



Review

Science and legend: Vesuvio's wines

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Abstract: This article is dedicated to the Campania region (South West Italy), a complex region both for environmental and cultural components: in particular, our attention is focused on the volcano, which, by representing its contradictions, becomes its icon. Through an examination of the relationships between the land settings and the geological history of the places, we move on to consider the link between the territory and one of its most symbolic products: on the slopes of Vesuvio, are cultivated those vineyards composing the so-called Lacryma Christi, a wine of ancient history, whose name is a reflection of legends and myths, deeply linked to tradition. Trying to explain the origins of the various elaborations of reality, characterized by resorting to the supernatural, the following pages want to offer a path that allows the observation of social and natural reality from multiple perspectives.

Keywords: Campania region; Vesuvio; wine; landscape; myth; science

1. Introduction

Campania is a land of infinite and intense history. It is inspired and reflected by awesome physiography: it is logical that culture reflects its light and amplifies its shadows, offering us a unique show in the world. The myth is a human elaboration of reality, guided by the visionary that nature itself triggers humans. Volcanoes, their phenomenology, characterize the region in all its complex identities. The wines born from the vines that grow luxuriantly on the slopes of the mountains of fire tell emotions and timeless legends, like that of the Lacryma Christi of Vesuvio. Tasting the drink that Romans already appreciated will accompany us on a sensory and intellectual journey between nature and culture, past and present, reality and myth. From a more concrete point of view, the suggestion evoked allows us to realize how, in Italian culture, the vineyard's cultivation is undoubtedly a social

heritage. The production of wine represents a meaningful activity, which goes beyond a mere economic factor. Any wine has its own natural and cultural landscape, which, in our country, strongly influences how the soil has been used due to its variety of geomorphological and landscape structures. The vineyards are related to the soil more than other types of cultivation [1–3]. The variety of the vineyards is a precious landscape heritage, mainly referring to the profound link between landscape, geomorphology, and terroir. Moreover, they are indicators of the socio-cultural development and environmental protection of an area. The relationships between the components of the landscape and the environment are very close. The interrelations between the cause and effect of the phenomena affecting the physical and biological part of production areas are mutually related. In the study of nature and territory, new and particular attention is currently dedicated to the agricultural structure and cultural settlement; that is recognized as an essential factor for an approach integrated with the territorial analysis. Special attention has been dedicated to Vesuvio Lacryma Christi, a wine born on flanks of the famous Italian volcano Vesuvio, called “a Montagna” (“the Mountain”), that overlooks the Gulf of Napoli, outlining its landscape and history, nature, and culture, reality and myth (Figures 1 and 2).

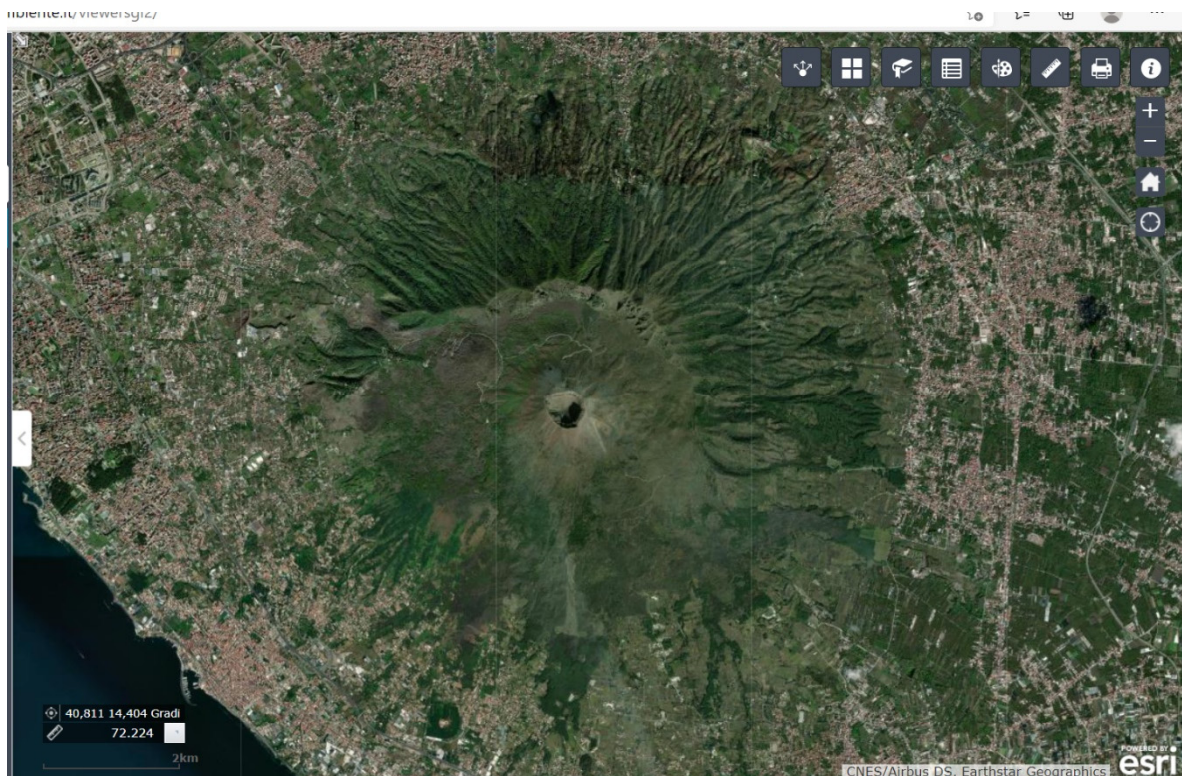


Figure 1. Satellite image of Vesuvio volcano (ISPRA).

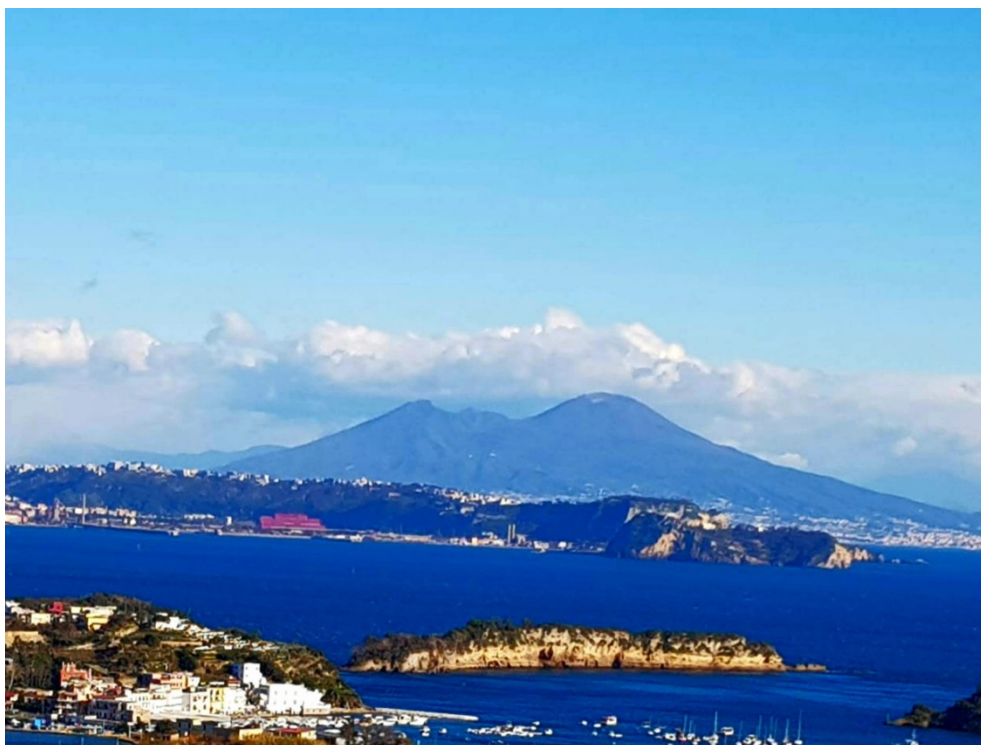


Figure 2. The gulf of Napoli and Vesuvio—M. Somma (photo B. Aligieri).

2. Materials and methods

2.1. *Communicating the territory: unconventional proposals*

The dissemination of scientific knowledge to society is one of the main objectives proposed by the synergy between ISPRA Institute for Environmental Protection and Research, the University of Camerino, and the Geology and Tourism Italian Association. The primary intent aims at raising individual/community/society awareness of the urgent need to protect oneself and the environment in which one lives. All this through a consciousness induced by the understanding of the characteristics of the landscape. Different morphologies strongly influence socio-cultural development. Understanding the physical reasons that determine its evolution helps comprehend the origins of both the resources and dangers, thus managing to guide territorial policies towards sustainable development and civil self-protection, and effective natural risk prevention [4]. In this work, we devote attention to the wine's sharing potential, so loved and known to become an excellent communicative vector.

Communicating the territory and its characteristics through a product of high cultural and economic value, especially in Italian country, has been for some time an extremely active operation, following new dedicated lines to unconventional scientific communication [5]. Effective projects for an oeno-landscape enhancement of the territory must be based on processes of recognition of the nature of places, precisely through the landscape, which is external visualization, integrating geological, geomorphological, geographical, and ecological data [1,2,6–8].

In Italy, the role of wine as a promoting instrument for the landscape through all its territorial, historical, cultural, and emotional aspects was the central theme of Lucilla Gregori's work. With brilliant intuition, she understood the potential of labels on bottles in communicating information on

geology and landscape, related to wine production and geomorphological characteristics to historical-artistic evolution of the area of origin [9]. The role of the label is crucial to attracting the attention of the buyer or connoisseur. The design has a commercial function to capture attention while satisfying the aesthetic canons. Still, it often overlooks the information that could offer the consumer a synthetic but precise overview of the wine—its organoleptic characteristics that makes it unique among many—and the environmental features of the area of origin. Gregori has repeatedly pointed out that while terroir is an ever-present concept, the concepts of “winescapes” [10] coined by her to denote wine landscapes do not yet enjoy appropriate prominence, although deserved.

The wines’ names talk about their origins: a proper design on the label, and precise wording on the back label, should describe the wine, the grape/variety, the landscape, history, and culture in which the wine is born. Combining the sommelier’s organoleptic description with precise and straightforward scientific and cultural messages, cognitive and emotional paths, otherwise completely inaccessible, are opened to the consumer.

2.2. *Wine and its landscapes*

An Aristotelic statement nowadays guides us in approaching Landscape studies: “Shape is synthesis.” These few words encompass multiple significances, so expressing the complexity of landscape analysis. This research line requires a multi-scale and multi-disciplinary approach to integrate all the components of the studied systems [11,12].

The landscape results from interaction among physical, biological, and anthropic phenomena acting in a different spatial-temporal scale [13–15]. From this perspective, both natural and cultural components are in integration, allowing us to reach a systemic vision of the land’s features and function.

The tools “par excellence” in studying the landscape and its evolution are the Geographic Information Systems, which provide a set of integrated information, continuously updatable, and essential to managing geo-environmental and social issues. Integration of data, elaboration of the indexes, multi-scale and multi-thematic analysis, representation of georeferenced information: these are the primary function of GIS. The Italian Association for Geology and Tourism realized an interesting elaboration by representing the wine production areas on thematic maps to highlight the link between vineyard cultivation and geomorphological landscape [15]. Figure 3 represents the Vesuvio volcanic mountain, so classified as Landscape Type (Italian Map of Physiographic Units at scale 1:250.000) [16], and the land use on the volcanic slopes, as from Corine Land Cover [17].

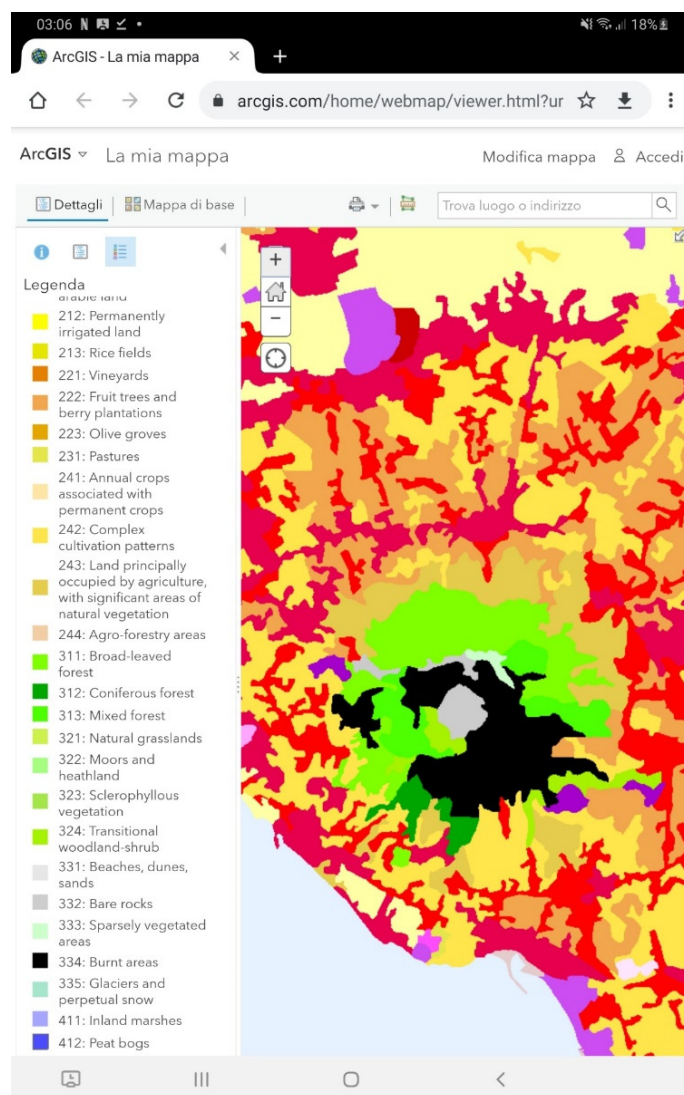


Figure 3. Land use map of the Vesuvian area.

2.3. *Terroir*

It is inevitable to refer to the term “terroir” when Talking about wines and landscapes. This untranslatable word, whose meaning expresses many significances, all about the relationship between the natural and the anthropic configuration characterizing vineyard cultivation/wine production area and their interrelations. The word, coined by Olivier de Serres [18], encompasses more than one meaning, representing the complex systems of soils, bedrock, geomorphological settings, and climatic conditions. A further meaning is based on a geographical perspective: the space terroir, intended as a space vacated to wine-making, strictly linked to the territoriality, intended as a synthesis of environmental and anthropic characteristics [19]. Terroir is, therefore, the sum of all of the environmental factors which make wine a unique agricultural product [6]. Recent studies give “terroir” an additional value in communication, referring marketing potential of the product [20]. Moreover, a concrete interpretation is related to the interaction between terroirs and grapes varieties to manage geographical production potential better [21].

2.4. Volcanic vineyards

The lavas and the tuffs covering the Vesuvio's slopes are made up of tephrites leucitichal, being leucite the main mineral: the related soils are very fruitful. The volcanic soil is "living soil". Referring to Vesuvio, its volcanic soil is highly rich in minerals. There are iron, potassium, phosphorus, and silica, characteristics that make the soil fertile. It is possible to quickly cultivate those vineyards that produce excellent wine exported all over the world. The area today enclosed in the Vesuvio National Park has always been intensely cultivated. Its fertility is attributable to the volcanic rocks and ashes that enrich the soil with elements necessary for the vineyards' proper nourishment [22]. The distribution of minerals and trace elements in volcanic soils derives from the spread of the ashes: their thin dimension allows an easy combination with the soil, thanks to atmospheric agents, so making nourishment readily available to the plants. Another peculiarity of volcanic soils is the immunity to phylloxera, an insect from North America, that from the mid-nineteenth century, exterminated almost all European vineyards. The phylloxera has difficulty taking root in sandy and acid soils, characteristics of the terrains surrounding the craters [23].

3. Science, culture and myth

The ordinary citizen, the man or woman who is not a scientist (and in any case also the latter, projected into an extraordinary moment of the event become like all the others) has an evocative tool to relate disasters, to evoke and exorcise them: the representation. Representing a dramatic event, telling it, favors the distance between events and people. Potential victims of disasters become bystanders, in a safe position: They can observe—maybe enjoy—the show, in which the actors, delegated to the scene, operate the magic of eliminating the threat, symbolically taking the weight off. It is no coincidence that Hans Blumenberg gives the subtitle "Paradigm of a metaphor of existence" to his book "Shipwreck with spectator" [24]. Each strategy of representation is advantageous: at the economical price of a slight emotional activation, anxieties and obsessions are averted. It is also a potential vehicle of knowledge: the observation of reconstruction, of a fiction, facilitates learning, recognition. In general, however, other less didactic and more evasive functions are preferred. Furthermore, in this regard, the element linked to the mystery, to the imponderable, to the unknown, is still today (despite the scientific and technological progress) a significant trend in the representation of catastrophic events, at any level: from disclosure to information, and entertainment. With its load of ineluctability and unfathomability, the mystery removes responsibilities and guilt, muddies the waters, and creates an audience. Even religions, with mystery rites, rituals, celebrations, and sacrifices, can often manage, often instrumentally, the complicated relationship between humans and nature. It is evident that catastrophes have always played a leading role in this complex and articulated game. Moreover, it is so understandable that recourse to myth was almost inevitable on the occasion of exceptional events, in times when science was not yet able to provide explanations. At the same time, it is almost disconcerting to see how even today, in the face of such advanced developments of science, myths and mysteries have not lost their fascinating role and are recalled with ease even on occasions of recognized scientific resonance. It is not absurd if science is not omniscient: we know what, but not always where and how, and rarely when. As in the past, it seems to be quite challenging to rebuild with accuracy what happened. Then it is better a little bit of fantasy, which justifies the confusion and dispels

dissonances. After all, mythology has crossed stainless millennia and still fascinates today: its many tales tell the story of humanity, playing with all kinds of narration, and listening is guaranteed!

Myths are stories with a high degree of stability in their narrative core and with one equally marked marginal variability. The two characteristics make easy the tradition: their stability stimulates us to recognize them in artistic or ritual representations, their modifiability tickles to experiment with new and personal means of presentation. Furthermore, it is the relationship of “theme with variations”, whose attractiveness for composers and listeners is known to us from music. Myths are therefore not like “sacred texts”, where one cannot change, not even one “iota” [25].

A myth is a symbolic configuration, a set of connected elements, characteristic of a human experience: studying myths is a way of questioning the representation that humans have of themselves and their relationship with the world in which they live.

In Greek tragedy, myths and catastrophes are perfectly articulated in an intertwining of unmatched representative strength. In ancient civilizations, the figure of the scientist and that of the narrator often overlapped. After all, the scientist observes and describes, and so far, there we are: it is the stage of interpretation that distinguishes the literatus/scholar from the researcher. The figures are close: both speak to the people and, often, truth and poetry are mixed, without copying too much from each other, giving life to works that fascinate us today as when they were written. And as we have seen, and will see again, it is currently a prevalent practice to mix science and fantasy, literally resorting to the myth as a “sacred narrative”. Here is the point: even if some particular events, the object of scientific observation, almost rightfully become part of the epic, by their nature and culture, an imperative not to betray should be the contrast between mythos and logos. Currently, we almost seem to be witnessing different media an involution trend in scientific disclosure, directly proportional to the flourishing of products dedicated to the genre. Broadcasts with scientific content are widespread and are starting to be transmitted regularly, recording excellent ratings [26].

Humans play their game with nature, for survival (and well-being), for the taste of the challenge, as old as the world. The comparison is also inevitably with themselves, with their own stories. In the collective imagination, the man who faces the sea to find food and other lands has always populated myth, stories, and songs and has been the subject of all artistic expression forms.

3.1. Vesuvio, nature and culture

The landscape context that characterizes the Gulf of Napoli, making it unique in the world, is strongly characterized by the presence of Vesuvio. “A Montagna” as renamed in popular culture, is a volcanic building 1281 m high, located in the southeastern area of Napoli, on the sea. The typology to which the structure refers is that of the so-called “enclosed volcano”. Properly, Vesuvio is the cone inside the caldera formed after the collapse of the southern slope of M. Somma, during the eruption of 79 A.D. [27]. Somma-Vesuvio’s evolutionary history spans over about 25,000 years, in which some different phases are distinguishable (Figure 4).

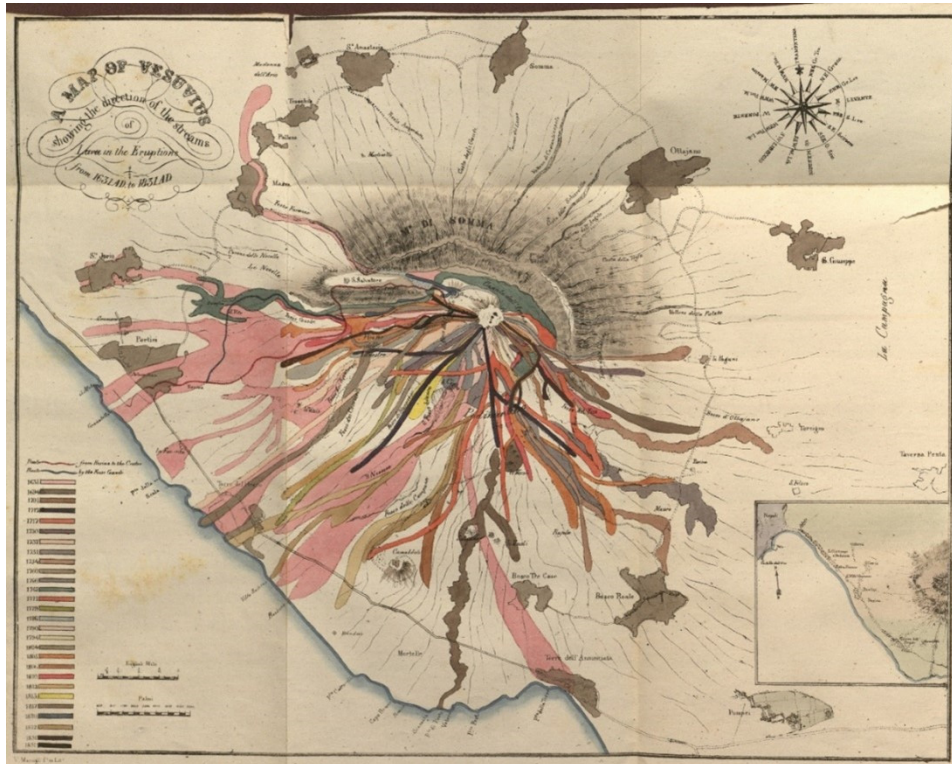


Figure 4. Map of Vesuvio's historical lava flows.

In 5960 BC and 3580 BC, Vesuvio had two eruptions that rank among Europe's terrifying. Large earthquakes have often hit the area. The eruption of 79 A.D., indeed, was preceded by an earthquake in 62 A.D. The famous eruption that destroyed Pompeii occurred in 79 A.D. and was classified "Pliniana", for the testimony of Plinius, the Younger, who witnessed the catastrophic event in which his uncle Plinius the Elder lost his life [22]. Herculaneum was buried under 23 m of ash deposited by a pyroclastic flow. About 5000 people lived in the city at the time of the eruption. Vesuvio erupted about three dozen times since 79 A.D., most recently from 1913 to 1944. It is believed that the eruption of 1913–1944 is the end of an eruptive cycle that began in 1631. The magma comes out with explosions with high viscosity due to the quick release of the gas: the so-called eruptive columns, a mix of solid fragments, and gaseous mixtures incandescent. Pompeii, Stabiae, and Herculaneum were destroyed by pyroclastic flows, which, through different ways and times, destroyed the entire area in which they expanded. The historical times include the eruption of 1631, and the most recent of 1944, so-called terminal, was mixed, both explosive and effusive [27]. Most of the rocks erupted by Vesuvio were Tephritic and Andesitic type (prevalent minerals calcium plagioclase, augite, and nepheline or leucite). Such lavas create explosive eruptions hazardous and difficult to predict.

Damages and losses caused by the eruptions of Vesuvio are historically witnessed dramatically. About 3360 people died in the eruption of 79 A.D. because of flows and ash falls; similarly, the situation was more than 1500 years later when the flows of mud and lava from the eruption of 1631 killed 3500 people.

Studies of past eruptions and their deposits provide volcanologists with tools to model the current danger linked to future eruptions (Figure 5). The population density in some high-risk areas is between 20,000 and 30,000 km²; altogether, about 1 million people live and work in this area, and more than 3

million people could be severely affected by future eruptions. A medium or large-scale eruption can destroy an area with a 7 km radius in the first 15 minutes. The Vesuvian observatory continuously monitors Vesuvio. In a socio-environmental context such as the one described, the risk-resource dualism is represented in its maximum expression: mild climate, strategic position, fertile soil, just under the volcano [28]. The hazard is regularly monitored today; however, it sees a very high exposure of people and infrastructures. The invaluable action of control guarantees the possibility of acting to protect the so-called “exposed value” but, the population density and the characterization of infrastructure, especially viability, create reasonable concern for the institutions responsible for risk prevention and civil protection [29]. In this regard, it is worth mentioning a curious and significant episode, which took place during the 12th European Geo parks Conference, held in Ascea, in the Cilento Park. A famous Japanese volcanologist, a prestigious guest of the event, attended the press conference and, prompted by pressing questions from journalists regarding the risks of the eruption of Vesuvio, admitted that an eruption could be possible in unpredictable times, but not necessarily in the distant future. Perhaps due to translation problems, many international news sources launched extremely alarming news about an imminent major catastrophic event. Even the Professor who chaired the plenary session the following day has been called by colleagues from various countries, concerned about the press’s news. As usual, there are—almost amusing—alterations in the flow of information that, like in the wireless phone game, start from a clearly expressed concept (which implies an awareness of the meaning of danger and risk, going towards a completely different one, through misunderstanding.

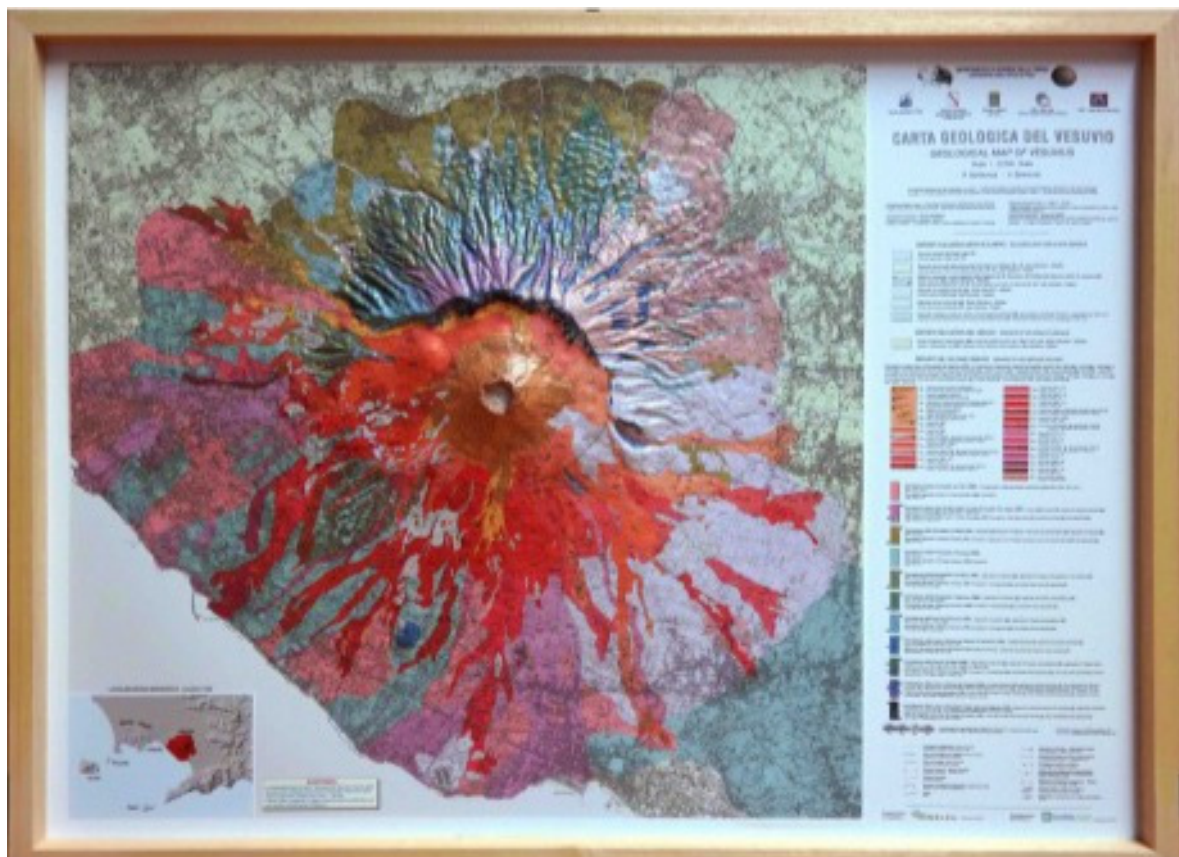


Figure 5. Geologic model of Vesuvio [30].

4. Results and discussion

The coexistence of risk and resources in the Vesuvian area is particularly representative of the complicated environmental value and territorial vulnerability that characterizes our country. The fertile terrain generated by the lava substrate allows the cultivation of the vine in the belt foothills, up to 400 meters above sea level. The vines selected for Lacryma Christi Bianco's realization are: Coda di Volpe (locally known as Caprettone or Crapettone), Verdeca, Falanghina, Greco; the most famous is Lacryma Christi Rosso produced from Piediroso, Sciascinoso (Olivella), and Aglianico grapes.

The chemical-physical environmental conditions give the wines the typical mineral taste and a range of scents that recall the Vesuvian broom in the white wine, while in red, it evokes the aroma of spices red fruits [31]. Their historical, landscape, and production value, also linked to peculiarities organoleptic characteristics of wine produced in these ways, is very high and significant, so much so that some experts have been directed to ask for their candidacy to UNESCO WHS [32]. It is newsworthy to note that these wines are obtained from vines cultivated with "piede franco", that is, a technique used before the invasion of phylloxera, the parasite that spread to Europe in the mid-nineteenth century, attacking the root system of the vines and causing the destruction of 80% of vineyards in Europe (Figure 6).



Figure 6. The so-called "piede franco" vineyards at the foot of the Vesuvio volcano (photo G. Giannella).

However, some types of soil protect the roots from aphid attack, forming a physical barrier to its proliferation. For example, the substrate with high sand content, inconsistent and humus-free, prevents the parasite's movement, as does the soil of volcanic origin, whose lava components give the soil similar physical conditions, contrary to the functionality of phylloxera. Therefore, the "piede franco" vineyards represent a testimony of viticulture techniques preceding the spread of the terrible aphid. However, they are more challenging to manage, precisely because of the geomorphological characteristics of the places of cultivation: this has led to a progressive abandonment that has only recently seen a turnaround in favor of recovery and enhancement of viticulture and its valuable products.

5. Conclusions

5.1. *The myth of Lacryma Christi*

Strabo, in A.D. 18, in “*Rerum Geographicarum*” [32], says: “Mount Vesuvio overlooks these places, surrounded all around by magnificently cultivated fields, except the summit, largely flat, completely sterile, showing an ashy appearance, and cavernous cavities of sooty stones as if devoured by fire, which attests that the mountain at first burned and had a crater which then went out when the igneous material was exhausted. Perhaps this is precisely the cause of the fertility of the surrounding land, like the decomposed ash of Etna in Catania”. These words highlight how Vesuvio has always allowed flourishing agriculture, thanks to the bedrock’s volcanic nature, rich in minerals whose components give the soil a high potential for agriculture. Same as ever was, there are many legends about Vesuvio, by its nature often assimilated to hell (Figure 7). The same for Pulcinella, a character of extreme symbolic value in the Neapolitan tradition, considered a sort of savior of Napoli, sent to Earth by Pluto through a magic egg, placed on the crater of the volcano. On the sacred front, the sources of the time narrate that San Gennaro’s statue, carried on the slopes of the “Montagna”, had miraculously stopped the eruption of 1631. Very suggestive are the stories about the symbolic wine of Vesuvio: *Lacryma Christi*. The best known tells us that Lucifer, after his expulsion from Paradise, had stolen a limb, then left it on Earth to form the Gulf of Napoli, before his fall into hell, which took place in the place where Vesuvio was later formed. The legend, reworked by De Musset, continues by narrating that Jesus’ weeping of pain for the act of Lucifer created a vine that gave life to the most sacred and representative wine of Campania. Another mythological version of the origin of wine speaks of Christ’s tears by noting the inhabitants’ iniquity in the face of the beauty of the Gulf of Napoli. The divine weeping made fertile the land on which some devoted women planted the vines and from which, later, the precious wine was obtained [33]. The most classic of legends is about Jesus, who is quenched by a hermit on the volcano’s slopes, and to thank him transforms the precious water offered to him in an equally loadable wine. On the other hand, history gave us certain information on the origin of the wine-growing activities started and handed down by the Capuchin friars, who populated the *Turris Octava*, which was later called “*Torre del Greco*”. The varied mix between reality and fantasy is hugely representative of *Campania Felix*, a fertile and beautiful geographical area rich in very different landscape typologies [34]. As we know, very often, beauty and fragility go hand in hand. Even, and perhaps above all, in this region, environmental value and territorial fragility make explicit the effects of an often unconscious and tremendously impacting management of places characterized by too delicate natural and socio-environmental balances [35]. However, it is never too late. After the demolition of some eco-monsters, the signs of a renewed attention to natural and cultural territory peculiarities need to be redeveloped in a planning perspective for sustainable development through social involvement in shared dynamics of participatory democracy. We are confident that wine, a formidable witness of culture and landscape, can lead us towards new happiness to Campania, which for too long has not been “*Felix*” (happy).

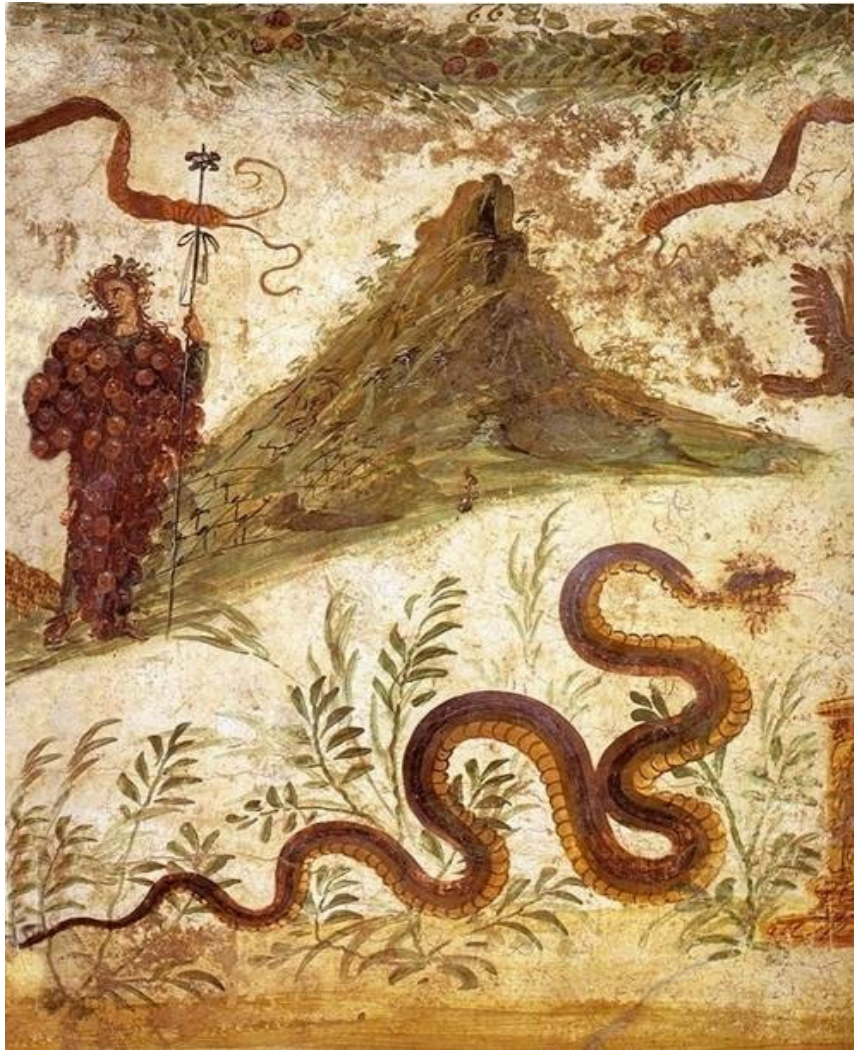


Figure 7. Detail of the Pompeian lararium with Dionysus and Mount Vesuvio, 1st century. A.D. Archaeological Museum of Napoli.

“HAEC IUGA QUAM NYSAE COLLES PLUS BACCHUS AMAVIT”.
 “BACCO LOVED THESE HILLS MORE THAN NISA’S HIS OWN NATIVE ONES”.
 (MARZIALE).

Conflict of interest

All authors declare no conflicts of interest in this paper.

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