



Research article

Uncovering the local foodscapes. Exploring the Etna volcano case study, Italy

Gianni Petino¹ and Donatella Privitera^{2,*}

¹ Department of Political and Social Sciences, University of Catania, via Vittorio Emanuele II 49, 95131 Catania, Italy

² Department of Educational Sciences, University of Catania, via Biblioteca 4, 95124 Catania, Italy

* **Correspondence:** Email: donatella.privitera@unict.it; Tel: 393687857650.

Abstract: The Etna natural and agricultural landscape, located on the island of Sicily in Italy, is known for its stunning views and unique geology. It is also home to a diverse array of plant and animal life, as well as a rich cultural and agricultural history and quality products. Using GIS (Geographic Information System) analysis, it is possible to quantify and evaluate the value of this landscape, providing a better understanding of the value that the Etna landscape provides to the surrounding region. The study highlights the landscape transformations of Etna over the last years to ensure market integration and support sustainable resource management strategies regarding local cultural heritage and environmental sustainability. Detailed knowledge of landscape dynamics is crucial for many applications, from resource management to governance services assessments.

Keywords: landscape planning; GIS; agricultural practices; quality products; Sicily; land use

1. Introduction, methodology and research objectives

When discussing landscape, there is an awareness that this concept is polysemic, constantly changing, and involves multiple disciplinary areas. Therefore, it cannot be treated without taking into account the perceptive, mnemonic, cultural, experiential phenomena of humans and their dynamism. All of these elements involve their identification and representation. Examining the changes in a landscape can help us comprehend how land is being utilized and how the landscape is evolving [1]. In the theme of landscape, the concept of territory but also memory, heritage and cultivation practices

converge when looking at natural and rural landscapes. Rural landscapes are a representative category of landscapes. They are considered by emphasizing the agricultural production function (i.e., of agri-food and agro-industrial products), but are inclusive of and integrate other functions such as protection and enhancement of the historic-artistic, environmental or ecological regulation and production of ecosystem services [2]. Many countries have been able to set their gastronomy as strongly connected to a specific landscape and culture [3]. Admittedly, rural landscapes have been shaped over millennia and represent significant parts of the history, ways of life, recreation, and shared natural heritage of human communities. There is increasing interest in the way landscapes are shaped by the production and consumption of food [4]. Recently there is a return to rural and traditional practices with the aim of recovering past cultures and crops, especially those related to agricultural practices, coupled with more sustainable land management; at the same time, the influence of the speed of information and the extent of technological, cultural (e.g., intensive cultivation), economic and market changes are leading to different and varied food models. As a result, new crops are also being experimented with as a function of increased competitiveness of agricultural production for even unsuitable areas. New identities arise included urban building.

Artisan and quality food, ethics, responsibility, ecological orientation, sustainability of production processes, support for the economy and local businesses are some of the new models that consumers seek by also subjecting their food choices to continuous review and reflection [5]. Consequently, producers also had to adapt to new needs, in line with food systems that require radical transformation if they are to contribute to the Sustainable Development Goals of zero hunger and sustainable communities and cities, as agreed by the 194 countries of the UN General Assembly in 2015 [6].

The paper presents a thorough study of the local foodscapes in the Etna area of Italy, featuring insightful visualizations that aim to understand the characteristics and changes occurring in the rural and natural landscapes. Agriculture, which is fundamental in shaping the landscape, responds to market logic. On the other hand, food experiences can play a crucial role in introducing segments of demand (including foodies) to territorial knowledge, offering essential cues for broader economic development by highlighting the value of changing landscapes [7]. This study analyzes the landscape in terms of both the production of high-quality agricultural products (such as those with a Protected Geographical Indication) and its role in shaping and constructing the landscape. Local people lend authenticity to the foodscape, and the quest for authenticity is considered a crucial micro-trend in the experience economy [8].

Geographic Information Systems (GIS) is a computer-based tool that can be used to visualize, analyze, and understand spatial data and relationships in the natural landscape. It can be used to identify and analyze agricultural changes in the landscape over time [9]. Agricultural changes in the natural landscape can be complex and multifaceted, and GIS can help to understand and analyze these changes by bringing together data from a variety of sources. For example, it can also be used to analyze changes in the types of crops being grown in a particular area, or in the intensity of farming practices, or to study impacts to landscapes of the renewable energy projects [10].

The study area is the Sicilian landscape of the eastern area, in southern Italy, where with the application of a mapping exercise it is possible to highlight interesting results both in terms of agricultural changes already evident (e.g., wine) and innovations still in progress and to be developed (e.g., avocado). Overall, the agricultural value of the Etna landscape is multifaceted and includes both economic and social/cultural considerations. By using GIS tools to analyze data on the types and quantities of crops grown in the area, as well as the economic, social, and cultural importance of agriculture to the region, it is possible to gain a more complete understanding of the value of agriculture in the Etna landscape.

This study utilizes a qualitative research method to analyze the various factors that contribute to the creation of a landscape. Through visual analysis, changes in the study area can be identified. Initially, desk research, a research methodology that involves gathering, selecting, and reprocessing existing information, was conducted [11]. Data was collected through document analysis, including policy documents, reports, local newspapers, and websites. This approach is cost-effective and efficient in terms of time. Additionally, walking has been demonstrated by geographers to play a significant role in highlighting the relationships between human actors and their surrounding environment [12]. This method aided in interpreting the tangible and intangible urban and rural heritage of the local community in the case study analysis [13]. Walking tends to be more spatially focused and generate more place-specific data. Specifically, the study compared the landscape plan created by the Sicilian region in 2004 with the current situation using GIS tools. The results indicate highly dynamic processes in the Etna landscape.

2. Rural Landscape and new aspects: an overview

The landscape itself is not the sum of tangible and intangible elements, but a system of relationships evolved over time and ‘constantly recreated by communities and groups in response to their environment, their interaction with nature and their history’ [14]. Stories about the landscape can provide an appropriate window on human-environment relations [15], and landscape analysis is already as a tool for risk reduction [16].

The character and genealogy of a place are integral to understanding its unique biography. In analyzing the countryside, traditional and modern visions of landscape are synthesized and expressed [17]. At the international level, a shared definition of rural landscapes has yet to be established, though the International Council on Monuments and Sites (2017) defines them as multifunctional resources with cultural meanings attributed to them by people and communities. Rural landscapes are dynamic, living systems that reflect the history, ways of life, and shared heritage of human communities, expanding beyond their predominantly agricultural functions. Traditional food systems have evolved from their relationship with urban dynamics, leading to the emergence of multifunctionality and diversification, which refer to different geographical and spatial settings. The productive function of rural landscapes has been coupled with the functions of territorial preservation and environmental protection, and service functions have acquired socio-cultural and economic importance. The rural space has become a location for multiple activities that enhance natural resources, promote social inclusion, and support disadvantaged communities.

The uniqueness of the agrarian landscape therefore lies in the relationship between the social system and the spatial context. The relationship between the local community of a given area and the resources allocated there has changed; the connection between the landscape and health therefore social welfare has become more evident.

The changes in the landscape are a result of the continuous interaction between social and environmental processes [18]. The landscape is shaped by the people who live there and pass on their actions, which are closely linked to its protection and enhancement, thereby preserving its identity values. As Swanwick states [19], the landscape comprises a system of tangible elements, such as the agricultural landscape with urban and rural buildings, that are connected by intangible relationships, including farmers’ knowledge and community traditions. The focus is on the characterization of the landscape that gives equal weight to its character, ecological character (biodiversity), historic character,

air and water resources, recreational character, and accessibility. This integrated characterization may also consider the economic characteristics of farming and local communities. It is relevant to consider all the key environmental components and not just landscape character. The identity of the landscape is derived from identifying what makes an area distinct, what constitutes its landscape, and what sets it apart from other areas.

Landscape is a dynamic experience that engages our senses, including visual perception. It is internalized through our values, meanings, and engagement, becoming a social product that is built on processes, practices, and cultural discourses [20–22]. The relationship between identity, landscape, and territorial framework contributes to renewing and strengthening the individuality and originality of local culture. From this perspective, local heritage participates in dynamic development paths, preserving identity values while adapting to evolutionary canons. When it comes to rural landscapes, consumer lifestyles can play a role in developing more sustainable foodscapes [23]. Food choices can reflect broader lifestyle choices, so it is important to understand the whole lifestyle context of food experiences, including food tourism. Foodscapes can involve a range of actors and resources working together to provide a place-based context for gastronomic experiences [24].

3. Material and methods

3.1. Natural landscape and volcano Etna

Etna, Europe's highest active volcano (see Figure 1), whose height above sea level is about 3,357 m in 2021, can be considered unique both as a geographical icon and for the anthropic dynamics that characterize it [25,26]. Its eruptive history, among the most documented in the world, for more than 2,700 years has proposed scenarios, territories and landscapes [27,28] that have not left travelers and scholars of all ages indifferent. Etna was already the favored and most described territorial feature by numerous Arab travelers such as al-Zuhri (7th century and Ibn Sa'id (13th century), among others 28 [29]. Equally numerous are the accounts of Grand Tour travelers who, between the eighteenth and nineteenth centuries, chose Southern Europe as far as Malta as cultural and discovery destinations; these include Johann Hermann von Riedesel and his "Journey to Mount Etna" (1767) and Johann Wolfgang von Goethe and his ascent to the Volcano described in his famous "Journey to Italy" (1787) [30]. Not to be forgotten are the many distinguished Italian travelers who devoted special mentions to Etna in their correspondence and within their own works; Edmondo De Amicis and Mario Praz among them.

All this literary production over the centuries allowed the destination to be celebrated in the parlors and at the powerful European courts of the time [31].

It should not be forgotten, however, that in the last 400 years Etna has brought about great changes not only to its own morphology but also to the urban and rural fabrics of the volcanic cone and slopes, along with the visual aspects of the neighboring landscapes. In this regard, of particular note were the eruptions of 1614 (lasting ten years), the eruption of 1651–54, and the eruption of 1669, which had a wide impact on the surrounding area, even affecting the city of Catania. In the 20th century, the eruption of 1928, considered among the most destructive, should be remembered. In fact, as reported in the chronicles of the time, the conducted analyses reported that the magmatic flow flooded and sterilized about 1.6 km² of highly productive agricultural land and severely disrupted communications throughout eastern Sicily, even destroying the urban center of Mascali, eastern slope of the volcano,

whose reconstruction on a new site was necessary [27,28,32]. Numerous eruptions occurred in the 21st century, up to the most recent in November 2022.



Figure 1. A view of the volcano Etna.



Figure 2. Winter snow and hiking and tourism activities on the volcano Etna.

While the eruptive activity has represented and still represents a state of impending permacrisis, it can also be seen as an example of man's ability to coexist with nature and to know how to take advantage of the undeniable benefits related to scenic beauty, soil fertility and consequent uses. In addition, the obvious tourism benefits should not be overlooked, both in terms of the historical, geological and environmental dimensions, as well as sporting activities, such as winter snow and hiking and tourism activities (see Figure 2).

Given its location (37.734 °N, 15.004 °E) and its large total area of about 1,200 square kilometers, it would be wrong not to consider the differences related to the four slopes to which the volcanic cone is usually divided all the way down to the slopes. Considerable differences that affect all levels of reading of the territory, with markedly different paths of development and richness related to proximity to the sea or to large urban centers. While these dynamics of spatial and landscape elaboration have represented opportunities or a brake on local development, they have certainly been a factor of resilience on the part of local communities that have been able to carve out their own economic dynamics and specific spatial configurations [33].

Such socio-economic diversity, coupled with specific and sometimes unique environmental and geological features, its notoriety and scientific importance, and its cultural and educational values, were considered to be of global importance; therefore, in 2013, the site named "Mount Etna" was inscribed on the "World Heritage List".

The Etna Meso Region (EMR), i.e., the territorial area under study, encompasses a vast territory stretching between the two metropolitan areas of Catania and Messina and the former province of Enna, and includes a large number of municipalities, located mainly within the metropolitan area of Catania. As a whole, it represents a complex and polycentric territorial system, characterized both by vital metropolitan functions and by the presence of numerous elements typical of the suburbs [33]. The entire area covers about 3,000 km², has a population of about one million and includes sixty municipalities classified by the National Strategy for Inner Areas NSIA 2021–2027 [34,35] as follows: a pole, namely the city of Catania, four municipalities in the belt area and 55 municipalities in the inner areas; of these, 21 are classified as intermediate municipalities, 23 as peripheral and 11 as ultra-peripheral (see Figure 3).

The long process of human activity on Etna and its surrounding area means that, in addition to being clearly identifiable as a geographic region [36], it is also strongly characterized by the presence of a complex cultural system. The cultural mosaic that has developed possesses both the functional characteristics of agricultural activity and a strong aesthetic connotation that few locals or travelers have been able to resist. This attraction has produced a series of negative effects on the territory, such as the expansion of urban areas beyond legal limits, which has increased since the 1970s due to second homes or the search for a better quality of life by residents of large cities, particularly Catania on the Ionian side of the Southeast, as well as processes of land consumption through the cementing of green areas or areas previously used for agriculture.

The only counteracting phenomena, which have had limited results, can be considered the establishment of the Etna Regional Park in 1987 and the aforementioned UNESCO recognition in 2013. The Park Authority, in addition to its primary function of protecting nature, was also tasked with drafting the "Management Plan" required by UNESCO, which is still being defined, in an attempt to implement a proto-policy of territorial cohesion, also in the making. Apart from governing instruments related to specific spatial functions, it is worth noting that the extent of the EMR and the Park do not coincide, with the latter being smaller than the former.

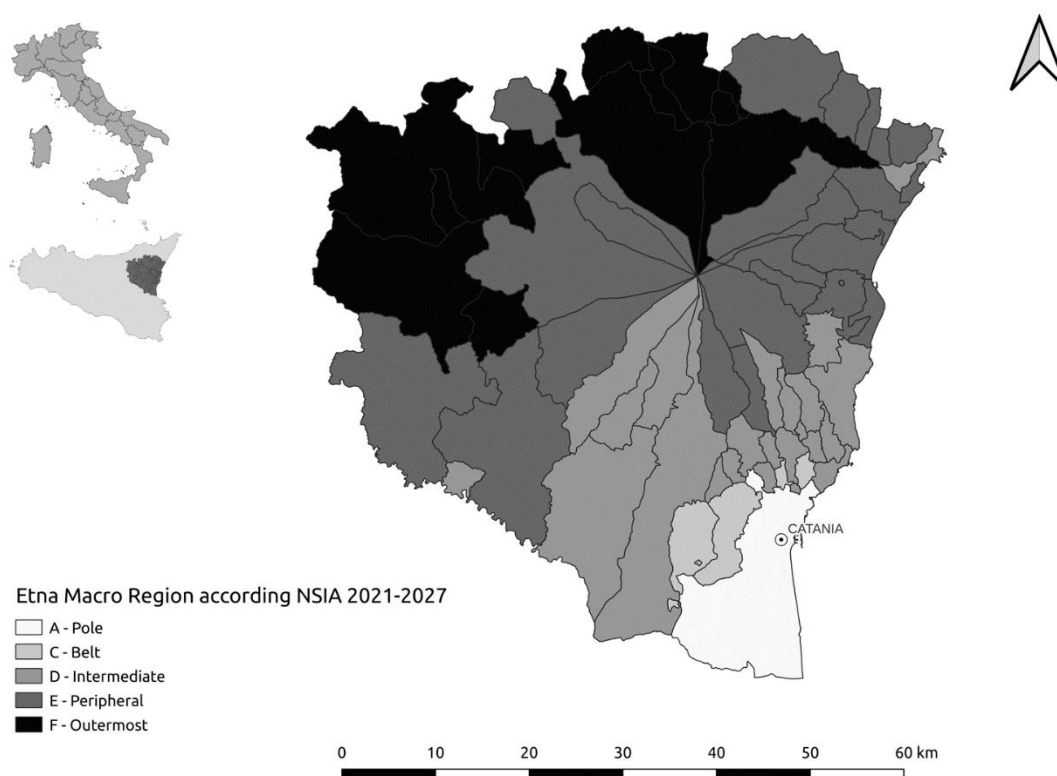
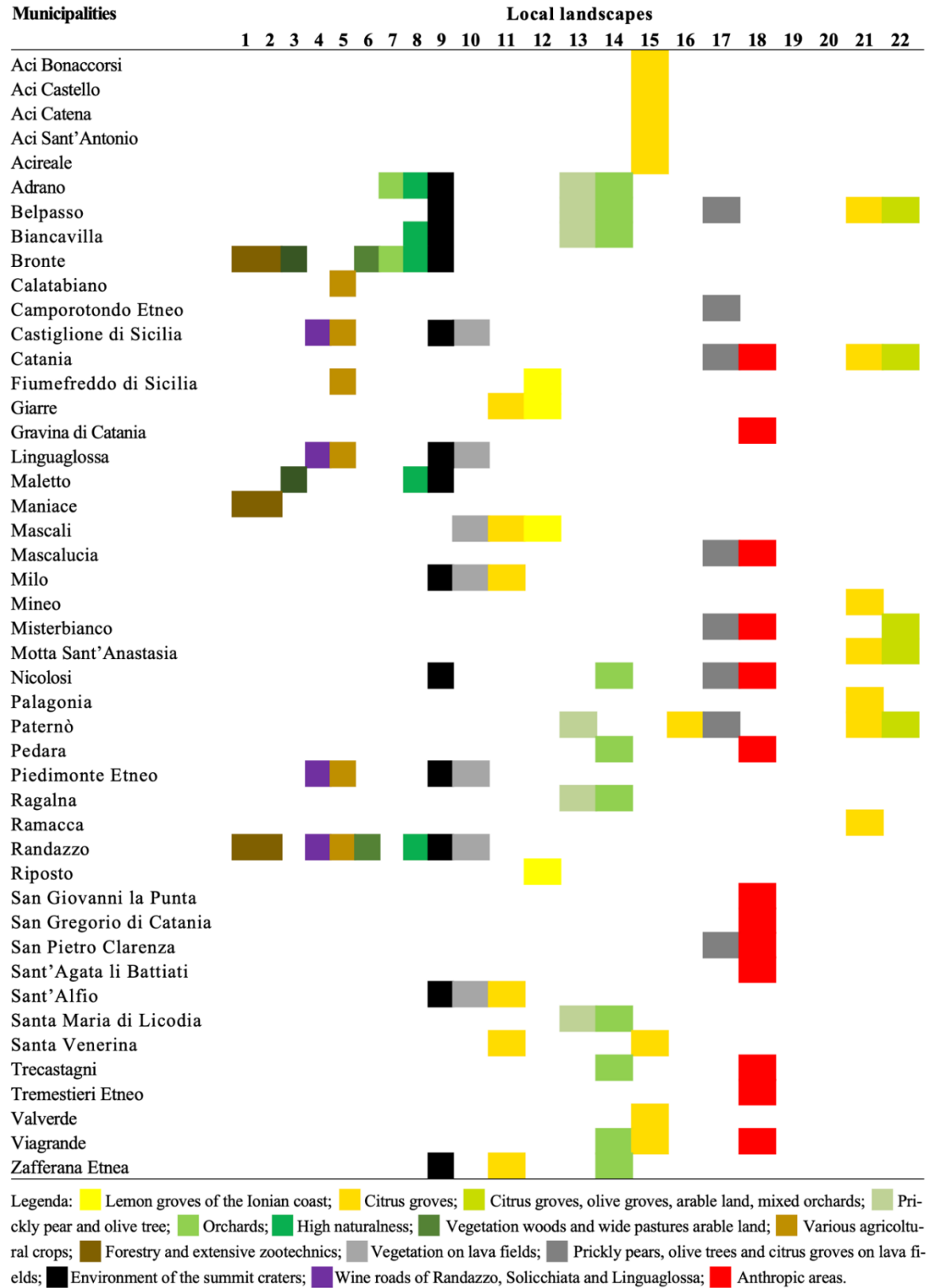


Figure 3. The Etna Meso Region municipalities classification by NSIA 2020.

The prevailing economic activities are related to pharmaceuticals, technology, and agriculture, with the first two coinciding with the expanding urban areas, and the third being more interesting from our point of view as it is among the main contributors to the definition of the landscape as identified and described by the Territorial Landscape Plan (PTP) of the Sicilian Region (Legislative Decree 42/04 as amended). The PTP is identified at the provincial NUTS3 level (for Sicily, these are ex-provinces because they were abolished by Law “Delrio” No. 56 of 2014) and hierarchically divided into landscape areas and local units (local landscapes). In detail, the numerous local landscapes (numbered from 1 to 22), a summary of which is shown through Table 1, fall in the landscape area 13 entitled “Area of the Etnean volcanic cone” and partly in the neighboring areas no. 12 and 14. In particular, mention should be made of “Local Landscape 18” because it is the only one in which the landscape aspect is reported in an almost negative sense because the anthropic component predominates over the natural and agricultural one. Two maps are provided to support this claim: the first (see Figure 4), based on population density, shows the Etna area divided into two parts and highlights the massive concentration of population in the Ionian coastal area; the second (see Figure 5) transforms the numerical population figure into an urban space that expands with a spillover effect up the slopes of the volcanic cone, to which the presence of the Etna Regional Park seems to put a halt.

Table 1. Local landscapes according to the “Piano Territoriale Paesistico” (2004). Source: our elaboration on the Regione Siciliana data [37].



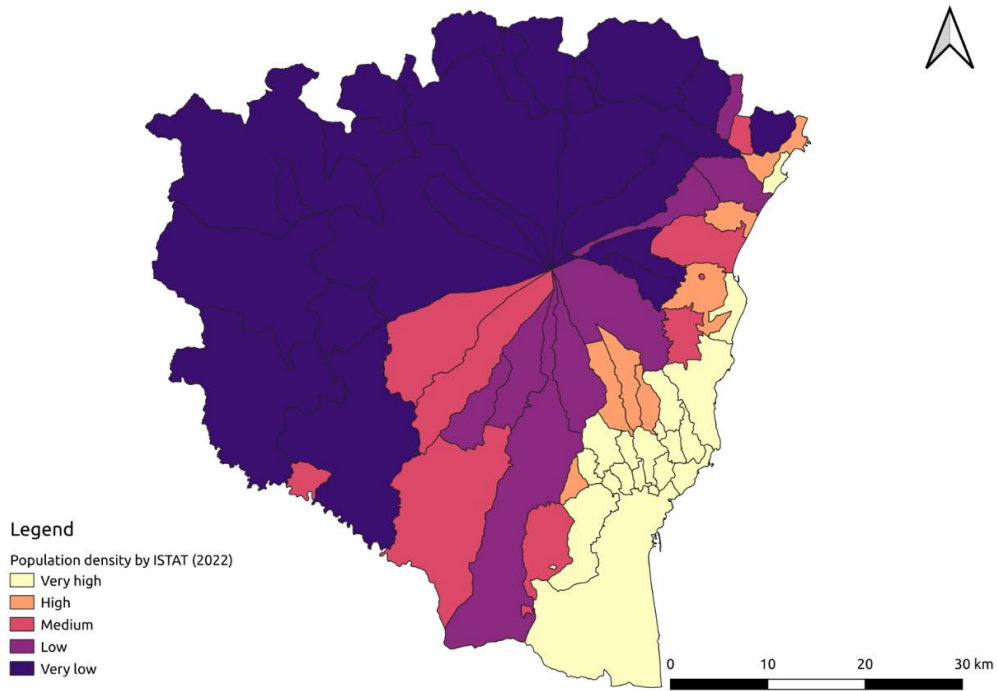


Figure 4. Population density of the municipalities in the Etna Meso Region.

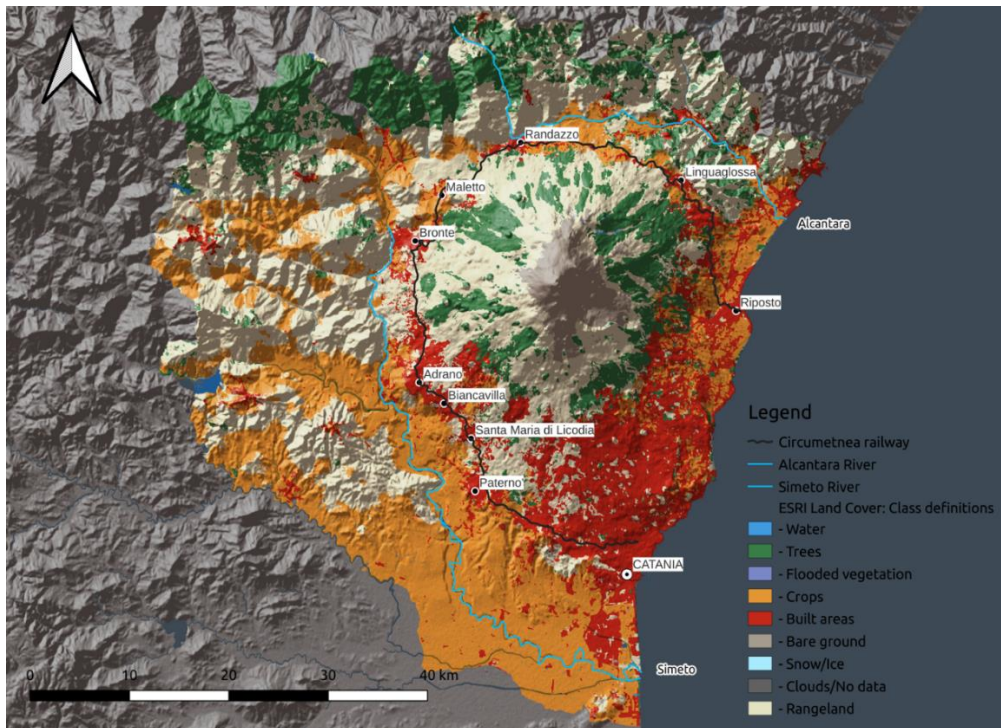


Figure 5. Land cover of the Etna Meso Region according ESRI Land Cover 2021.

4. Results

The use of GIS can aid in comprehending and analyzing changes by amalgamating data from various sources. Comparing the agricultural component of the Etnean landscape as outlined by the PTP

does not offer a complete representation capable of describing its different variations and particularities, particularly in the extensive EMR area. It is also possible to describe and map the so-called agricultural specialties [38] that fall entirely or partially within the territory of the Etna region. These specialties offer a vision based on vital values, including the landscape and more. The term “agricultural specialties” refers to productions that differ from commodities and represent the excellence of territories, which undoubtedly includes Protected Designations of Origin (PDOs), Protected Geographical Indications (PGIs), and Traditional Specialties Guaranteed (TSGs) as identified by EU Regulations 2080/92 and 2081/92 of the MacSharry Reform and their subsequent amendments. These certifications are not just European tools for brand attribution and legal actions in the markets. They have a broader vision that integrates economic, environmental, and social pathways to serve a dual purpose: market orientation and maintaining the specific “typicality” character of territories [39]. The aforementioned certifications produce a landscape with a dual role: functional and aesthetic. It describes the action of man in the territorialization process and evokes images that attract consumption and the consumer, in addition to the territorial component that welcomes the consumer in case he or she decides to visit the places of production of the product.

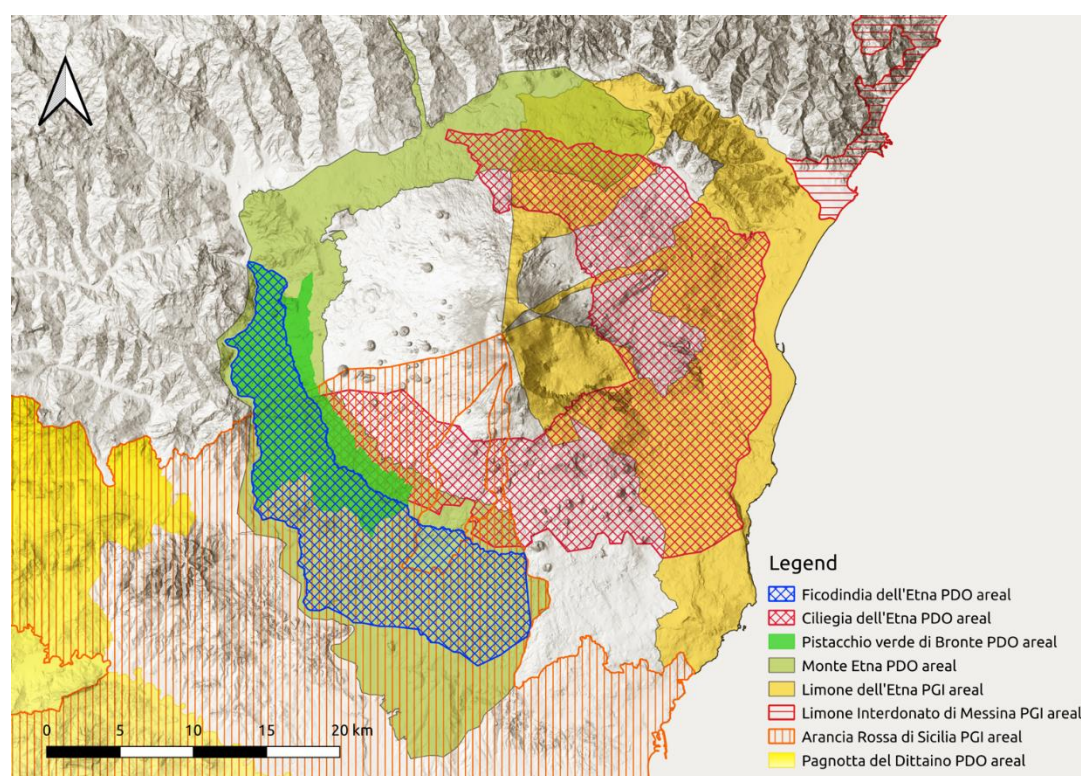
For this reason, it should be emphasized that the landscape component, as well as for PDO and PGI productions, derives its strength from the geographical component, which is probably the only one capable of distinguishing and diversifying products that are similar in appearance and identifying local communities and their territorializing activities. However, when it comes to products with names containing geographical elements, the most significant limitation that deserves attention is the defense of the product’s tangible and intangible peculiarities as the geographical scale increases. This limitation consists of being able to communicate and protect the aforementioned characteristics derived from the place of origin on the supply side. Conversely, on the demand side, i.e., on the consumption side, it consists of being able to have “guaranteed” consumption, which results in well-being and satisfaction. While territorial proximity to places of production allows for immediate and direct verification and validation, as geographic distance tends to increase, these possibilities diminish. In such cases, it is left to European certification and protection “standards” to guarantee the rules of production of protected products and their places of origin. However, outside the European political-administrative bounds, these certifications’ effectiveness and rigor begin to falter in the face of a global competitive environment that is not always within the limits of fair competition. Moreover, there is a proliferation of frauds and imitations that do not spare the internal market dynamics of EU countries themselves [40].

4.1. *The landscape of quality food products*

The official history of geographical indication productions related to the Etna region began in 1996 (as shown in Table 2 and Figure 6) with the recognition by the European Union of two products that are strongly associated with the region: *Pecorino Siciliano PDO*, which covers the entire regional territory (thus not shown on the map), and *Arancia Rossa di Sicilia PGI*, which covers a large territory up to the slopes of the Volcano. The most recent recognition occurred in October 2020, with the *Limone dell’Etna PGI*, which is an important recognition considering the significant presence of citrus crops protected by the PTP of Sicily in at least nine local landscape units (as indicated in Table 1).

Table 2. PDO and PGI product of the Etna Meso Region. Source: Qualigeo 2022 [41].

Name	Category	Typology	Covered municipalities	Date of registration
Arancia Rossa di Sicilia	Fruit	PGI	32	06/21/96
Pecorino Siciliano	Cheese	PDO	391 (all regional territory)	06/21/96
Monte Etna	Oil	PDO	19	08/26/03
Ficodindia dell'Etna	Fruit	PDO	6	08/26/03
Pagnotta del Dittaino	Bread	PDO	17	07/18/09
Limone Interdonato di Messina	Fruit	PGI	19	11/12/09
Pistacchio verde di Bronte	Fruit	PDO	3	01/13/10
Ciliegia dell'Etna	Fruit	PDO	23	12/22/11
Sicilia	Oil	PGI	391 (all regional territory)	09/16/16
Limone dell'Etna	Fruit	PGI	17	10/22/20

**Figure 6.** The Geographical Indication on the Etna Meso Region.

From the perspective of viticulture and wine production, the Etna landscape also holds significant importance in the regional, national, and European contexts. The Etna DOC wine (Figure 7) is one of the oldest to obtain the Designation of Origin (DOC) status, dating back 55 years to 1968. In addition to the traditional *Bianco* (white), *Bianco Superiore* (superior white), *Rosato* (rose), *Rosso* (red), and *Rosso Riserva* (red reserve) varieties, sparkling wine has also been produced since 2011. The Consortium for the Protection of Etna DOC Wines (*Consorzio Tutela Vini Etna DOC*) is responsible for promoting and enhancing the value of the Etna region and its wines. The Etna DOC includes several subzones that reflect the region's diverse characteristics and terroirs. The production area of Etna wines is quite extensive and has a semicircular shape that almost completely surrounds the four slopes of the

volcanic cone. Different climates characterize each slope, resulting in rather diverse organoleptic characteristics. The North slope, with its historical significance, is highly sought after by producers due to its relatively harsh climate and considerable temperature range. It is also characterized by gentle slopes. On the Eastern side, which is more exposed to sea currents and precipitation, viticulture competes with other important crops such as citrus. Finally, the South side, which producers divide into southeast and southwest, has the highest temperatures that lead to more robust and flavorful wines. From a landscape perspective, it is a patchwork of numerous crops of equal value.

The economic value of the Etna area's wine production can potentially be enhanced through tourism development. Wine tourism in the Etna area offers a range of unique and attractive experiences for visitors [42].

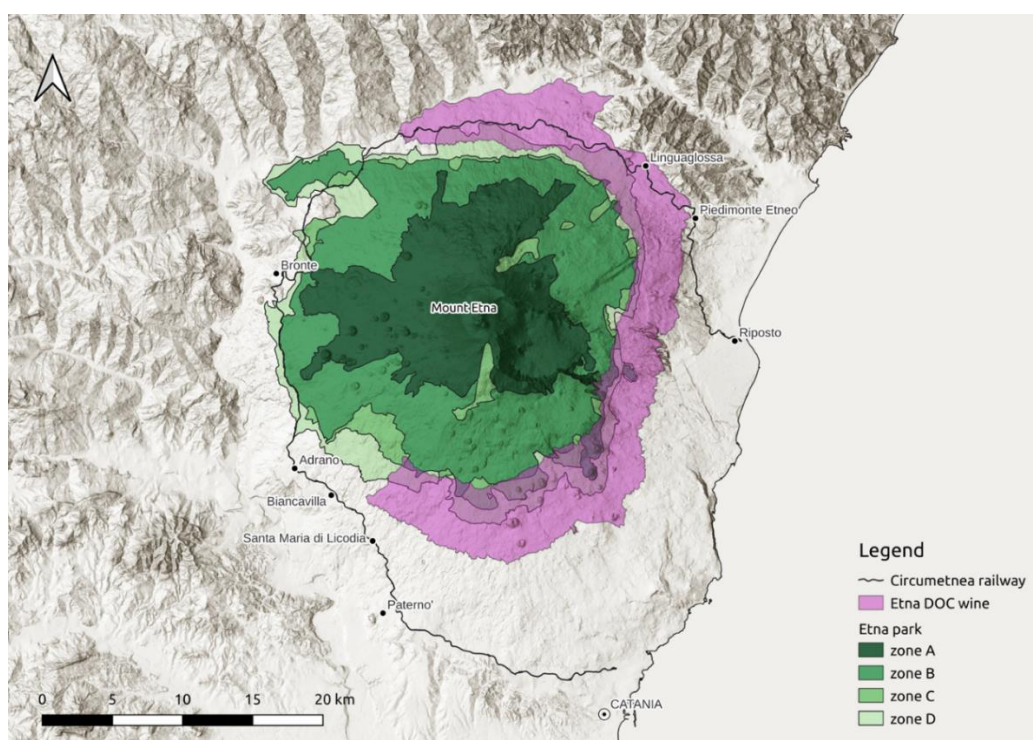


Figure 7. Etna DOC wine area.

5. Discussion

The study provides an important opportunity to advance the understanding of landscape features because agricultural expansion driven by global food demand is not only deeply altering landscapes at the local level but also affecting the forms of life and culture of rural communities. This could be an opportunity for market development but also for the same landscape.

Etna area is renowned for its high-quality agricultural products, which are grown in the fertile volcanic soil that surrounds the volcano. In addition to its agricultural products, the region around Mount Etna is also known for its natural beauty. The mountain itself is a popular tourist destination, with a number of trails and paths leading up to the summit. This area includes the Etna Regional Park, which offers a range of outdoor activities such as hiking, mountain biking, and birdwatching. The local economy around Mount Etna is largely centered on agriculture and tourism, offering a range of activities and experiences for visitors.

However, the shift from the coexistence of a wide variety of products, which used to draw the territory, to the primacy of a few, while involving the transformation and changing the social composition of the communities involved, also pushes towards major transformations of the landscape. One example is wine. Wine represents within the agri-food market not only a valuable product but the one that provides the most income, coupled with tourism. In fact, wine tourism, in which visitors come to the region specifically to learn about and experience the local wine industry, can bring additional revenue to the region, as well as through the tourism industry more broadly (e.g. accommodation, transportation, and restaurants). The process by which wines become typical elements of certain territories contributing to their success, also in tourism, is slow and affected by the expansion of consumption. This mechanism is growing in parallel with the increase in collective welfare and the market, as evidenced by the spread of wine routes in different regions of the country made possible by tourism and the introduction of various quality labels to guarantee the origin of wine products. However, a hyper-specialization of areas [42] and landscape is created. In the case of wine production, this is developed around the cultivation of a very small number of grape varieties, if not a single one, an organization of the territory and its productive (and cultural) activities that immediately refers to the structure of production districts.

The Etna area has a great potential for tourism development that could significantly contribute to its economic value as well as other tourism-related businesses. Many of these businesses focus on showcasing the region's natural beauty and cultural heritage. For instance, visitors can visit local wineries and vineyards to learn about the production process and taste different wines. Additionally, they can participate in wine-making workshops or classes to learn more about the art and science of winemaking. Guided tours of the region are also available for visitors to learn about and taste traditional Etna foods and products. Finally, outdoor activities such as hiking or biking through the beautiful landscapes of the region are also popular among visitors.

When examining the diversity of a landscape's structure, the level of projection is relevant. Agricultural mosaics significantly increase landscape diversity, and this may be overlooked if they are treated as a single entity. Overall, the natural landscape of Mount Etna and the surrounding region is characterized by stunning natural beauty, rich agricultural heritage, and a diverse range of high-quality products. However, the natural landscape of Mount Etna also carries a number of risks and hazards [43] that must be carefully managed and mitigated to ensure the safety of the local community and visitors to the region (e.g., wildfires, landslides, and earthquakes).

The traditional agricultural landscapes often observed are mosaics of small-scale cultivated fields that have resulted from a continuous succession of small-scale arable land and permanent agricultural crops, including vineyards and tall orchards. These are sometimes interspersed with "ski slopes" and, on some slopes of the Volcano, increasingly with the ever-expanding urban fabric. However, these dynamics are at odds with what traditional agricultural landscapes should be, that is, landscapes in which sustainable traditional agricultural practices are currently implemented and biological diversity is conserved [44]. Other risks are related to processes of land abandonment, which is a phenomenon that is also related to the small size and low intensity of farms [45], structural characteristics observable in most of Etna's productive farms. Scholars have demonstrated that an opportunity for the development of renewable energy exists, but it would require a holistic approach that combines measures to exploit the advantages and positive aspects of each technology with measures to mitigate their negative impacts on the landscape [46].

In addition to the landscape, a decisive element in the construction of local identity and cultural

heritage (as defined by UNESCO and the European Landscape Convention), risks becoming a hostage to the product. It is obliged to assume and maintain the characteristics for which it has been identified and known to offer itself to the market without the risk of losing the position obtained.

6. Conclusions

The landscape plays a strategic role in the development of intervention policies because it is the physical manifestation of the interactions between natural and human systems. This includes, the way that land is used, the types of products and other natural features present, and the infrastructure and human settlements that exist within it. By understanding the unique characteristics of a landscape, policymakers can tailor interventions and policies to address specific challenges and opportunities within that environment.

This study could help to include initiatives to requalify territories, such as the creation of green spaces, or efforts to promote sustainable and high-quality agricultural production. Therefore, understanding and managing landscape change, policymakers can work to create more livable, healthy, and resilient communities; which can be especially important for the long-term sustainability and success of the food production industry in the Etna area.

At the same time, understanding and tracking changes in the landscape can be important for producers of quality food products in the Etna area for several reasons. For example: changes in the landscape can affect the availability and quality of natural resources such as water and soil, which are essential for agriculture. Land use changes, such as the conversion of agricultural land to urban or industrial use, can affect the availability of land for farming. Changes in the landscape can also affect the appearance and character of the region, which can, consequently, have an impact on tourism and, the overall economic viability of the area.

The study is limited to the analysis of the local foodscapes in the area of Etna, Italy. Future studies should analyze and investigate both the breadth and depth of conflicts and transformations in the local context. In this area, conflicts can arise due to competing interests of various stakeholders, including developers, environmentalists, and local communities. In fact, the area encourages a model of territorial development that supports farms through an increase in agricultural production with virtuous cultivation practices and the protection of biodiversity. It is a protected area that is home to a wide variety of flora and fauna, including endemic species unique to the region.

Future studies should also analyze the role of agricultural changes that are already evident, such as the cultivation of mangoes and avocados, categorized as major tropical fruits grown for local consumption, export, and a source of income for the growers. In fact, these ongoing innovations have implications for the relationships between place and landscape identity, as well as different market values.

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Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

All authors declare no conflicts of interest.

References

1. Dimopoulos T, Kizos T (2020) Mapping change in the agricultural landscape of Lemnos. *Landscape Urban Plan* 203: 103894. <https://doi.org/10.1016/j.landurbplan.2020.103894>
2. Janssen J, Luiten E, Renes H, et al. (2017) Heritage as sector, factor and vector: Conceptualizing the shifting relationship between heritage management and spatial planning. *Eur Plan Stud* 25: 1654–1672. <https://doi.org/10.1080/09654313.2017.1329410>
3. Miocevic D, Mikulic J (2023) Expatriate adjustment and engagement with host country gastronomy: investigating the role of identity projects. *J Hosp Tour Res* 47: 691–713. <https://doi.org/10.1177/10963480211014933>
4. Roe M (2016) Editorial: food and landscape. *Landscape Res* 41: 709–713. <https://doi.org/10.1080/01426397.2016.1226016>
5. OCSE, Rebuilding tourism for the future: COVID-19 policy response and recovery. 2020. Available from: <https://www.oecd.org/coronavirus/policy-responses/rebuilding-tourism-for-the-future-covid-19-policy-responses-and-recovery-bced9859/>.
6. United Nation, Transforming our world: the 2030 Agenda for sustainable development. 2015. Available from: <https://sdgs.un.org/2030agenda>.
7. Luger FR, Aldighieri B, Farabollini P, et al. (2022) Territorial knowledge and cartographic evolution. *AIMS Geosci* 8: 452–466. <https://doi.org/10.3934/geosci.2022025>
8. Yeoman I, McMahon-Beattie U (2019) The experience economy: Micro trends. *J Tourism Futures* 5: 114–119. <https://doi.org/10.1108/JTF-05-2019-0042>
9. Nijhuis S (2019) Mapping the Evolution of Designed Landscapes with GIS. Stourhead Landscape Garden as an Example. In: Coomans T, Cattoor B, De Jonge K, Eds., *Mapping Landscapes in Transformation. Multidisciplinary Methods for Historical Analysis*, Leuven: Leuven University Press, 95–129. <https://doi.org/10.11116/9789461662835>
10. Sargentis GF, Siamparina P, Sakki GK, et al. (2021) Agricultural land or photovoltaic parks? The water-energy-food nexus and land development perspectives in the thessaly plain, Greece. *Sustainability* 13: 8935. <https://doi.org/10.3390/su13168935>
11. Bryman A, Bell E (2011) *Business Research Methods*. 3rd Edition. Oxford: Oxford University Press.
12. Evans J, Jones P (2011), The walking interview: Methodology, mobility and place. *Appl Geogr* 31: 849–858. <https://doi.org/10.1016/j.apgeog.2010.09.005>
13. Yin RK (2017) *Case study research and applications: Design and methods*, London: SAGE Publications.

14. Scazzosi L (2018) Rural Landscape as Heritage: Reasons for and Implications of Principles Concerning Rural Landscapes as Heritage ICOMOS-IFLA 2017. *Built Heritage* 2: 39–52. <https://doi.org/10.1186/BF03545709>
15. Davis DK (2011) Reading landscapes and telling stories. Geography, the humanities and environmental history. In: Daniels S, Eds., *Envisioning landscapes, making worlds. Geography and the humanities*, London: Routledge, 170–187.
16. Luger FR, Farabollini P, Luger L (2019) Landscape analysis as a tool for risk reduction. *AIMS Geosci* 5: 617–630. <https://doi.org/10.3934/geosci.2019.3.617>
17. Paniagua A (2021) Countryside, landscape and heritage in (new) historical Geography: Some considerations in the current geographical tendencies. *AIMS Geosci* 7: 291–299. <https://doi.org/10.3934/geosci.2021017>
18. Council of Europe, European Landscape Convention, CETS No. 176. Strasbourg, 2000. Available from: <http://www.coe.int/t/dg4/cultureheritage/heritage/Landscape>.
19. Swanwick C (2002) The Countryside Agency, Scottish Natural Heritage, Landscape Character Assessment, Guidance for England and Scotland, Cheltenham (Gloucestershire). Available from: <https://publications.naturalengland.org.uk/publication/2671754>.
20. Fairclough G (2019) Landscape and heritage: ideas from Europe for culturally based solutions in rural environments. *J Environ Plan Manag* 62: 1149–1165. <https://doi.org/10.1080/09640568.2018.1476026>
21. Butler A, Sarlöv-Herlin I, Knez I, et al. (2018) Landscape identity, before and after a forest fire. *Landscape Res* 43: 878–889. <https://doi.org/10.1080/01426397.2017.1344205>
22. Albanese V (2022) Global images vs cultural images: mixed methods to deepen territorial representations. *AIMS Geosci* 8: 593–608. <https://doi.org/10.3934/geosci.2022032>
23. Richards G (2021) Evolving research perspectives on food and gastronomic experiences in tourism. *Int J Cont Hosp Man* 33: 1037–1058.
24. Richards G (2015) Evolving gastronomic experiences: from food to foodies to foodscapes. *J Gastronomy Tourism* 1: 5–17.
25. Di Blasi A (1997) Per una definizione della regione etnea. *Etna Mito d'Europa*, Catania: Maimone, 9–13.
26. Privitera S (2018) Il territorio del Monte Etna da Parco Regionale a Patrimonio Naturale Mondiale dell'UNESCO. *AGEI Geotema* 57: 143–148.
27. Chester DK, Duncan AM, Guest JE, et al. (1999) *Mount Etna: The Anatomy of a Volcano*, Stanford: Stanford University Press.
28. Branca S, Jean-Claude T (2015) L'attività eruttiva dell'Etna degli ultimi 2700 anni, in Carta geologica del vulcano Etna. *Memorie Descrittive della Carta Geologica d'Italia* 98: 109–116.
29. Torre S, Trimarchi R (2007) *Di qua dal mare delle tenebre: geografi e viaggiatori della tradizione arabo islamica in Sicilia*, Catania: Cuecm, 94–105.
30. La Mesa R (1961) *Viaggiatori stranieri in Sicilia*, Rocca San Casciano: Universale Cappelli.
31. Cannizzaro S, Corinto G (2012) La littorina dell'Etna: la Circumetnea come prodotto turistico enogastronomico. *Annali del turismo* 1: 283–303.
32. Chester DK, Duncan AM, Dibben C, et al (1999) Mascalì, Mount Etna region Sicily: An example of fascist planning during the 1928 eruption and its continuing legacy. *Natural Hazards* 19: 29–46. <https://doi.org/10.1023/A:1008001003888>

33. Di Bella A, Petino G, Scrofani L (2019) The Etna macro-region between peripheralization and innovation: Towards a smart territorial system based on tourism. *Reg Sci Policy Pract* 11: 493–507. <https://doi.org/10.1111/rsp3.12176>
34. Barca F (2008) An agenda for a reformed cohesion policy. A place-based approach to meeting European Union challenges and expectations. Bruxelles: Commission of the European Communities.
35. Barca F, Casavola P, Lucatelli S (2014) Strategia nazionale per le Aree interne: definizione, obiettivi, strumenti e governance. *Materiali UVAL* 31: 24–32.
36. Pecora A (1968) Sicilia, Collana: Le regioni d'Italia. Torino: UTET.
37. Linee guida del piano territoriale paesistico regionale, Palermo, Regione Siciliana, Assessorato dei Beni Culturali, Ambientali e della Pubblica Istruzione, 2004. Available from: <https://www2.regione.sicilia.it/beniculturali/dirbenicult/bca/ptpr/documentazione%20tecnica%20catania/NORME%20E%20REALAZIONI/norme%20di%20attuazione.pdf>.
38. Petino G (2020) *Atlante Siciliano delle aree interne e delle specialities agricole*, Aracne: Rome.
39. Napoli D, Petino G (2017) Il prodotto attrae, il territorio accoglie. Analisi dell'offerta turistica di due areali produttivi IGP siciliani. *Annali del Turismo*, 153–175.
40. Carrà G, Mariani M, Radić I, et al. (2016) Participatory strategy analysis: The case of wine tourism business. *Agric Agric Sci Procedia* 8: 706–712. <https://doi.org/10.1016/j.aaspro.2016.02.050>
41. Qualigeo (2022) Piattaforma multimediale delle Indicazioni Geografiche Italiane. Available from: <https://www.qualigeo.eu>.
42. Franco S, Pancino B, Martella A, et al. (2022) Assessing the Presence of a Monoculture: From Definition to Quantification. *Agriculture* 12: 1506. <https://doi.org/10.3390/agriculture12091506>
43. Mercatanti L, Gaetano S (2019) Volcanic risk and the role of the media. A case study in the Etna area. *AIMS Geosci* 5: 448–460. <https://doi.org/10.3934/geosci.2019.3.448>
44. Harrop SR (2007) Traditional agricultural landscapes as protected areas in international law and policy. *Agric Ecosyst Environ* 121: 296–307. <https://doi.org/10.1016/j.agee.2006.12.020>
45. Kristensen LS, Thenail C, Kristensen SP (2004) Landscape changes in agrarian landscapes in the 1990s: the interaction between farmers and the farmed landscape. A case study from Jutland, Denmark. *J Environ Manage* 71: 231–244. <https://doi.org/10.1016/j.jenvman.2004.03.003>
46. Ioannidis R, Koutsoyiannis D (2020) A review of land use, visibility and public perception of renewable energy in the context of landscape impact. *Appl Energy* 276: 115367. <https://doi.org/10.1016/j.apenergy.2020.115367>



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