Submitted Abstract

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First Author First Name Last Name	 Cesare (1) Ravazzi
Submitting Author First Name Last Name	 Cesare Ravazzi
Correspondence	cesare.ravazzi@cnr.it
Co-Authors >> E-Mails will be not listed	Bertuletti, Paolo (1); Chiarucci, Alessandro (2); Comolli, Roberto (3); Ferré, Chiara (3); Furlanetto, Giulia (1,3); Morosini, Stefano (4); Perego, Renata (1); Pini, Roberta (1)
Organisations	1: IGAG, National Research Council (I) 2: BiGeA, University of Bologna (I) 3: DISAT, University of Milano Bicocca (I) 4: DOFLLC, University of Bergamo (I)
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Title	What Do The Industrial Revolution And The Ecological Baselines Stepping The Last Millennium Tell Us About The Conservation Strategies Of Mountain Ecosystems?
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Abstract

An increasing array of observations show that the European mountains are experiencing a period of intensified environmental transformation. However, the timing, rate and amplitude of these changes are only partly detectable by monitoring the contemporary ecosystem dynamics. Too many ecological alterations occurred since Medieval permanent settlements, overriding part of the pristine (i.e. pre-Neolithic) ecosystem structure. The industrial revolution transformed practices of mountain land use, and lead to a fast abandonment since the Second World War. Disentangling the effects of these socio-economic processes from the impact of climate change is paramount to conservation strategies.

We suggest that land use changes observed since the Industrial Revolution (i.e. the last 200 years) may provide the tipping point to connect earlier baselines with the contemporary active pressures on mountain ecosystems. This requires focusing the timing, the rate of change, and the mutual interaction between climate and land-use change in the last 1000 years with a decadal to centennial scale resolution. This framework promises support to the development of the NRRP's plans helping the biodiversity and the communities living today in the mountain areas of Europe.

We propose a few ideas to overcome the above-mentioned shortages:

1. Expanding palynology towards microbotany, integrating charcoal analysis of sedimentary and soils

2. Assessing changes in pedogenetic processes degree (e.g. brunification vs. podzolization) resulting from changes in land use

3. Connecting proxy records to their spatially explicit boundary conditions e.g. (i) sedimentary basin processes; (ii) modern ecoclimatic elevational gradients

4. Connecting today's established network of ecological monitoring to the historical record

5. Coupling co-registered abiotic and biotic variables, e.g. organic nutrients, microbotany, dendrochronology, with archivial documents of land-use changes and of climate changes of the last thousand years to meet the requirements of statistical analysis (description, inference and modeling)

The conceptual framework so far discussed will be illustrated by several case studies from the Italian Alps, in the perspective of nature conservation, rewilding, promotion of cultural heritage, and of the sustainable progress of traditional land uses (i) Medieval cultural forest fires eradicating pristine forests; (ii) Late Medieval expansion of the foraging area for pastoralism; (iii) Comparative dynamics of pastures, fertilization, wildlife populations, timberline and glaciers changes; (iiii) Conservation of old-growth larch meadows; (iiiii) ancient drainage and recent warming of peat mires.