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Assessment of static and dynamic geodiversity in the Sesia Val Grande UNESCO Global Geopark: constraints for a sustainable use of related abiotic ecosystem services

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Geodiversity includes geological, geomorphological, hydrological and soil elements and processes. By analysing geodiversity we can offer static and dynamic views of abiotic landscapes on the Earth. The current state of geodiversity includes both relict, long-term features recalling the past of our planet earth and active landforms and processes whose monitoring is a key for interpreting relationships between geosphere, biosphere and human activities. If the long term geodiversity mainly represents distribution of litho-structural “static” constrains to environmental changes, recent and active environmental features may act as dynamic “proxies” for interpreting climate change.
Aim of this work is to analyse relevant examples of both static and dynamic geodiversity within the territory of the Sesia Val Grande UNESCO Global Geopark (Western Alps, Italy), in order to assess their role as georesources and to highlight possible sustainable use of related abiotic ecosystem services, including geoheritage. Geodiversity assessment has been performed by means of creation of geothematic maps and related factors analysed for better mountain environment understanding and management.
Starting with static geodiversity we collected, analysed and interpreted lithological and structural data in order to obtain information on distribution of georesources in the study area and to create a geothematic map on landscape resistance to erosion.
Thereafter we focused on two aspects related to dynamic geodiversity and their relationships with dramatic changes of the alpine landscape: glacial evolution and fluvial processes. On one hand, valley scale geomorphological evolution has been reconstructed by means of multitemporal data (e.g.: glacial landforms maps, glacier inventories) on evidences in the Sesia Valley. Obtained information crossed with national landslide inventory allowed to identify areas of strong glacial influence on slope stability (deep-seated gravitational slope deformation and landslides due to slope debutressing). Moreover, recent glacier withdrawal results in new glacier lakes increasing the hydrogeodiversity of the area and representing important potential georesources to be used. Finally, recent alluvial event (October 2020) has been considered for its high impact in reshaping fluvial environment and effects on both infrastructures and popular geosites along the Sesia river. Results of this work are useful for the establishment of a proper Driver-Pressure-State-Impact-Response (DPSIR) framework related to environmental issues due to global change in order to

support educational activities and sustainable development of alpine “tourism hubs” included in the Sesia Val Grande UNESCO Global Geopark by the “ArcticHubs” H2020-EU.3.5.1 project.