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From landfill to water, land and life: The creation of the Centre for stone materials aimed at secondary processing

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ABSTRACT

This paper focuses on the creation of a Centre for the recycling of stone materials. The Centre will be able to offer a range of activities amongst which is the improvement of the production chain of the Orosei Marble district in Sardinia, Italy. Several companies operate within the marble producing area, specializing in both quarrying and stone processing. They have formed a Consortium in order to rehabilitate an area of more than 17 ha. The restoration will be carried out through an environmentally sustainable procedure. The area was previously used as a landfill for waste deriving from marble quarrying and processing. At that time unshaped blocks of various sizes (which are unsuitable to block-cutter sawing), waste deriving from both block sawing and slab/strip cutting (such as broken slabs, strips, tiles) and microfine dust from filter presses of water treatment plants were representing an environmental problem. The local administration was struggling to find new areas which could be used for landfills, resulting in an additional cost for the landfill, ultimately affecting the variable production costs. The project involves the building of a venue to be used for temporary storage, treatment of wastes produced by both quarrying and primary processing, in order to make them suitable as secondary raw materials. The project also deals with the catch basin hydrology of the area involved in the project, the building of a multifunctional centre, the landscaping and other environmental features such as vehicle traffic and slopes greening.

Introduction

The environment, safety and economy of the entire Orosei Marble producing area have been carefully examined and studied in the last 30 years as well as its features, possible usage and the impacts generated by both operating quarries and stone processing plants (Careddu and Siotto, 2011).

The examined area covers a surface of about 200 ha and is located at the foot of *Monte Tuttavista* (Eastern Sardinia) as shown in Figs. 1 and 2. More specifically, the outlying areas around the town of Orosei where quarries and stone processing plants are located, is classified in the current general town-planning scheme as Industrial Zone "D" (Siotto, 2006).

The quarries provide local employment opportunities that support the town's economy. Fifteen quarries and 15 stone processing plants currently operate in the area, employing almost 500 workers (and over a 1000 more if we consider the related activities), over 16% of industry employees (Siotto et al., 2010). Over the last few years its total annual revenue amounted to more than 100 million Euros, and the related activities are estimated to generate at least three times as much.

Monte Tuttavista is composed of Mesozoic limestone and dolostones layers of Jurassic to Cretaceous age. From a lithological standpoint, the term "marble" is really an inaccurate name. Unlike true marble, the "Orosei Marble" is actually an unmetamorphosed sedimentary rock which is classified as a polishable limestone in the stone market. The fossils contained in it are visible to the naked eye.

In over 40 years the intense quarrying, followed by processing of blocks in semi-finished and finished products, resulted in a remarkable production of wastes/scrapes, currently inconveniently stored at a consortium landfill. Fig. 3a and b shows that marble waste and also tyres, tanks or other spare parts of plants and machines were all disposed at the landfill. Moreover, the

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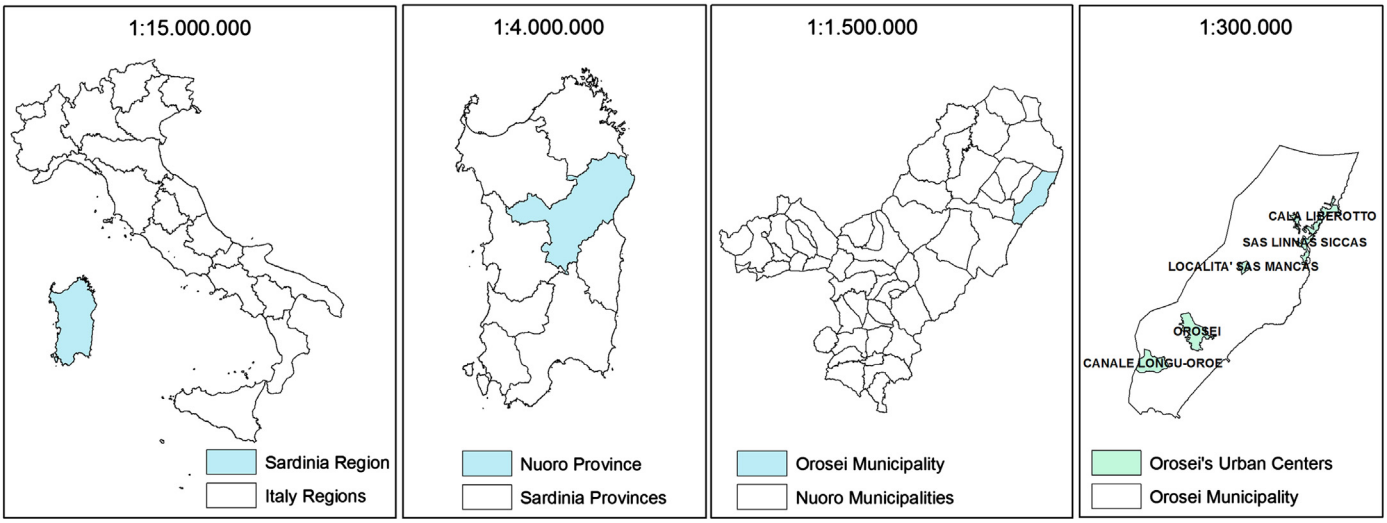

Fig. 1. Orosei geographic location, from Italy to urban centres.

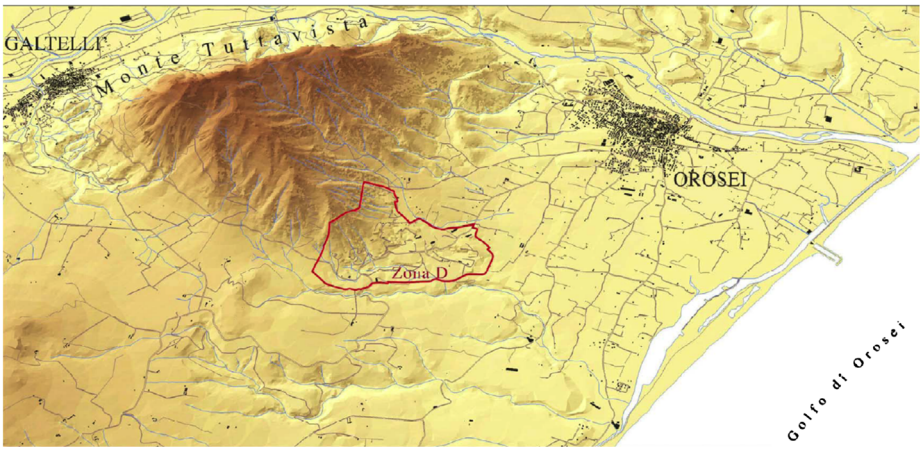

Fig. 2. Perspective view of Orosei Marble producing area. The line delineates the Industrial Zone "D" where quarries and processing plants are located.

Fig. 3. (a and b) Views of the current marble waste landfill in Orosei. Some plants were built on it (Fig. 3a). Other types of waste are disposed in the landfill (Fig. 3b).

hydrology of the area was affected too, with streams covered or dammed by the waste. These practices are no longer compatible with the concept of sustainable development (Siotto et al., 2008).

Therefore, following the "*Raw Materials Initiative*" of the European Union (Commission of the European Communities, 2008), which aims to identify the critical needs for raw materials and strategies supporting the economic development and employment in the EU, the Project of a *Consortium Centre for development and logistics of stone materials for secondary processing* was carried on.

Background

As envisaged in the following paper, the change in the use of the area from landfill to service area for the Consortium (Consorzio Distretto Marmi Orosei, CDMO), aims at the completion of the short production chain via the upgrade and sale of secondary raw materials. This will first reduce and ultimately void the requirements for the area to be used as landfill, resulting in a visible environmental and landscape improvement of Zone "D" where the Industrial District of Orosei is based.