A sustainable and renewable chemistry for the protection of biodiversity

Lucia Gardossi
Dipartimento di Scienze Chimiche e Farmaceutiche, Università degli Studi di Trieste

On 25 September 2015, the member states of the United Nations adopted the Sustainable Development Goals (SDGs) with the ambition of achieving them by 2030, combining social, environmental and economic sustainability. [1] Chemistry, seen both as a discipline and as an industrial sector, is directly involved in the achievement of many of these goals such as overcoming hunger (2), health and well-being (3), access to clean water (6), clean energy (7), industry innovation (11), conscious and sustainable use of resources (12), mitigating climate change (13), preserving the health of the seas (14), respecting the land and the soil (15). [2] It should be noted that the chemical industry is the European sector that generates the products with the greatest added value, thanks to significant investments in research and development and the contribution of the largest percentage of university graduates among all manufacturing sectors. [3] This makes it a phenomenal driver of technological, social and economic innovation. The current challenge that chemistry is experiencing concerns the integration of sustainable processes and products, in order not only to mitigate the environmental impact deriving from industrial plants - an objective already largely achieved at the end of the last century - but also to contribute to the decarbonization of our production systems through the transition from fossil to renewable raw materials. The fallout of this revolution potentially extends to all production sectors that are powered by sustainable and renewable products (also called bio-based) of modern sustainable chemistry. [4] New integrated production systems, called biorefineries, are now widespread in Europe and the world, and transform both biomass and waste, organic waste, sewage, carbon dioxide and other biogenic gases into chemicals with low environmental impact. Scraps and waste are transformed from a threat to a resource, allowing us to overcome a linear growth model and implement a bio-circularity free from fossil carbon sources. All without entering into conflict with the food supply chain. [5]

The European and Italian strategies for the implementation of this bio-economic model have highlighted how chemistry, integrated with biotechnologies, is able to enhance the biodiversity of territories and ecosystems, thanks to a range of scientific and technological innovations already available and which are progressively transforming themselves into tools for growth and social well-being. [6,7] An example comes from the possibility of utilize semi-arid or marginal land for the cultivation of oil plants that provide the raw materials for the production of polymers, lubricating oils, components for cosmetics and herbicides. Forest ecosystems represent an additional reservoir of biodiversity that can be enhanced through the sustainable conversion of lignocellulosic biomass into materials and chemicals.

Sustainability is therefore not a mere legal constraint, but rather an opportunity to reconcile social well-being, economic growth and the environment. The realization of this integrated model of sustainability and well-being is necessarily based on innovation and attention to education and research. [8, 9, 10]

References:

1. SWD(2016)390, Key European action supporting the 2030 Agenda and the Sustainable Development Goals, 22.11.2016 ;
2. https://cefic.org/
3. https://www.federchimica.it/docs/default-source/pubblicazioni/26-rapporto-annuale-responsible-care.pdf?sfvrsn=4cfd4493_8
4. The BBI JU SME landscape: driving impact and innovation', November 2019: https://www.bbi-europe.eu/sites/default/files/media/bbiju-sme-landscape.pdf
5. Guidelines for the feed use of food no longer intended for human consumption; https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018XC0416(01)&from=EN
6. SWD(2017)374, Review of the 2012 European Bioeconomy Strategy, 13.11.2017
7. http://cnbbsv.palazzochigi.it/it/materie-di-competenza/bioeconomia/
8. https://www.bbi.europa.eu/news/commission-gives-green-light-successor-bbi-ju
9. https://ec.europa.eu/info/horizon-europe/cluster-6-food-bioeconomy-natural-resources-agriculture-and-environment_en
10. https://www.mur.gov.it/it/aree-tematiche/ricerca/programmazione/programma-nazionale-la-ricerca