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Sustamining: Selective and sustainable exploitation of ornamental rocks based on demand, a new approach to ornamental rock exploitation.

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The FP7 project SUSTAMINING marks the beginning of a series of technological development activities for the ornamental rock sector with the aim of understanding the concept of zero impact exploitation that is integrated into the environment. The natural stone extraction sector is seen as outdated and highly polluting, so everyone should join forces to change this image of natural stone extraction and demonstrate that cutting-edge methodologies can be incorporated. These methodologies provide a very precise knowledge of the deposits in order to achieve a targeted resources exploitation with low environmental impact. Along the project the technological support for the sector is developed by research in centers with extensive experience and track record in natural stone, business associations and SMEs. It is necessary to develop a new methodology for selective exploitation according to demand, taking into account the quality of the material at origin, based on the geolocation of the different materials and qualities within the exploited area. This methodology needs to be incorporated into the design and exploitation of new quarries, the transformation of the raw materials based on this knowledge, and quality control through the use of non-destructive geophysical methods. For this purpose, several geophysical techniques have been used: ground-penetrating radar, high resolution electrical tomography, refraction seismic, reflection seismic, and MASW. In addition, data obtained from laboratory tests were used to develop quality indices for three sample materials for ornamental rocks: granite, dolomite and limestone, which are extracted in quarries located in Spain, Turkey and Italy respectively. The resulting approach minimises the production of waste to a maximum and provides a model for rational exploitation in a quarry. Also, this approach will help to increase the operational security in a quarry. The application of geostatistical methods for processing the information obtained from the different investigations has been fundamental to the estimation of reserves. Geostatistics also support an exploitation system that is based on the demand for materials according to the market. The three-dimensional modelling of the different layers of materials and its characteristics as well as the visualisations in 2D and 3D are valuable for the decision making by quarry operators.