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Global change effects on hydrology and sediment transport in the Ésera river catchment

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Mediterranean river basins, holding around 400 million people, are characterized by high (often extreme) temporal variability in precipitation, and hence discharge. Mediterranean countries are considered sensitive to global change, considered as the combination of climate change (e.g. increase of extreme storm events and by the direct human influence (e.g. changes on land uses). It is widely recognised that global change increases the anthropogenic manipulation of hydrology (e.g. runoff generation). Panels on climate evolution predict future scenarios that combine increasing frequency and magnitude of floods and extended droughts in the Mediterranean basin. Hazards are perhaps most acute in catchments which have suffered drastic land use changes (e.g. urbanization, new agricultural exploitations, deforestation by logging and/or wildfires, reforestation because of agricultural abandonment). Hazards are not just confined to headwater areas (i.e. where the most of the runoff and sediment is generated) but also the middle and low areas (i.e. where the water and sediments are transported and deposited) and the floodplains. Lowlands and floodplains are critical for settlement, food production and industrial development, as well as being important because they support distinctive and important ecosystems. Changes to river flow regimes associated with global change are therefore ushering in a new era, where there is a critical need to evaluate hydro-geomorphological hazard from headwater to lowland areas.
Within this framework, the present work aims to predict and assess the hydro-geomorphological hazards associated with global change in the Mediterranean Ésera river catchment (i.e. 1,600 km2); it transports huge sediment loads, being the responsible together with the Isábena river, of the historical silting of the Barasona reservoir in which they both flow into. The Ésera has also been historically affected by human impacts, as can be, intense gravel extraction, drastic changes on land-uses owing to a reduction of agricultural activities towards the transformation of a more natural landscape by plant re-colonisation (mainly shrubs) and reforestation with conifers of the abandoned fields.