Editorial

Conserving Nature.
The contribution of ecological research to education

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We are pleased to present this special section of *Visions for Sustainability* concerning the contribution of ecological research to education within the framework of nature conservation. Our aim is to spark reflection on the new frontiers of environmental education applied to nature conservation. Given the complexity of environmental issues, we believe that it is important to pay special attention to formal, non-formal and informal environmental learning contexts. Examples of places with a strong ecological vocation include natural parks, natural science museums and the many agencies that promote scientific culture dissemination, which offer citizens the opportunity to participate in tailored educational projects. Virtual contexts, such as online resources from organisations that build and disseminate ecological knowledge, can also be effective in broadening the cultural and professional horizons of all those involved in Environmental Education.

The editors, Giuseppe Barbiero and Martin Dodman, conceived this special section as a way to examine how ecological research specifically contributes to Environmental Education – a topic which may be of specific interest to educators and trainers working on ecological and environmental subjects.

The Earth's ecosystems are experiencing high pressures, including habitat change, exploitation, pollution and invasive species, which have been recognized as the most important anthropogenic causes of biodiversity loss (IPBES, 2019). The recent Conference of the Parties (COP 27) of the United Nations Framework Convention on Climate Change (UNFCCC) stressed that current climate plans are insufficient and more ambitious actions are needed.[1] Global

[1] https://www.un.org/en/climatechange/cop27 accessed 22nd November 2022.

climate and regional human pressures, from the tropics to the Antarctic, are jointly causing the erosion of biodiversity (Bergstrom et al., 2021). It is therefore undeniable that nature conservation processes and the diffusion of knowledge about environmental degradation and restoration are crucial.

Nature conservation practices have ancient origins and were regulated internationally as early as 1980, when governments, non-governmental organisations and experts all over the world were involved in drawing up a global conservation document. *World Conservation Strategy. Living Resource Conservation for Sustainable Development* was commissioned by the United Nations Environment Programme (UNEP) together with the World Wildlife Fund (WWF) and prepared by the International Union for Conservation of Nature and Natural Resources (IUCN). In this document, *conservation* is defined as "the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". The purpose of the World Conservation Strategy is described as the achievement of three main objectives: 1. to maintain essential ecological processes and life-support systems; 2. to preserve genetic diversity; 3. to ensure the sustainable utilisation of species and ecosystems (IUCN, 1980). Later, Harrison and Burgess (2000) proposed a definition of nature conservation that refers more specifically to the importance of wilderness: "nature conservation is about ensuring that the widest possible number of habitats and species persist through time". More recently Hambler and Canney (2013) offer a more effective, albeit concise, definition: "conservation is the protection of wildlife from irreversible harm".

Over the years, conservation items have become a mainstream political issue. The publication of *Report of the World Commission on Environment and Development: Our Common Future* (also known as Brundtland Report) in 1987, and the United Nations Conference on Environment and Development (UNCED) (also known as the "Earth Summit"), held in Rio de Janeiro in 1992, are recognized as milestones for the understanding and preservation of natural ecosystems. Since then, conservation has usually been a legal requirement, within a complex and interconnected network of national and international treaties, conventions, statutes, regulations and laws. Within this framework, the Convention on Biological Diversity (CBD, 1992), signed by many governments, is of relevant importance. Here, *biological diversity* is defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other

aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems".[2]

An international organisation that has been working for the past twenty years to provide policy-relevant knowledge to tackle the loss of biodiversity and degradation of ecosystem services is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2012). IPBES builds on previous initiatives carried out in the field of biodiversity, outstanding examples of which include the Global Biodiversity Assessment (GBA, Heywood, 1995) and the Millennium Ecosystem Assessment (MA, Millennium Ecosystem Assessment, 2005). It is an independent intergovernmental body established by various States to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being, and sustainable development.[3]

For many decades, by seeking to achieve nature conservation goals, ecologists and biologists have devoted considerable research efforts to identifying and determining sites that best capture a significant range of diversity (Gaston, 1996). In Italy, for example, on February 16, 2022, the European Commission approved the latest (fifteenth) updated list of Sites of Community Importance (SCIs) for the three biogeographical regions of interest to Italy: Alpine, Continental, and Mediterranean.[4]

However, the complexity of nature conservation processes needs to offer articulated solutions. It is not enough to identify key sites for conserving biodiversity *in situ* (Harrison & Burgess, 2000). There has to be a synergistic space where research findings are interpreted and applied in on-the-ground contexts in ways that acknowledge and integrate with social, political, and economic milieus (Ardoin et al., 2020).

Within this framework, the role of environmental education becomes crucial. The growing body of research foregrounding environmental education and related disciplines such as environmental psychology, the history of ecological thought and behaviour, environmental sociology, etc, "moved away from suggesting a linear path from environmental attitudes to knowledge to action, now emphasising a dynamic, complex ecosystem of relationships that influence

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2 https://www.cbd.int/ accessed 5th January 2023.

3 More details about IPBES and other relevant national and international organisations are reported in Lorenzi & Sangiorgio paper in this special issue.

4 https://www.mite.gov.it/pagina/liste-dei-sic accessed 5th January 2023.

behaviour rather than earlier ideas derived from an information-deficit perspective" (Ardoin et al., 2020).

In this special section we present three original papers that specifically focus on the future of environmental education, exploring new ways of acquiring knowledge and skills by forming partnerships with schools and institutions that promote the dissemination of ecological culture and building multidisciplinary teams.

In the paper titled *"Introducing children in the primary school to the concept of ecosystem services"* Rota N., Canedoli C., Fava M. & Padoa-Schioppa E. focus on the concept of biodiversity conservation and the related concept of ecosystem services as they are understood at school age. The authors highlight the need to encourage greater environmental sensibility compared to the past, in relation to the increasing effects of the environmental crisis. One project discussed in this paper, aimed at developing children's sensitivity to environmental issues, is based on the use of the concept of ecosystem services as a teaching tool in primary school. The authors note a positive change in children's perception of the environment after this project based on ecological content, which could be the starting point for an increased sensitivity of children towards nature and ecosystem services.

In the following paper, titled *"Urban vegetable gardens and composting as tools for primary schools' students understanding of the EU Green Deal"*, Vicente M.M., Leitão R., Quintino V., Pombo P. & Rodrigues A. M. address the importance of ecological knowledge, aimed at nature conservation and the sustainable use of natural resources, in urban design and management practices, also stressing the importance of ecological training for all operators in the field of education. This article offers a contribution to the Green Deal strategies with a pilot project called "Nutrients Boomerang", as part of the environmental education activities of a National Agency for scientific and technological culture in Portugal (Fábrica Ciência Viva). The authors emphasise the importance of making primary school students aware of natural resources depletion and highlight a change in children's behaviour after the project activities, fostering conscientious behaviour in young students towards a more sustainable world.

With their contribution entitled *"Sustainable food consumption in nature conservation processes. Educational considerations",* Bartoccioni F., Lorenzi C. & Sangiorgio F. highlight the connection between nature conservation and food consumption within the educational framework. The subject of an agricultural production that respects natural ecosystems is currently very relevant, as it is being tackled by international agencies such as FAO and IPCC, focusing on the double link

between biodiversity conservation processes and sustainable agriculture in a virtuous circular process. In this context, the adoption of sustainable eating habits, strongly relying on educational processes, is indispensable.

The special section ends with a note by Guida F. & Da Milano C. in memory of Elisabetta Falchetti, a highly influential researcher whose death has left a big hole in the community involved in environmental education and science dissemination.

We wish to deeply thank the authors who have contributed to this section and our special thanks go also to the editors of *Visions for Sustainability* for hosting it. As a further reflection, we would like to draw readers' attention to the importance of encouraging all those working in Environmental Education, especially young researchers in ecology with an interest in educational issues, to solicit more attention to it from all ecological and environmental organisations. Particular emphasis should be placed on the literature reviews because this is a complex and interdisciplinary field of research. In this regard, Gutierrez et al. (2022) report that the literature reviews on Environmental Education, including Sustainability, have seen a marked increase in quantity and scope in recent decades, but still tend to have diverse and somewhat provisional research objectives. Moreover, strengthening the capacity of educators and trainers to become learning facilitators for Education to Sustainable Development (ESD) is one of the priority action areas of the Global Action Programme on ESD. There is an urgent need to build the skills of educators, as well as trainers and other agents of change, in relevant issues related to sustainable development (UNESCO, 2014).

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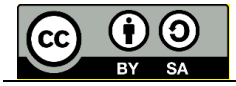

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