

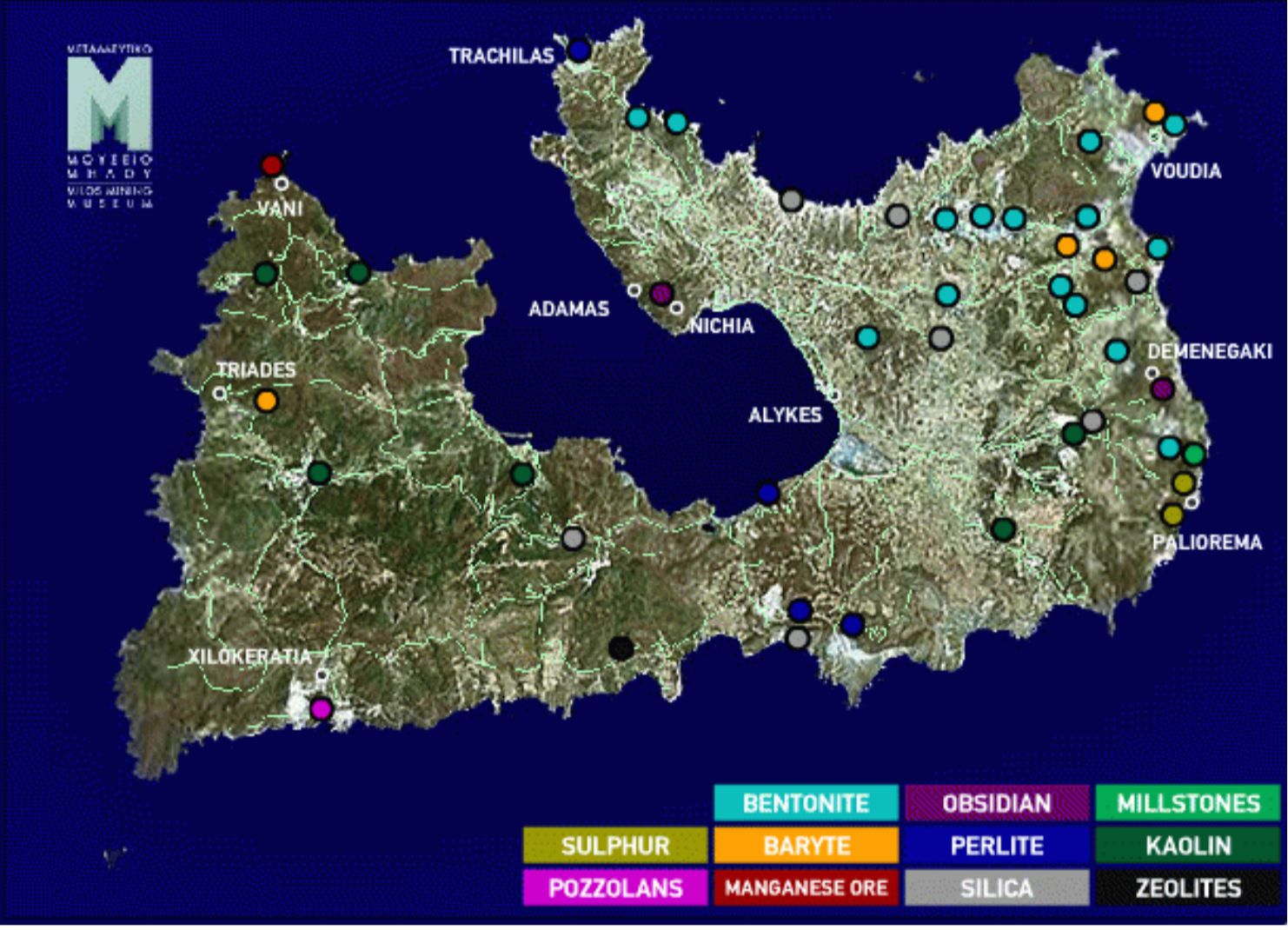
# MILOS, AN ISLAND TWICE AS VULNERABLE?

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## Who are we?

ISF SystExt is a French volunteer organization gathering young professionals from various backgrounds (geology, mining engineering, agronomy, environmental humanities) in order to address the environmental, social and human aspects of mining activities. We went to Milos island as part of a mining trip in Greece in May 2018. The visit of the perlite quarry was made possible thanks to Imerys.

## Economic Vulnerability



Historic and modern Mining Locations (Source: Milos Mining Museum)

As a minerals-rich volcanic island, **Milos has an important mining history** (silver, obsidian, manganese, silver, pozzolan...) since the Prehistory. About one third of the island is dedicated to mining activities.

**Today mostly two minerals are being extracted: perlite and bentonite**, both by the French company Imerys (after buying B&S in 2015). Altogether, Greece is the first producer of perlite in Europe. On this 5000 inhabitants island, the perlite mine represents an important part of the economic activity, as 300 persons work for the mine (5 directly on the mining site). The cost price is 40 €/metric ton, with roughly a 10% margin.

Perlite is used for construction, agriculture and thermic insulation. All of the production is exported, and there is no downstream industrial activity on the island. **Milos' economy is therefore very sensitive to the global market**, as the 2009 crisis revealed. The production was indeed roughly halved since the crisis, going down from 300 000 T/year to 145 000 T/year today. This can be explained mostly by the fact that most of the production was shipped directly to the US (East Coast) and that after the 2009 crisis, transportation cost from the West Coast (Asian market) to the East Coast became cheaper than shipping from Milos. This illustrates that Milos' vulnerability is enhanced by its insular and isolated geographic position, far from the transformation industry hubs.

In addition to this economic vulnerability, inherent to any globalized activity, Milos' economic vulnerability also has two features more specific to an extractive economy:

- ➔ **Resources Depletion:** Perlite reserves in the permit area have been estimated to last, at the current rate of production, for about 30 years. This is enough for Imerys to consider that depletion needs not be addressed, and there is no program or fund to start planning a post-perlite Milos.
- ➔ **Usage conflict with other activities** (tourism industry, agriculture) : the conflict usage is enhanced by the mining sector's major environmental impacts. In addition, the patrimonialization strategy (making the mining history a part of Milos' touristic attractiveness) is coexisting with poor post-mine management.



Perlite Quarry, Milos Island (Photos: SystExt 2018)

## Environmental Vulnerability



Aerial view of the Aggeria mine (bentonite), Milos Island (Photos : SystExt 2018)

Due to its important mining history and the small size of the island (around 160km<sup>2</sup>), the impacts of the mining industry are quite noticeable. However, the different phases of exploitation trough time did not have the same consequences on the local environment. The old mines (from antiquity to 19<sup>th</sup> century) were pretty small, often under ground. Yet, the ancient sulphur mines for example (located on the east of the island) could still cause environmental damages as post-mine management is non-existent, as well as proper impact studies. **In addition, around 20 quarries exploited in the last two centuries are still abandoned and waiting for rehabilitation.**

Today, extraction on Milos follows the global trend and the size of the bentonite and perlite quarries are enormous compared to the size of the island. The deposits' morphology requires large open-pit operations and **the amount of waste produced is substantial** (25% of waste for perlite extraction). Waste are supposed to be used for post-mine management (major part for backfilling), but it is not always the case. The major disturbances related to mining extraction and process as dust's production, noise pollution, explosions, groundwater quality or landscape are quite problematic, due to the proximity of local communities and scarcity of drinkable water, as Milos is not self-sufficient in water (Evangelinos & Oku 2006). Even if the health and environmental impacts of such exploitations seem limited, **few data has been found about the potential impacts of present and past exploitations on the island and its inhabitants.**

**The visual impact is not negligible.** Perlite deposits consist in volcanic domes, that are entirely removed and bentonite deposits are of great extension. Consequently, hills disappear and other, artificial ones, appear. **Except the irreversible damages on landscapes, this can cause microclimatic changes and have consequences on local or indigenous flora** (Evangelinos & Oku 2006). The artificial hills that are erected (in terrace form) present problems of stability, wich can be unsafe in case of seism (several appeared in the last decades), and vegetation is struggling to grow.



From top to bottom: a viewpoint in front of a rehabilitated site ; a viewpoint in front of an artificial hill near to a bentonite mine (Photos: SystExt 2018)

## Patrimonialization strategies vs Post-Mine Management

**Patrimonialization strategies of the mining activity on Milos Island take many forms:** viewpoints, geowalks, educational activities... many of them organized by the Mining Museum, that was inaugurated in 1998. Mining tourism also benefits from a tradition of volcano tourism in the Cyclades (Gaki-Papanastassiou and Papanastassiou 2014).

This contrasts sharply with the **absence of proper post-mine management** for abandoned mining sites. The most paradigmatic example of this is the Paliorema mine in the Theiorychia valley, where sulphur was extracted from 1862 to 1958, most of the production being destined to the French market (to spray on vineyards mainly). After the mine closed, everything was left on site: buildings, engines, galleries... and mining waste and residue under water, a pollution that has yet to be fully assessed. Yet, the Theiorychia site has been declared a historic site by the Greek Ministry of Culture and is now a part of geowalk.

A parallel can be drawn here between this way of promoting geotourism, without addressing the environmental impacts of the mining activity, and the way urban rivers have been covered in formerly industrial cities, as a way to make the cities more attractive for both residents and tourists (eg. Rive-de-Gier). 30 years later, many municipalities want to uncover their rivers, but have to deal with a pollution that has never been addressed before. From this perspective, **patrimonialization strategies of the mining heritage are not a way to decrease environmental and economic vulnerabilities, but simply to postpone their effects.** Drawing attention to this phenomenon could affect what has been called "a social licence to operate" (Evangelinos & Oku 2006) in the Cyclade Islands, in spite of a weak regulation of mining activities.



### References

- Evangelinos, Konstantinos I., Mami Oku. 2006. « Corporate environmental management and regulation of mining operations in the Cyclades, Greece ». *Journal of Cleaner Production*, Improving Environmental, Economic and Ethical Performance in the Mining Industry, 14 (3): 262-70.
- Gaki-Papanastassiou, Kalliopi, Dimitrios Papanastassiou. 2014. « Volcano Tourism in Greece: Two Case Studies of Volcanic Islands ». In *Volcanic Tourist Destinations*, Patricia Erfurt-Cooper eds. 69-87. Berlin, Heidelberg: Springer Berlin Heidelberg. <https://www.milosminingmuseum.com>
- <https://www.mininggreece.com/tag/imerys/>

The abandoned Paliorema sulphur mine, within the Theiorychia valley (Photo: SystExt 2018)

From top to bottom: a viewpoint in front of a bentonite mine ; advertising sign for geowalks ; room inside the Milos Mining Museum (Photos: SystExt 2018)