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A fundamental question in ecology is how ecosystems function and change in time. Time is the context where all the interactions among abiotic and biotic components of the environment take place. The Long Term Ecological Research (LTER) represents the scientific platform for the analysis of the temporal evolution of the ecosystems over decades in response to local and global stressors.

The present Special Issue entitled "*Italian Long-Term Ecological Research for understanding ecosystem diversity and functioning. Case studies from aquatic, terrestrial and transitional domains*" is the first published collection of studies carried out at LTER-Italy sites addressing the diversity and dynamics of ecosystems in different domains in response to natural and anthropogenic forcing. Research sites considered in the Issue span over a wide altitudinal range, from the mesopelagic ocean (- 800 m) to the high-elevation mountain (2.800 m) and reflect the diversity of the Italian territory and landscapes. The heterogeneity of the research activities included in this volume mirrors the variety of ecological issues that still need to be addressed.

The insights hereby gained contribute to multiple aspects: from the formulation of general laws of ecology to the development of actions to face the Grand Challenges under Global Change at local, regional and planetary levels.

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Edited by Maria Grazia Mazzocchi, Lucilla Capotondi, Michele Freppaz, Antonella Lugliè, Alessandro Campanaro

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