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The effects of land use changes on mountainous terraced soil systems of the Dolomites region (northern Italy)

Diana Maria Zilioli, Mohammad Wahsha, and Claudio Bini

Ca' Foscari University of Venice, Department of Environmental Sciences, Venice, Italy (Tel.: + 39 412348918; fax: + 39412348584/E-mail: diana.zilioli@stud.unive.it)

During the last decades, the increasing of man-induced processes and changes in the soil profile and the dichotomy between soil knowledge and land use, have determined intensive soil exploitation. Soil loss by erosion, chemical contamination, acidification and low fertility, are evidence of the human contribution to the Global Soil Change. Although the effects of global soil change are presently little quantified, to understand how and at which intensity soils modified by man react, in tour, with the environment, is of capital importance to predict and quantify the anthropic effects in a short time and to realize effective management of rapidly changing ecosystems.
This research project investigates soils as a target of human-induced landscape changes in a typical terraced mountain area in the Dolomites region (northern Italy). A general soil survey allowed to identify different landform units in terraced soil systems, characterized by different land use. Forty representative soil profiles developed from limestone and under different vegetation cover (mown meadows, abandoned agricultural land, and forest) were opened and sampled for routine analyses. Within the surveyed territory, two study areas were chosen for their representativeness of Dolomites terraced landscape changes. In the selected areas, for each soil profile, soil properties, both physical (soil structure, porosity, texture, root penetration depth, skeleton, water retention) and biochemical (pH, nutrient status, carbonate content, solute translocation, organic matter content and transformation, biological soil quality index) allowed assessment of the remarkable effects of land use change on soils and soilscapes.
Three developing stages were recorded in terraced soils:
• Little degraded soils under permanent meadow (>50 years old): deep umbric horizon, active pedofauna (mostly earthworms), strong crumb structure, good nutrient status. No structural landform degradation, no ecological degradation (INCEPTISOLS);
• Moderately degraded soils under forest (30-50 years old): reduced soil depth, shallow umbric horizon, slowed biological activity; reduced forest floor. No structural landform degradation, moderate ecological degradation, loss of biodiversity (INCEPTISOLS);
• Strongly degraded soils under forest (<50 years old): shallow depth, abundant skeleton, little water retention, reduced biological activity, inconsistent forest floor, strong erosion phenomena. Structural and ecological degradation (ENTISOLS).
Dynamic soil properties, phytosociological surveys and biological observations, proved greatly useful to understand processes involved into environmental transformation mechanisms and to assess possible consequences of land abandonment on soils and the whole environment.