CLIMATE CHANGE IMPACTS ON INFRASTRUCTURES IN ALPINE AREAS

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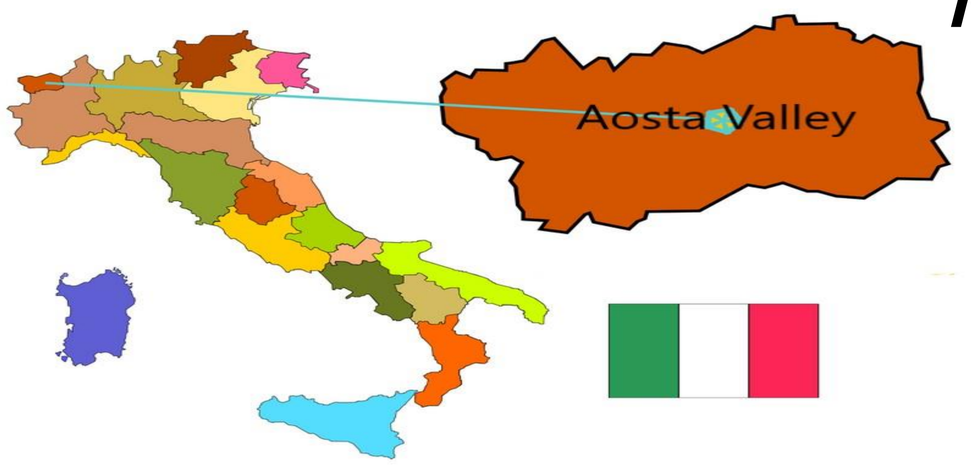
Do you know How can ***adaptation*** strategies help reduce and manage the risks posed by ***climate change*** impacts on geo-structures? What are the potential effects of ***global warming*** on the stability of mountain slopes? How does global warming impact the resilience of ***infrastructural networks***, including waterways, energy networks, dams, road and railway infrastructure?

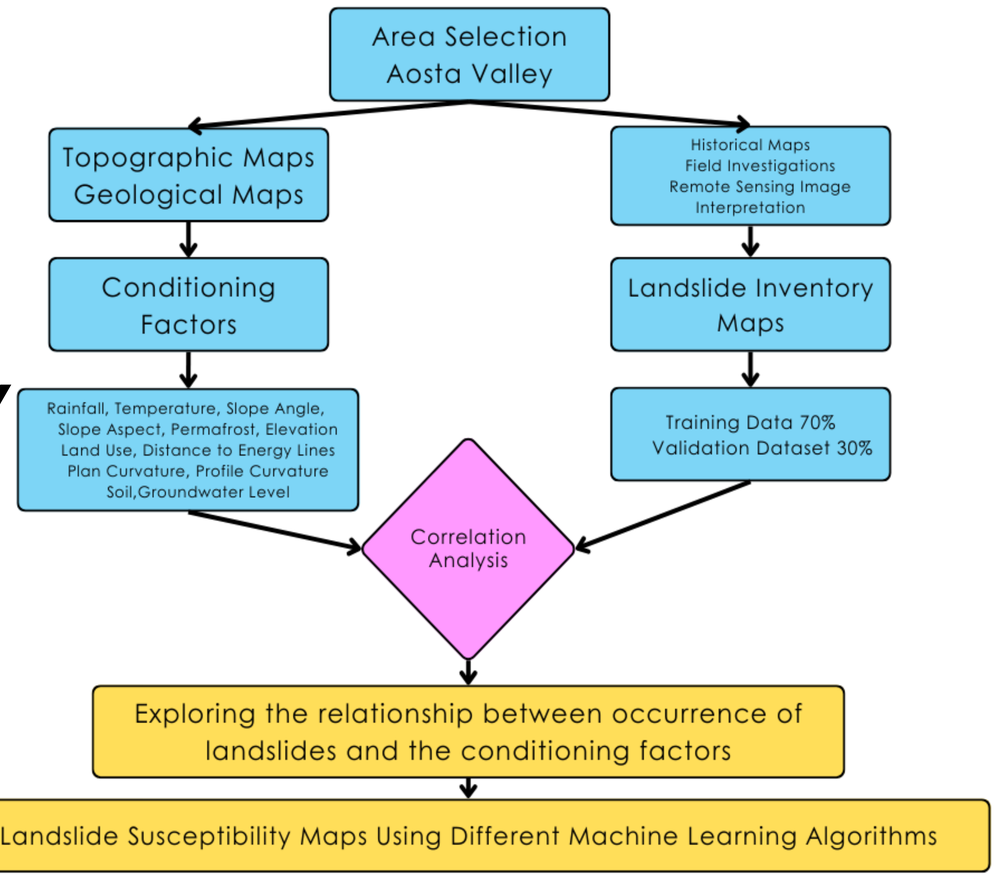
Climate Change and Landslides

Landslide, driven by gravity, involves the downward motion of rock, soil, and organic material. It results in severe damage to ecosystems, property, and human lives. This increased occurrence is attributed to three main factors: urbanization, deforestation, and intensified precipitation linked to ***global climate change.***

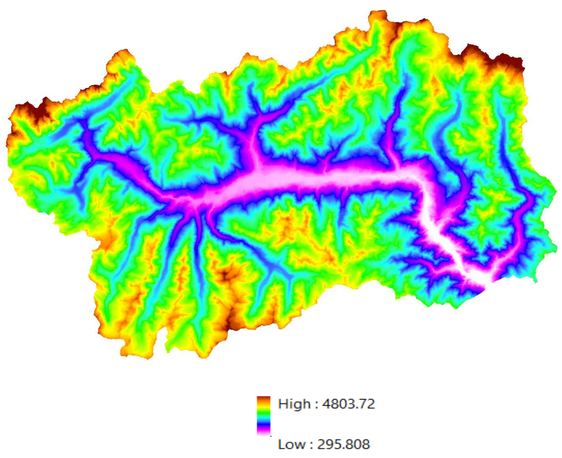
Study Area & Methodology

Aosta Valley is an Alpine region in the Northwest of Italy with a total area of 3263 km2. The altitude ranges from 295 to 4810 m a.s.l., with the mean altitude of 2200 m a.s.l..
Most of the region's surface comprises loose soil and materials, with the remaining portion featuring rocks, glaciers, lakes, and other non-soil elements.

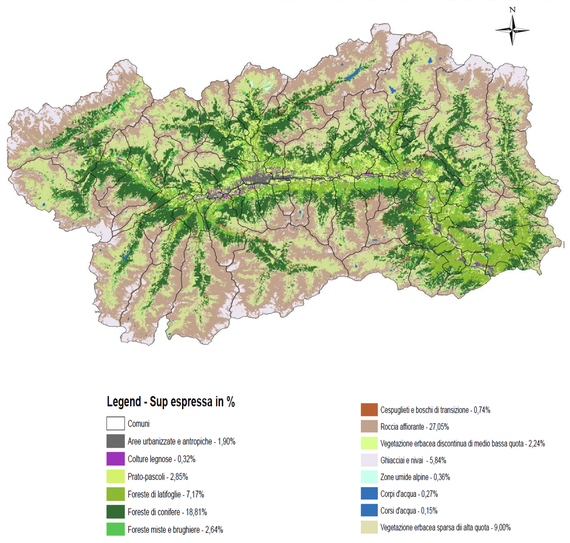




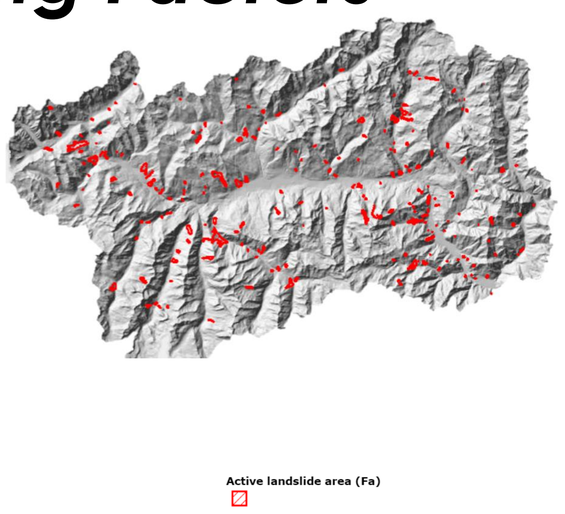
Conditioning Factors



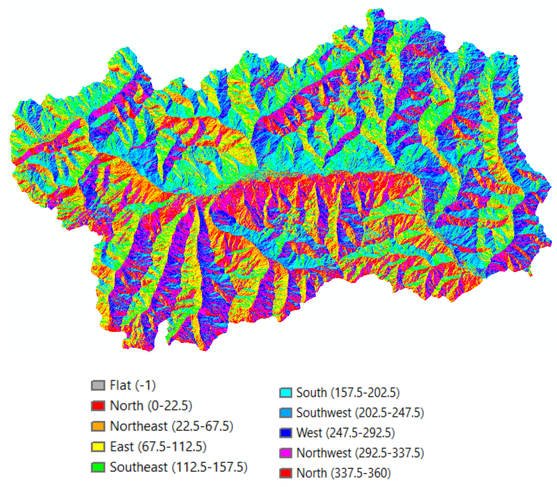
Elevation Map



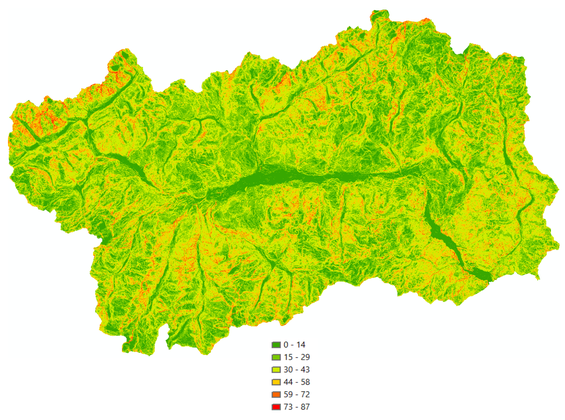
Land Cover



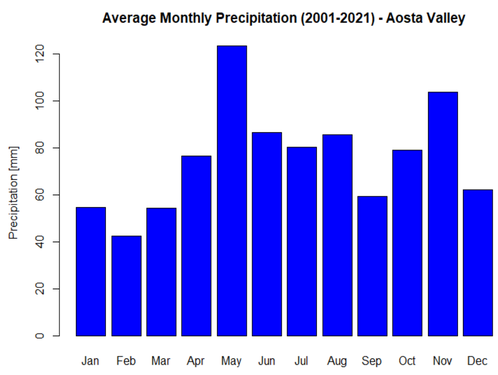
Landslide Inventory



Aspect



Slope



Rainfall

Obviously, ***climatic conditions*** are considered in this study. These data should be obtained not only for historical periods, but also for mid (2050) and far future (2100).

Variable	Mean value	Time scale
Glacial deposits [%]	12.9	Constant
Snow Cover Area [%]	9.6	Daily
Soil moisture (Mean) [%]	33.3	Daily
Soil moisture (Max) [%]	59.0	Daily
Mean freezing level 10 days [m a.s.l.]	3788	Daily

Ponziani et al. 2023

Next Steps

- Obtaining predictive data for precipitation and
- Obtaining predictive and historical data for temperature
- Obtaining changing in ice cover and NDVI(Normalized Difference Vegetation Index) data
- Correlating the data with landslide occurrence with different ML algorithms
- Obtaining landslide hazard map of region

This research investigates the critical role of adaptation in mitigating ***climate change*** risks to geo-structures, emphasizing the need for flexible, multidisciplinary approaches that consider local variations. The research explores how global warming impacts mountain ***slope stability*** and ***infrastructure resilience***, with a goal of identifying 50-year risk scenarios to enhance infrastructure planning and management.

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