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POST-QUARRY LANDSCAPE. 3D representation and topology alteration as a tool for landscape recovery and secondary raw material procurement in the context of granite quarries.

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At the end of their activity, quarries require environmental recovery in order to ensure a new balance between the quarry site and its physical and ecological context. Moreover, the activities of the ornamental rock extraction produce a large amount of extraction waste which profoundly modify the site's topography in an increasing way as the accumulations are formed progressively during the quarrying process. These wastes can be either recycled as secondary raw materials (e.g., in the context of the ceramic industry) or reused within the quarry site to mould a new topography and a new landscape as a result. Earth sciences and landscape architecture should constitute the disciplinary basis on which to develop the recovery project associated with the supply of secondary raw materials and the environmental improvement of the quarry site. This contribution discusses the case study of the Buddusò granite quarry (northern Sardinia, Italy), where a design methodology based on topology alteration of the site was applied. Through 3D survey and parametric design, it is possible to calculate the waste volumes within the excavation site and estimate how much and in what way the waste material can be recycled and reused. The first phase of the process consists of taking orthophotographic images by drone with subsequent georeferencing through G.P.S. points acquisition. After processing the acquired data, the topography of quarry volumes is recreated in an explorable 3D model. The last phase concerns the design management of the site topology through the application of parametric design tools. The objective is to create an adaptive project based on parameters such as: the balance between excavation and fill volumes; the recycling potential of waste material; the dynamics of water runoff; the ecological and ecosystem site potential; the site accessibility. The presented design methodology can be carried out either in the pre-quarry phase and/or during the quarry's operation, which allows an a priori assessment of what the future landscape will look like as a consequence of quarrying activities and subsequent site recovery. In practical terms, the presented methodology become a preliminary tool for the assessment of landscape evolution scenarios and ensures that the extraction cycle can be completely closed by reintegrating waste volumes into the recovery process.