A multidisciplinary approach to investigate the geomorphological evolution induced by landslides in the piedmont and coastal sectors of Abruzzo region (Central Italy)

Monia Calista, Valeria Menna, Enrico Miccadei, and Nicola Sciarra
Università G. d’Annunzio; Chieti, Italy (m.calista@unich.it)

According to their structural-geomorphological features, different types of landslides, with variable areal extension, largely affect the Abruzzo region (Central Italy) from the mountains to the coastal areas, contributing to the geomorphological evolution of the landscape.

In this work, we present the results of integrated investigations carried out in recent years in the Abruzzo piedmont and the coastal areas. In detail, we investigated the role of the morphostructural setting, seismic and meteorological factors in the development of piedmont landslides, and the geomorphological evolution, erosion and retreat processes widespread along clastic soft rock coasts of the region.

We investigated Ponzano landslide (Civitella del Tronto, Teramo), a large translational slide-complex landslide, affecting the Miocene–Pliocene pelitic-arenaceous bedrock, and the Castelnuovo landslide (Campli, Teramo) a complex (topple/fall-slide) landslide, which involved conglomerate rocks pertaining to terraced alluvial fan deposits of the Pleistocene superficial deposits. Both these landslides occurred in the NE Abruzzo hilly piedmont in February 2017, causing severe damage and evacuees. Regarding the coastal area, we analyzed rockfalls, topples and translational landslides which characterize the active cliffs of Torre Mucchia, Punta Lunga, Punta Ferruccio (Ortona, CH) and Punta Aderci (Vasto, CH), composed of clayey-sandy-arenaceous-conglomeratic marine sequence (Early-Middle Pleistocene) covered by continental deposits (Late Pleistocene-Holocene). These coastal areas are popular tourist destinations, included in natural reserve areas with high tourism, natural and cultural landscape value.

Through this multidisciplinary approach, the lithological, geomorphological and structural-jointing features were estimated. Focusing on their role on the stability, processes and dynamics affecting Abruzzo piedmont and coastal sectors, it was possible to analyze the triggering factors, the landslide mechanisms and types, as well as the most critical and/or failure areas.

The obtained results outline how field and remote investigations combined with FLAC3D numerical modeling provide an effective approach in the analysis of landslides, strongly improving the identification and prediction of landscape changes and supporting a new geomorphological hazards assessment.