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Inquiries on the liminality in between Raw material extraction sites and urbanized centers. Study case: The quarry in the outskirts of Sofratike

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Abstract
Compared to the rest of the urbanized centers along Drinos valley Sofratikë is a particular case since it stands between a natural system, the historic site of Hadrianopoli, and an agriculture system. The former productive areas in Sofratikë have been one of the main sectors of economic growth during the communism period.
The aftermath following the fall of the communist regime was catastrophic for the most part of the productive areas as they suffered major changes due to the abandonment after the closure of many productive activities. Abandoned for almost 30 years these productive areas suffered uncontrolled exploitation. The quarry sites before the 90-s were built in the outskirts of the urbanized center.
With the fall of the communist regime these productive sites were reactivated by uncontrolled informal urbanization. The opportunities these areas present today are now a main objective for urban requalification. This paper aims to analyze and investigate how these former quarries can be repurposed and regenerated. The paper focuses on the relation between the raw material extractions facilities with urbanized centers on the one hand, and the natural system in which these are contained. This paper also measures the extent of the damage these sites have suffered in terms of their disconnection with the natural system.

Introduction
In the Albanian folk culture, the Gjirokastra and the whole valley of Drinos are closely related to the tradition of stonework. This is also reflected in the technological methods of construction throughout the valley of Drinos, where the local population has managed to better utilize the material that the area itself offers. This has led to the creation of almost all the quarries along the valley of Dropull, which respected the environmental system by not exploiting it exhaustively. With the fall of the communist system, these quarries increased the extraction and processing capacities and the time limits for their exploitation. The quarry of Sofratikë is one of thosse situated in the outskirts of the urbanized area of Sofratikë.

The whole area consists of a natural system combined with other systems such as the agrarian and archeological ones, creating a complex system that can be read in layers. The dominant system of the entire area is the agricultural system, which is also the least utilized considering the agro-economic potentials of the area.

The archeological system consists of the ruins of the ancient Hadrianopoli, a city of the Roman period, and of the cemeteries which were discovered before the ruins of the city. There are supposed to been the Necropolis of the ancient city of Hadrianopoli. In 2005 the Department of Humanist Studies of the University of Macerata and the Albanian Archaeological Institute of Tirana started archaeological research activities in Hadrianopolis (Sofratikë) and in the territory of the Drinos valley, with particular attention to the site of Antigonea also with the purpose of establishing an Archaeological Park.

The Archaeological Park proposal has

been conceived to offer a service-oriented economic policy. It abandons the idea of the exploitation of the area for the extraction of the stone's raw material as an activity that is widespread in the Dropull area. During the 90-s, because of the massive movements of the local population toward Greece, the local population declined. This justifies putting an end to the further use of the Sofratikë quarry. Being close to one another, both Sofratikë and Terihati are considered as one urban conglomerate. Built by the organic form of the terrain, they are integrated into the natural system of the valley of Dropull, becoming an inseparable part of its natural system.

Quarry processes problems

There is a wide range of potential environmental effects caused by quarries that inevitably create negative externalities. Major environmental effects are the destruction of vegetation, disruption of animal habitats, diversion and blockage of natural drainage systems, soil erosion, noise and vibration, and dust pollution. Furthermore, quarries may also damage or destroy sites of scientific, archaeological, and cultural interest, and can negatively affect the local tourism industry. These adverse impacts created by quarrying vary in their frequency and longevity from occasional short-term low-levels of nuisance to daily ever-present disruptions with cumulative or long-term effects and instances of irreparable damage. They have a direct impact on the countryside by leaving pits and heaps of waste material. The extraction processes can also contaminate air and water with sulfur dioxide and other pollutants, putting wildlife and local populations at risk. More careful use of natural resources, including recycling, and also restoration efforts after quarrying can help limit these environmental impacts. This impact has led to most of the world's nations adopting regulations to moderate the negative effects of mining operations.

Some of the environmental disturbances created by quarrying are caused directly by engineering activities during aggregate extraction and processing. The most obvious engineering impact of quarrying is a change in the geomorphology and conversion of land use, with the associated change in visual scene. This major impact may be accompanied by the loss of habitat, noise, dust, vibrations, chemical, erosion and sedimentation of the mined site. Some of the impacts are short lived and most are easy to predict and easy to observe.

Most engineering impacts can be controlled and can be kept at tolerable levels, and restricted by aggregate operation by employing responsible operational practices that use available engineering techniques and technology.

The air pollution resulting from the activities of mining and mining support companies emanates from high airborne particulate matter, noise and vibration resulting from blasting. Large quarry waste tips or quarry fines stockpiles can be a source of airborne dust which can be exacerbated if they are elevated above the original ground level. Dust may also originate from air filtration units or stacks, haulage trucks, conveyors and transfer points. According

to the International Standardization Organization, dust consists of small solid particles that are usually below 75 μm in diameter, which settle out under their own weight, but which may remain suspended for some time. Dust is carried by moving air when there is sufficient energy in the airstream and is removed through gravitational settling washout such as during rainfall or by wetting and through impaction on surfaces. Settled dust can be re-suspended where conditions allow, either by wind blow from bare surfaces or by disturbance such as vehicle movement. Dust particles are dispersed by their suspension and entrainment in airflow. Dispersal is affected by the particle size, shape and density, as well as wind speed and other climatic effects. Smaller dust particles remain airborne for longer periods, dispersing widely and depositing more slowly over a wider area. The chemical effects of dust, either directly on the plant surface or on the soil, are likely to be more important than any other physical effects. Areas of high ecological value or agricultural resources may be more sensitive to dusts than other areas.

From raw material extraction area to an integrated system

Former "Lustrelle" quarry - Comune di Cutrofiano (LE), Italy

The park, which covers about 12 hectares, was built in the late 1990s in a former clay quarry abandoned at the end of the 1970s. During the recovery, 8000 trees were planted along the edges of a gentle slope. Various geological layers of marine origin are exposed in the open pit, some of them extraordinarily rich in fossils. Routes have been traced for visitors, with the intention of transforming the locality into a real tourist-scientific park today called "Fossil Park". The seventeenth-century peasant house that falls within the area and located less than ten meters from the quarry edge became the Malacological Museum of Clay, which contains a collection of fossils of mollusks, even rare ones, recovered in the area during the extraction of the clayey material. Industry scholars have classified the material. The museum is visited every year by thousands of Italian and foreign students and university teachers.

This quarry is located in Piedmont, on the right of the hydric system of the Vermenagna Valley, in a mainly wooded landscape. The present case study offers an example of how environmental recovery increases the biodiversity of the site by reforestation with broad-leaved trees typical of the mountain plain. The animal's presence is mainly characterized by species related to the forest environments of the mountain plain: the stone marten, the weasel, the honey buzzard, the blackcap, the cuckoo.
The goal of this recovery project, in addition to achieving the gradual reintegration of the area into the territorial context, is to increase the degree of biodiversity and the naturalistic value of the site through a 160% increase of the forest area compared to the current state.

Ecological potential of quarries

If properly planned, some phases of the mining activity can offer an active contribution in the conservation of biodiversity.
Studies conducted in France and Germany in mining areas have shown that some species-protected areas that have become rare in these countries find refuge in the new habitats offered by the old extraction sites recovered. An environmental study conducted on 35 massive rock quarries in France, of which half are still active, highlighted that these sites are home to about 50% of the species of birds, reptiles, amphibians and grasshoppers currently identified in the French territory (UNICEM, 2008). At the extraction sites and in the surrounding areas, species protected under the terms of the Birds and Habitats Directives have also been found. Numerous old quarries or opencast mines have been included in Natura 2000 network precisely because they currently host rare and endangered species of community interest. The old quarries can be colonized by protected bird species, for example the Kestrel and the Peregrine falcon. Even in situations where the mineral deposit is located under well-established forest cover, the opening of a quarry can become interesting from the point if it is restored in accordance with the surrounding area.

From the analysis of the problems that have been pointed out, it is obvious that the Sofratikë quarry can't be used anymore as a quarry. This type of arrangement, generally carried out in areas subject to acquisition by public bodies, is increasingly spreading also due to the need to return, at least in part, to the territory the shares of "naturalness" subtracted from human activities. In this context, requalification and creation of green areas are aimed at creating formations of different conformations and specific variability. These interventions, in fact, play a fundamental role in the conservation

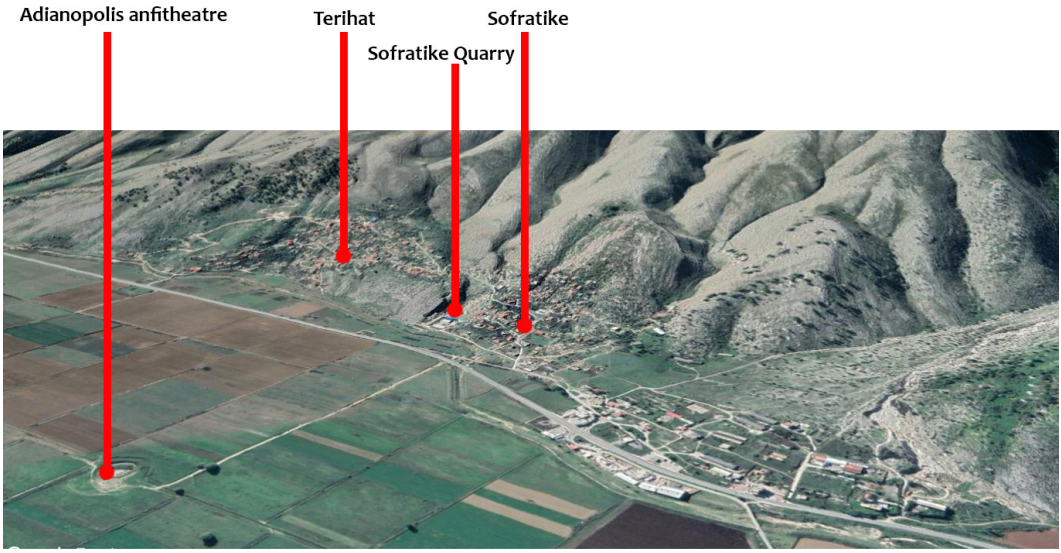

Fig. 1 / Google Earth. Source / the author, 2019

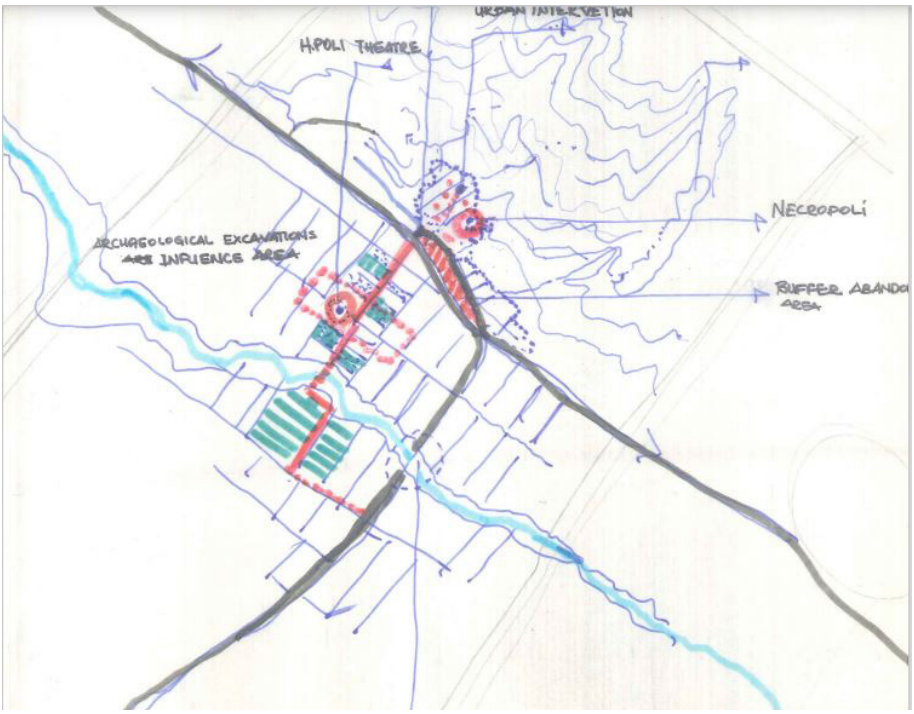

Fig. 2 / Layer System Analisys. Source / B. Nika, E. Petërçi, M. Suppa, 2019

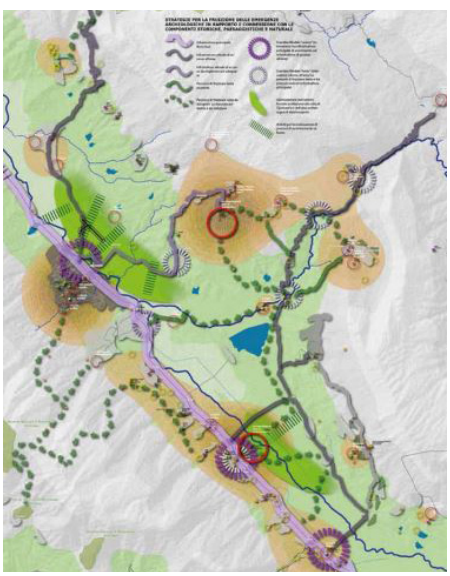

Fig. 3 / Structural framework and strategic plan proposal for the Management Plan of the Archaeological Park of Antigonea-Hadrianopolis and Drino valley. Source / Roberto Perna, 2016.

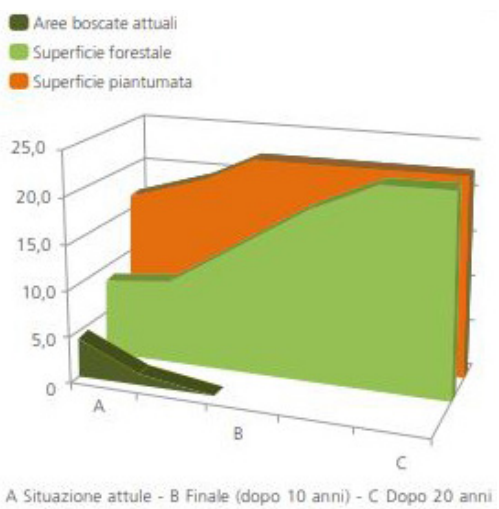

Fig. 4 / Data projection in 30 years. Source / AITEC, 2012

Fig. 5 / Former Lustrelle quarry. Source / AITEC, 2012

Fig. 6 / Lustrelle park. Source / AITEC, 2012

Fig. 7 / Museum of Clay. Source / AITEC, 2012

Fig. 8 / Lustrelle park. Source / AITEC, 2012

Fig. 9 / Piedmont quarry after regeneration. Source / AITEC, 2012

and spread of biological diversity, both as primary places of reproduction and refuge, and as transition corridors for the movement of many animal species in heterogeneous environments.

The main objective of the recovery works is to redesign the structure of the landscape. It is essential that the considerations underlying the design choices to be adopted are supported by an ecological vision. It is therefore evident that these considerations can be based exclusively on the varied and solid knowledge that can only be fielded by environmental specialists.

Conclusions

The recovery of an abandoned quarry area is a complex activity that, by its very nature, requires to be tackled with adequate resources and land use policy. In this case, as in others, man's needs (social, aesthetic, productive) require relatively fast results. The choices that are made at the time of planning are in some way definitive since they presuppose the use of a land that is substantially unchangeable in the medium and even long term. These considerations, added to the intrinsic difficulty of operating in objectively difficult conditions make it essential both in the planning and realization of the works the recourse to the biological and technical competences of which the agronomist is undoubtedly bearer.

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