.

The concept of biodiversity, hence, is a multifaceted and encompassing idea that goes beyond just the diversity of species in an ecosystem. It encompasses the entire range of living organisms, including all species of plants, animals, fungi, and microorganisms, as well as the genetic differences within these species, the interactions between them, and the ecosystems they form a part of. The concept of biodiversity is crucial because it underpins the health and functioning of ecosystems, which in turn sustains human well-being. Biodiversity supports ecosystem services that are essential for food production, medicine, climate regulation, and cultural values.

Since ecosystem services are services provided by nature to humans they can be simply defined as: "The benefits people obtain from ecosystems" (Millenium Ecosystem Assessment-MEA, 2005). MEA provided a classification in four categories of ecosystem services, which is still considered as universal:

- Provisioning. The goods or products obtained from ecosystems such as food, freshwater, timber, and fiber.
- Regulating. The benefits obtained from an ecosystem's control of natural processes such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards. "Regulating" in this context is a natural phenomenon and is not to be confused with government policies or regulations.
- Cultural. The non-material benefits obtained from ecosystems such as recreation, spiritual values, and aesthetic enjoyment.
- Supporting. The natural processes such as nutrient cycling and primary production that maintain the other services.

Business and biodiversity

Biodiversity could be seen as an integral component of natural capital. Nowadays, the relationship between economic activities and the environment is universally known, meaning that business can generate positive and negative impacts on the environment and at the same time, it relies on the resources that the environment provides to it. Therefore, businesses both impact and depend on biodiversity and the ecosystem services it provides.

The concept of dependency refers to the organization's reliance on the use of biodiversity, meaning the biological resources of species and their interaction with ecosystems and ecosystems services, such as pollination, water flow regulation, water filtration. These dependencies are directly and indirectly interlinked with biodiversity impacts, which can be defined as "a change in the diversity of ecosystems and/or species that may take place because of business activities". Such impacts can be direct, where business directly exploit biodiversity resources (agriculture, forestry, fishing) or indirect, where business affect indirectly biodiversity and natural resources (fashion, finance, manufacturing) (Mace et. al. 2012). However, the relationship

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between business and biodiversity is not yet well-known at business strategy level, even though the link between economic activities and biodiversity/ecosystem services is extremely strong. In this sense valuing biodiversity and ecosystem services can facilitate business in understanding the real value of biodiversity and the economic benefits that conservation practices could bring to them. Economic valuation of ecosystem services and biodiversity can help society and business in let them understand that biodiversity and ecosystem services are scarce and that their depreciation or degradation is bringing costs to society. Therefore, valuing ecosystem services and biodiversity is a needed step for businesses for increasing their awareness concerning the importance of these services for the efficiency of such economic activities in the long term.

Biodiversity and circular economy

As it has been previously shown, one of the main drivers of biodiversity loss is the wasteful and unsustainable economy characterized by a linear flow. Circular economy, as well known, is a closed system focused on the values of materials, resources, and products, which can bring benefits in different sectors such as reduction in GHG emissions, materials, reduction in primary material consumption, in sustainable agriculture (it has been estimated that designing food products, such as wheat, potatoes, dairy, etc., for nature using diverse, upcycled, lower-impact, and regeneratively grown ingredients can bring to a 50% reduction in the negative impact on farm-level biodiversity), in economy, in the form of net material cost savings and reductions in externalities, and in the environment (e.g. in the global plastic sector CE can bring to a strong reduction in plastic leakage).

Biodiversity presents different features. It is composed by ecosystems, genes and species and therefore, when it comes to measure the status and/or the impact of biodiversity, it can be tricky. Therefore, for each component, different aspects must be measured (UNEP-WCMC et al., 2022):

a) Ecosystems - two aspects must be considered: the ecosystem extent (spatial features of the ecosystem) and the ecosystem condition (composition of ecological communities);
b) Species - the population size must be measured (MSA - Mean Species Abundance is one of the most utilized indicators in this framework), and the extinction risk. So, it provides an idea on the health of a species in an ecosystem;
c) Genes - only the genetic diversity must be considered, which describes the variability in genetic characteristics within a given species, or within an ecosystem. It can provide an indication of its resilience to change.

Hundreds of different indicators, indices, or metrics that measure the status of one of each component exist and the challenge relies in finding the more holistic one.

Final remarks

In conclusion, biodiversity is indispensable for the functioning of ecosystems and the provision of ecosystem services. The loss of biodiversity is a pressing global concern with far-reaching consequences, and addressing it is paramount for sustainable development. The circular economy offers to business and human activities an option to mitigate the main drivers of biodiversity loss.

Understanding this relationship and valuing biodiversity and ecosystem services can enhance business awareness of their long-term benefits and the costs associated with their degradation.

The crucial point remains the full enforcement of the circularity of the circular economy, which even today encounters various implementation challenges and therefore still has a long way to go before it can be considered a business system that is neutral towards biodiversity.

Technical, regulatory, and authorization barriers (e.g., End of Waste) in recycling waste, the difficulty in producing pollutant-free goods and thus fully reintegrating them into the secondary production cycle, the need to economically support the more fragile and less aware countries of the impacts of uncontrolled waste management, are all aspects that slow down the positive impact of the circular economy on biodiversity conservation. If biodiversity can truly be protected and promoted through the conscious use of resources and their conservation, the new economic paradigm that bases its material circularity on the recovery of materials through waste recycling, does not, however, address the issue of uncontrolled consumption of goods and services in an equally important way, and, indeed, emphasizes the need to always find new sources, alternatives to virgin raw materials, but not to drastically reduce their comsumption.

If we will be able to define and quantify the ecosystem values on which various corporate businesses depend and impact, the circular economy could still make progress in preserving and promoting biodiversity.

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