



# Slow Tourism and Smart Community. The Case of Sulcis - Iglesiente (Sardinia -Italy)

Ginevra Balletto<sup>1,3</sup>(✉), Alessandra Milesi<sup>1,3</sup>, Silvia Battino<sup>2,3</sup>,  
Giuseppe Borruso<sup>2,3</sup>, and Luigi Mundula<sup>1,3</sup>

<sup>1</sup> DICAAR – Department of Civil and Environmental Engineering and Architecture,  
University of Cagliari, Via Marengo 2, Cagliari, Italy  
{balletto, mundulaluigi}@unica.it,  
alessandramilesi.unica@gmail.com

<sup>2</sup> DISEA – Economics and Business, University of Sassari,  
Via Muroni 25, Sassari, Italy  
sbattino@uniss.it

<sup>3</sup> DEAMS – Department of Economics, Business,  
Mathematics and Statistical Sciences “Bruno de Finetti”,  
University of Trieste, Trieste, Italy  
giuseppe.borruso@deams.units.it

**Abstract.** In the last few years the term resilience has entered into force in the policies and practices concerning the territorial development. The paper, interpreting the territory through the paradigm of systemic complexity, aim to read the territorial resilience in a dynamic and procedural sense that is as the response to change not simply according to adaptive (passive) modalities, but through a reaction, that is by implementing a “regenerative” response from the territory and, therefore, from its communities. In other words, there is a community resilience that shows itself through the capacity of human groups to resist environmental changes, which involves upheavals not only of a natural, but also of a social nature. It resists, even not restoring the previous balance, but preserving identity through the change and adaptation to new situations. In this framework the aim of the paper is to represent the slow network of the Sulcis Iglesiente area in the Sardinia region - a vulnerable area due to it has been affected by an intense mining activity and more recently hit by flooding events and socio-economic stress - and the role of the smart community in relaunching its touristic image. Here, in fact, started in 2016 a slow tourism experience in the shape of a way practicable on foot, by bicycle or on horseback, that retraces the ancient mining routes of the Sulcis Iglesiente - Guspinese, developing a ring of about 400 km length.

**Keywords:** Slow tourism · Sustainable tourism · Ecological tourism

---

This study is supported by RE-MINE - Restoration and rehabilitation of abandoned mining sites, funded by the Foundation of Sardinia (Grant CUP F72F16003160002) and TSULKI - Tourism and Sustainability in the Sulcis (Sardinia- Italy) SULCIS-821319, funded by Region of Sardinia. This paper is the result of the joint work of the authors. Section 1 was been written by S. Battino; Sect. 2 by L Mundula and A. Milesi; Sect. 3 by G Borruso; Sect. 4 by G. Balletto and G Borruso; Sect. 5 by G. Balletto, A. Milesi and L Mundula; Sect. 6 was jointly written by G. Balletto and G. Borruso. The images were processed by A. Milesi and G. Cosseddu.

## 1 Slow Tourism Social Network

In Italy and in other European countries the local communities, the public and private bodies have been joining forces for some time now to plan, according to the guidelines of sustainable development, the tourist offer of the destinations. Specifically, the places most involved in these actions are the marginal areas, too often cut off from the international tourist circuits, where the enhancement of the landscape and the use of the same become the main object of interest. The natural and cultural heritage and the different local specificities are increasingly organized in the form of thematic itineraries (religious, culinary, etc.) capable of stimulating new forms of slow and outdoor tourism [1–5]. Religious paths, eno-gastronomic itineraries, old routes taken by miners are all of cultural importance. This importance has been confirmed since 1987 by the Council of Europe (CoE) which, through the “European Cultural Routes” program, considers the cultural routes to be useful instruments for strengthening European identity. A useful program for promoting the socio-economic development of territories, for encouraging motivated cultural tourism respectful of places and for promoting the protection and enhancement of natural and cultural heritage [6, 7]. The Cultural Routes, both those best known by the public of travelers, such as the Pilgrim’s Way to Santiago or the Via Francigena, and those that in a less sensational way are practiced in different European regions, strengthen the spirit of cohesion and inclusion, giving value to small villages and encourage more intense connections between rural and urban areas. The initiative recently undertaken in Italy, under the direction of the Ministry of Cultural Heritage and Activities and Tourism (MiBACT), seems to be moving in this direction. It consists in the enhancement of the identity of places and characteristics of Italian landscapes with the express desire to create a structured system of routes capable of connecting the resources present in the different regions. It is in this framework that the MiBACT “Digital Atlas of the Paths of Italy” takes shape (<http://www.turismo.beniculturali.it/cammini/>). This is an innovative tool through which it is possible to benefit, in digitized form, from an informative heritage consisting of the maps of 42 recognized Italian Routes (out of 113 passed to the coordination committee) divided into historical, naturalistic, religious and cultural that meet international standards. The cartographic representation of each path is associated with information on distances, accessibility and signs, for a total length of over 6,500 km.

The “Digital Atlas of the Paths of Italy”, with a mobile friendly interface, represents a useful tool for the promotion of large areas of the Italian territory that are not well known, but rich in landscape goods. A tool that satisfies in an innovative way even before the trip, through the use of modern devices, the needs of a responsible, alternative and slow tourism. The routes tracks show the points of interest, the stages, the junctions, the deviations as well as the variants that can be practiced; each of them is then associated with a technical sheet with signs, accessibility, seasonality and length. Equally useful is the presence of links to the websites of each itinerary and the photographic and multimedia equipment accessible from the “multimedia” section, as well

as various links to social networks, now essential to convey information and communicate specific offers of use. The evolution of digital tools and Information and Communications Technology (ICT) can in this case improve the conditions of competitiveness and attractiveness of the territories involved and enrich the local tourist experience [8]. An integrated system of innovative services, available to tourists on mobile devices, which simplify their access to information and landscape resources that fall into the area affected by the cultural routes.

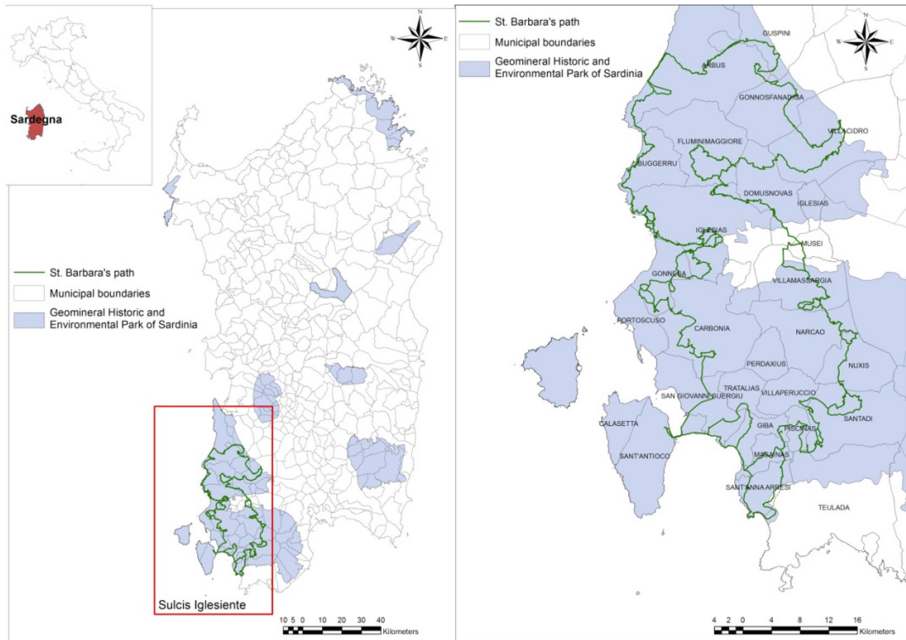
This represents a different approach to the use of the territory, made even more innovative thanks to the possibility of interaction and sharing of the tourist experience between the different actors. In this sense the Sulcis Iglesiente offers a multitude of contexts with multiple possibilities of use (wave, walk, bike,...) characterized by the landscape pruning of abandoned mines and which finds its synthesis in the Way of Santa Barbara.

## **2 The Santa Barbara Walk: Slow Network of the Sulcis Iglesiente**

The Santa Barbara walk retraces the ancient mining routes of the Sulcis Iglesiente - Guspinese, developing as a ring for a length of about 400 km [9]. Since 2013 it has been included in the regional register of historical-religious paths of Sardinia and in 2017 the Ministry of Cultural Heritage and Activities and Tourism has included it in the first Atlas of the Paths of Italy.

It is accessible on foot, by bicycle or by horse and its altitude spans from zero at the sea level to an altitude of 900 m. The route consists of 24 stages in the Sulcis area defined on the basis of the following parameters: length in km, difficulty traveling and availability of accommodation facilities. The walk crosses a territory characterized by a complex mining basin, which constitutes the Geomineral Historical Environmental Park of Sardinia [10–12, 18, 19].

The area of Sulcis Iglesiente has been for millennia interested from a complex mining activity, such as to be considered the main extractive basin not only of the Island but of the whole Mediterranean. This territory was the most important district for national and international mining due to its large production of lead and zinc (Fig. 1).



**Fig. 1.** Territorial framework of the Santa Barbara Path - Sulcis Iglesiente

The crisis in the mining sector and the subsequent closure of the mines in the 1990s left a rich heritage of industrial archeology and infrastructure, as well as a unique landscape.

The landscape of the path is characterized by a complex geological heritage and industrial archeology - mineral deposits, excavations and mine dumps and buildings - from an important ancient archeological heritage - domus de janas, nuraghi, sacred wells, etc. - and significant heritage natural (beaches, cliffs, lagoons, etc.).

The context of South-Western Sardinia, where most of the route is located, is geologically set on Cambrian-early Ordovician rocks, dating back to about 550 million years ago. Starting from the bottom, the geological succession shows the terrigenous sediments (mostly sandstones) of the Nebida Formation, followed upwards by the thick carbonate successions (dolomites and limestones) of the Gonnesa Formation, up to the fine-grained slates of the Cabitza Formation, which in the whole region are unconformably covered by the conglomerates and other coarse-grained siliciclastic sediments of the middle-late Ordovician Monte Argentu Formation (“Pudding” Auct.) [11].

These rocks shaped the landscapes of the Iglesiente and Sulcis, where the sea and the mountains merge, and where, for millennia, men have fought against the adversities of nature to extract a large underground wealth of ore deposits, profoundly modifying the morphological aspect of the territory.

The landscapes of South West Sardinia are in fact deeply marked by the consequences of mining activities, with the presence of large open-air and underground excavations, mine adits, tunnels and numerous mine wastes. These latter are constituted



by accumulations of different types of waste rocks and tailings from mines and processing/metallurgical plants. All these elements highlight the vastity of mining operations carried out in the main mining places of the district, such as the great mines of Monteponi, San Giovanni and Masua, and their related processing plants and handling systems, as the historical Laveria Lamarmora and Porto Flavia plants.

The remains of the previous mining activity make the Santa Barbara Walk one of a kind among all the most known national and international paths. The Santa Barbara Walk then crosses a landscape rich in natural and anthropogenic elements (landfills, mine muds and abandoned buildings), but at the same time mutable, because its vulnerability. This condition of changing landscape (or landscape in progress) is therefore linked to a potential GeoTourism that “provides economic, cultural, relational and social benefits for both visitors and host communities” [12].

### 3 Methodology

The authors analyzed the behavior of the smart community (walk, bike and wave) in the Sulcis Iglesiente, also in relation to the recent definition of the Santa Barbara’s Path. The analysis developed was based on the concept of the network and on the examination of its fundamental elements [13]. In fact, taking up the basis of the network analysis, the relevant territorial elements were considered, classifying them in points (or nodes) and lines (or arcs), zones (or areas) according to their punctual, georeferenced nature and the connections between these elements [14].

The analysis of network structures has, in fact, the advantage of understanding the organization of the territory in an “oriented” manner, independent from hypotheses of homogeneity of space. In the case in question, the movements of people for the reasons related to tourism in the area take place along paths, the linear elements of the network, and the connectors between these act as privileged places such as origin, destination and flow interchange. As part of this work, the network analysis focused on the classification and representation of nodes, arcs and areas; proceeding with a first analysis on the spatial distribution of these and trying to highlight the more “dense” areas - in the present research following a ‘visual’ approach - as regards the various ways of using the territory.

Following a lack of official data concerning the number of people accessing the path in its different segments and on preferences about ways of enjoying it, the authors decided to rely on a ‘smart community’ of users, as in “Neogeography” approach [15], relying on the user-generated contents by means of GPS - enable portable devices. In particular, the authors have investigated the traces left freely on the web by walk and bike tourists who have visited the Sulcis Iglesiente. These data currently represent the only data available regarding the Santa Barbara path.

At the same time we proceeded to construct the information layers attributable to the elements characterizing the landscape of the Sulcis Iglesiente, and to the evaluation of the main hospitality typologies present in Sulcis Iglesiente. We use the following categories:

1. **Santa Barbara's path** (arcs): Santa Barbara path consists of 24 stages that can be downloaded from the official web site of Foundation of Santa Barbara's Path [9].
2. **GPS walk and bike tracks** (arcs): the digital application used for data collection was Wikiloc, which allows the user to record in real time, save and share GPS tracks related to their itineraries [16]. In addition to the track it is possible to save and georeference the photographs as well as comment, evaluate and report particularities along the route. The Wikiloc community is made up of over 4 million users who share about 11 million tracks and 20 million photos. The search for traces was limited to the area of Sulcis Iglesiente, selecting only the tracks that intersect the official St. Barbara's path. The final result was the downloading of 460 useful tracks divided as follows: 230 walk tracks (downloaded between 20 and 29 January 2019) and 230 bike tracks (downloaded between 21 January and 3 February 2019). In particular, the data download was performed manually, using the geographic search option made available by the website, applying search filters. Following the identification of all the tracks, we proceeded with the homogenization of the data, transforming the paths into shape files and implementing the database with some fields obtained directly from the user data registration (path length, name of path, upload date, number of views, number of downloads, category of user, sex and origin). The data were processed by means of an open source GIS platform (QGIS 3.4).
3. **Raster wave, run and bike tracks** (arcs): the WMTS service (web map tile service) of STRAVA was used to display and download in raster format data relating to run, bike and wave tracks classified according to travel intensity.
4. **Points of interest historical and landscape (POI)**, (nodes): the points of interest, related to historical and cultural sites, and to sites of environmental and landscape interest, have been overlaid on the map in order to analyze the relationships between the position of these elements and the paths taken by users.
5. **Maritime state concessions** (nodes): It was used the official data relating to maritime state concession for recreational tourism activities. It has been hypothesized that the state concessions represent nodes both for walk and bike users and for traditional users.
6. **Abandoned mines** (areas): the mining sites of Sulcis-Iglesiente and Guspinese districts have been for a long time the real economic and cultural driving force of their territories. Indeed, many of the existing urban centers in these areas were created to support mining. The activities initiated from the II millennium BC and carried out until the late 1990's left positive and negative inheritances. While the mining industry has brought economic prosperity and cultural growth, it has certainly left a hard legacy of environmental degradation, geomorphological instability and widespread pollution [17].
7. **Geomorphological and hydraulic hazards** (areas): data on geomorphological and hydraulic hazard published in the RAS Geoportal were downloaded and overlaid. The data have been shaped on the area of interest and thematized on the basis of hazard and risk classes. This phase evidenced the incompleteness of the available data, as the territories of Sulcis-Iglesiente and Guspinese have been only partially studied, regarding the aspects of hydraulic and geomorphological risks. However, the presence of instability phenomena, both natural and deriving from human

activities, is marked and evident throughout the territory. In the study area, these phenomena include physical and mechanical instability of mine wastes and excavations and phenomena related to the sinking of the soil better known as Sinkholes, studied with increasing attention over the last few years [20].

8. **Sinkholes** (areas): Data about these phenomena, linked to sudden land collapses, have not yet been made public in vector format, therefore it was not possible to proceed with the precise identification and location of related sites. As described by Mureddu [21], the general setting of these phenomena refers both to large outcrops of Paleozoic limestones in Sulcis Iglesiente, subject to natural sinking of the overlying alluvial detrital covers, (e.g. Cixerri, Narcao-Nuxis and S. Anna Arresi plains), and to areas of past mining affected by sinkhole-type landslides and collapses. These latter are generated by sudden failure of roofs due to the decrease of geomechanical properties of rocks at the sides of deep mining voids. A comparison with the Hydrogeological Planning Plan (PAI) of the Sardinia Region highlighted that out of 247 measured subsidence phenomena 214 (85%) occur in areas outside the PAI boundaries and may not be classified as landslide risk sites. From a comparison with the Landslide Phenomena Inventory in Italy (I.F.F.I. Project), it emerges that 175 sites among those surveyed (71%) by the technical table have not been inventoried. In many areas of the territories of South-West Sardinia, particularly those lacking adequate vegetation and soil cover, past mining activities greatly enhanced the rock stability problems deriving from the natural presence of steeply sloping slopes set on fractured rocks [22].
9. **Hospitality** (nodes): the main hospitality typologies present in Sulcis Iglesiente: hotel, extra hotel (B&B, landlords, holiday homes, camping), home sharing. The data relating to the hotel and extra-hotel equipment were taken from Region of Sardinia open data<sup>1</sup>, while data on home sharing were taken from the Airbnb site (downloaded between 4 and 12 February 2019).

**Table 1.** Information layers.

Information layer	Code	Description	Source	Ref. date
Network	NW01	St. Barbara's path	<a href="https://www.camminominerariodisantabarbara.org/">https://www.camminominerariodisantabarbara.org/</a>	2019
	NW02	walk tracks	<a href="https://it.wikiloc.com/">https://it.wikiloc.com/</a>	2019
	NW03	bike tracks	<a href="https://it.wikiloc.com/">https://it.wikiloc.com/</a>	2019
	NW04	wave tracks	<a href="https://github.com/bertt/wmts">https://github.com/bertt/wmts</a>	2019
	NW05	run tracks	<a href="https://github.com/bertt/wmts">https://github.com/bertt/wmts</a>	2019
	NW06	bike tracks	<a href="https://github.com/bertt/wmts">https://github.com/bertt/wmts</a>	2019

(continued)

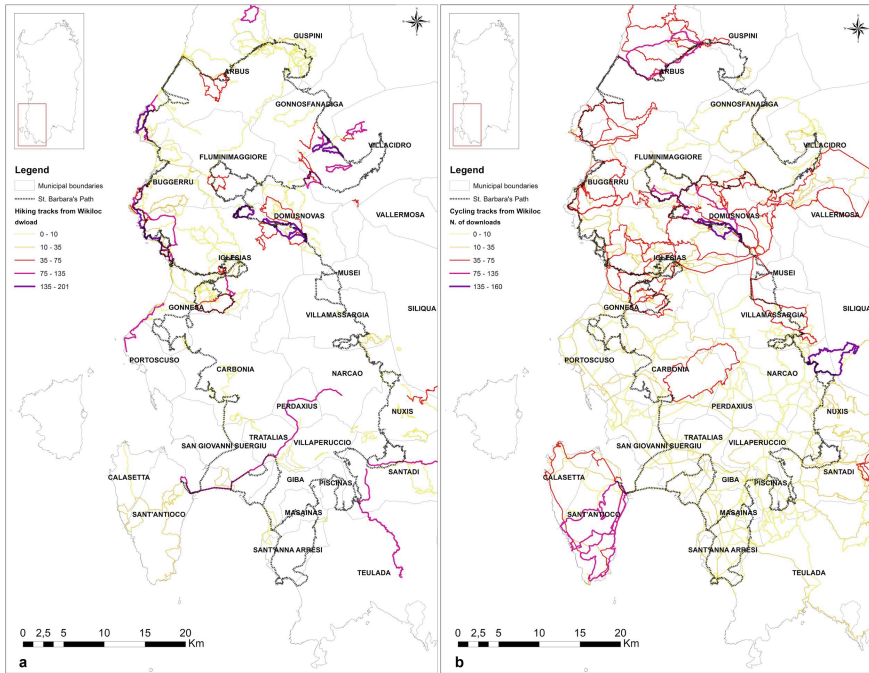
<sup>1</sup> [http://opendata.sardegaturismocloud.it/IT/turismo/offerta/ricettivita/\(2017\)](http://opendata.sardegaturismocloud.it/IT/turismo/offerta/ricettivita/(2017)).

**Table 1.** (continued)

Information layer	Code	Description	Source	Ref. date
Point of interest	POI01	historical and cultural point of interest	<a href="http://webgis2.regione.sardegna.it">http://webgis2.regione.sardegna.it</a>	2015
	POI02	points of landscape interest	<a href="http://webgis2.regione.sardegna.it">http://webgis2.regione.sardegna.it</a>	2015
	POI03	maritime state concessions	<a href="http://dati.mit.gov.it/catalog/dataset/concessioni-demaniali-marittime">http://dati.mit.gov.it/catalog/dataset/concessioni-demaniali-marittime</a>	2018
Mining areas	MA01	Abandoned mining areas	<a href="http://webgis2.regione.sardegna.it">http://webgis2.regione.sardegna.it</a>	2015
Risk areas	RA01	Hydraulic hazard	<a href="http://www.sardegnaeoportale.it">http://www.sardegnaeoportale.it</a>	2018
	RA02	Geomorphological hazard	<a href="http://www.sardegnaeoportale.it">http://www.sardegnaeoportale.it</a>	2018
Receptions nodes	N01	hotel	<a href="http://opendata.sardegnaturismocloud.it/IT/turismo/offerta/ricettivita/">http://opendata.sardegnaturismocloud.it/IT/turismo/offerta/ricettivita/</a>	2017
	N02	non hotel	<a href="http://dati.regione.sardegna.it/dataset/registro-regionale-degli-identificativi-univoci-iun-delle-strutture-ricettive-extra-alberghiere">http://dati.regione.sardegna.it/dataset/registro-regionale-degli-identificativi-univoci-iun-delle-strutture-ricettive-extra-alberghiere</a>	2017
	N03	home sharing	<a href="https://www.airbnb.it/">https://www.airbnb.it/</a>	2019

## 4 Slow Network Analysis

The evaluation of the spatial distribution of the tracks (wave, walk and bike) and the relative density (n. Downloads from Wikiloc) and the correlation of the attributes of the environmental information system (Table 1) allows to represent the slow network of Sulcis Iglesiente. In particular, the interpretation of the information layers took place associating for each network (NW01, NW02, NW03, NW05, NW06) the different wave (NW04, N01), environmental (MA01, MA02, RA01, RA02) and receptivity (N04, N05, N06) nodes. The authors then selected the main cartographic representations of the information layer associations, Fig. 2(a–b).



**Fig. 2.** Walk (a) and bike (b) tracks classification by number of downloads from Wikiloc

In particular, the bike tracks have a diffused layout compared to the localized ones. About the density of the tracks is found:

- the density of the walk tracks (Fig. 2a) is prevalent in the northernmost area, between Iglesias - Domusnovas and along the Iglesias Arbus coast;
- the density tracks bike (Fig. 2b) is prevalent to the north and south of the Sulcis Iglesiente. To the north in the inland areas of Iglesias Domusnovas up to the Iglesias coast - Arbus. To the south instead of the island of Sant’Antioco.

The authors then interpreted of the information layers took place associating for each network (all NW) the points of interest (all POI), the mining areas (MA01), the areas at risk (all RA) and the receptivity nodes (all N). The overlapping of all these information layers show the distribution and concentration in the abandoned mining areas (MA01) and therefore identify the risk areas. From the comparative analysis of the Wikiloc walk tracks and Strava tracks (Fig. 3), we can highlight some significant aspects: to the north, where the concentration of POI01 and POI02 points of interest is greater than the mines abandoned sites (MA01) are also concentrated and dense footpaths. Furthermore, the walking tracks follow the path of Santa Barbara. From the comparative analysis of the Wikiloc bike tracks and Strava (Fig. 4) we can see a slow diffused and uniform network in the Sulcis Iglesiente area. However, even in this case there is a greater concentration in the North, with circular traces that partly follow the path of Santa Barbara. To the South the traces are distributed and concentrated on the island of Sant’Antioco along the coast in correspondence with points of natural and landscape interest.

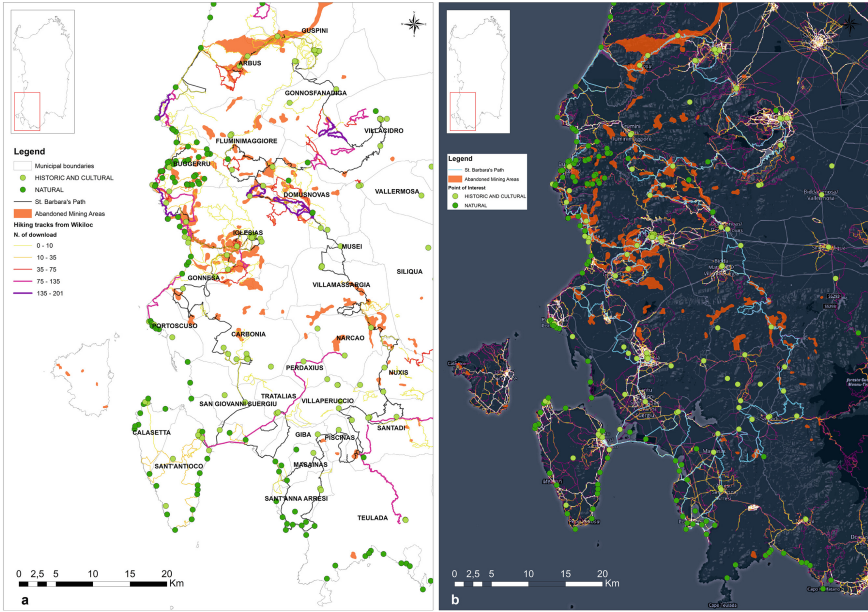


Fig. 3. Walk tracks from Wikiloc (a) and Strava run heatmap (b) with POI01, POI02, MA01

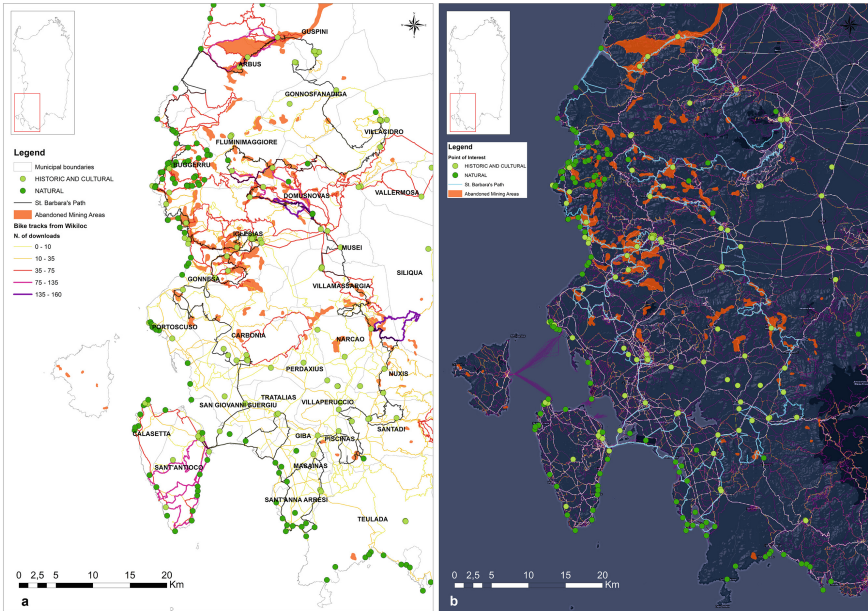
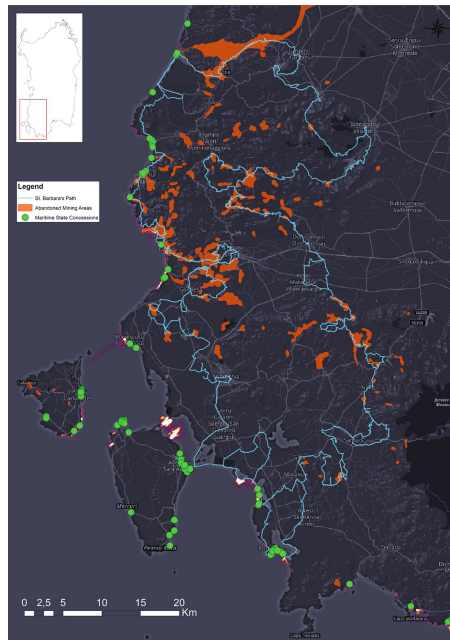


Fig. 4. Wikiloc Bike path (a) and Strava bike heatmap (b) with POI01, POI02, MA01



The slow network in the Sulcis Iglesiente, obtained from the walk and bike tracks, shows diversities, both in distribution and in concentration, within the territory. In particular the walk tracks are in correspondence of the greater concentration of points of interest of the mining landscape, unlike what happens for the cycle tracks, which seem to follow sporting and competitive motivations, not always linked to the context landmarks. However, both the walk and bike tracks highlight that the Santa Barbara Path constitutes an important infrastructure for slow tourism. Furthermore, the authors analyzed the distribution and concentration of Strava wave traces.

These wave tracks are distributed and concentrated the correspondence of the safest coasts (Buggerru - Masua, north; Isola di San Pietro, south) and of the state maritime concessions which constitute the main services of beach tourism (Fig. 5).



**Fig. 5.** Strava wave heatmap with NW01, P01, P02, MA01

In summary, the comparative evaluation show the walk tracks are located and dense in the north of the Sulcis Iglesiente and that are correlated with the wave tracks.

In fact, from the traces of the Wikiloc and Strava web platforms it's possible to observe how the cycle paths present intersections with wave traces in correspondence with the maritime state concessions. The environmental information layers then provide contextual elements (mining landscape and environmental risks, natural and



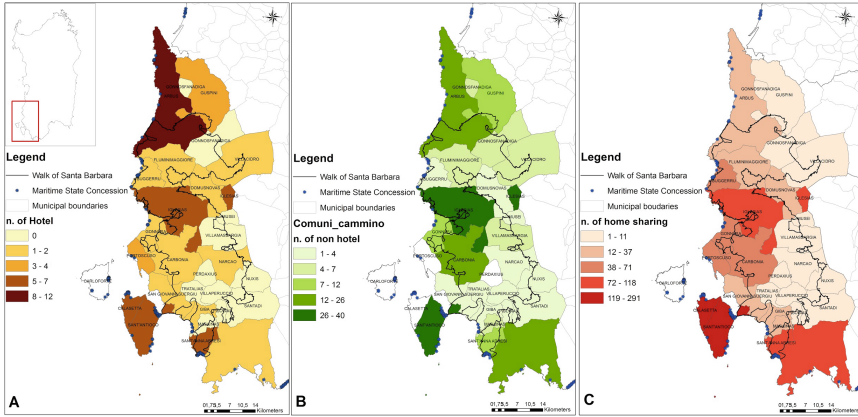
anthropic points of interest) which, associated with the distribution and concentration of the tracks, allow highlighting as the walk and bike tracks are in sensitive and in morphological evolution contexts.

## 5 Slow Tourism and Accommodation in Sulcis Iglesiente

The Sulcis Iglesiente, because of its strong mineral characterization, presents a young - about 20 years old - tourism. The accommodation offer varies from traditional hotels to extra-hotel accommodations such as B&B, guest houses, camping, etc., up to home sharing. However, offer is variable throughout the year depending on the type of structure. In fact, while the hotel offer is greater in the summer period, like that of home sharing, the non-hotel accommodation offer is instead constant throughout the year [11]. Slow tourism is less and less linked to seasonality and more tied to the territory and to the local community and therefore prefers extra-hotel [12].

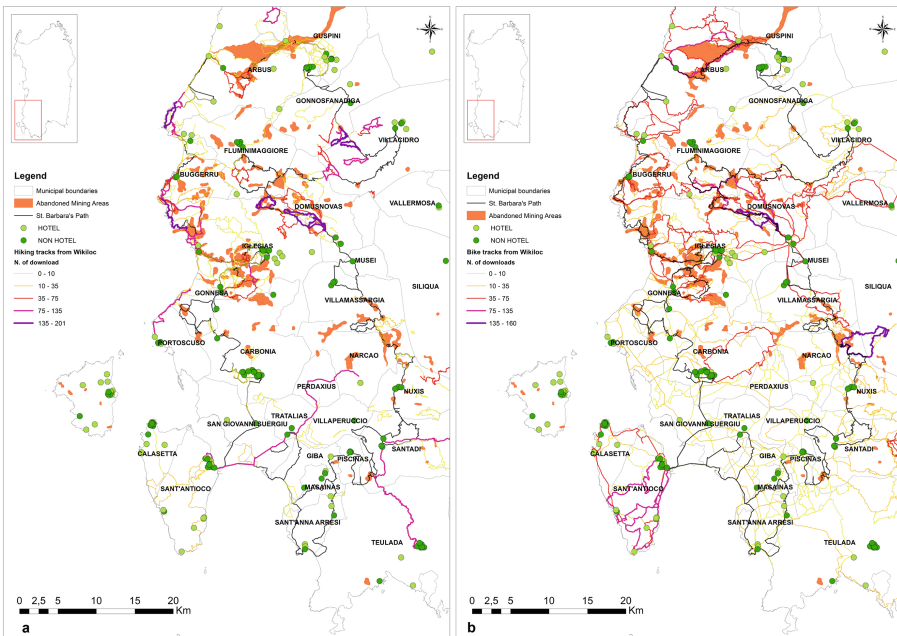
The objective was to assess the density by type of accommodation in the Sulcis Iglesiente, to understand the degree of territorial response in relation to the slow network. This analysis shows how the territory responds in a different way: the typology of home sharing shows a greater concentration in coastal municipalities (Fig. 6C), the non-hotel offer is instead more evenly distributed over the territory (Fig. 6A and B). However, offer is variable throughout the year depending on the type of structure. In fact, while the hotel offer is greater in the summer period, like that of home sharing, the non-hotel accommodation offer is instead constant throughout the year [13]. Slow tourism is less and less linked to seasonality and more tied to the territory and to the local community and therefore prefers extra-hotel [23].

The spatial analysis developed by overlapping the information layers relating to the punctual position of the hotel and extra hotel facilities (N01 and N02) with the Santa Barbara path (NW01), the walk tracks (NW02) and the bike tracks (NW03) of Wikiloc and disused mining areas (MA01). The information layer relating to home sharing (N03) was selected not as a point-in-point data, in order not to burden the representation, but as an attribute relating to density by municipality. This is also because home sharing has a 'variable form' linked to seasonal seaside tourism in competition with hotels [24]. Because the distribution of Strava's run and bike tracks confirms what was shown by the Wikiloc walk and bike tracks, it was not considered relevant to overlap these layers too. Through the Figs. 6, and 7 the authors represented the tourist offer and the slow network of Sulcis Iglesiente. In particular Fig. 6 shows how the concentration of the accommodation offer is unbalanced towards the coastal municipalities.



**Fig. 6.** Distribution of accommodation facilities in the Sulcis area: A. Hotels, B. Extra hotel, C. Home sharing

The hotel and home sharing facilities supply is mainly concentrated in the summer period and in coastal area, demonstrating that tourism in Sardinia is still highly seasonal and linked to seaside tourism. Otherwise, the extra-hotel type of accommodation offer is constant throughout the year, resulting unrelated to seaside tourism. Moreover, the extra-hotel offer is more evenly distributed throughout the territory and localized near the points of historical, cultural and natural interest. Figure 7 instead shows how the set of hotels and extra-hotel structures of Iglesias, Guspini, Arbus, Fluminimaggiore, Buggerru, Guspini are located near the abandoned mining sites.



**Fig. 7.** Wikiloc walk path (a) and run path (b) with N01, N02

This confirms that the home sharing also in the Sulcis is strongly in competition with the hotel supply. On the other hand, the extra-hotel offer, also located in the more internal territory of the Sulcis Iglesiente area, represents an important response to slow tourism, both because it is highly contextualized and because it is free from summer seasonality [14]. In this research framework, also based on voluntary data, which certainly still deserves developments and insights, the territory of Sulcis Iglesiente proves to be a territory suitable for slow tourism. Furthermore, the slow network shown is consistent with the abandoned mining context from which it draws appeal and motivation together with the marine context.

## 6 Conclusions

The natural and historical emergencies, above all the anthropic emergencies deriving from the mining remains, constitute the landscape background of the Sulcis Iglesiente, on which the slow network is rooted. The representation of the slow network (on foot and by bicycle) of the Sulcis Iglesiente is attributable to the tourism of the paths, which presents similarities with the new forms of national and international tourism. It is a tourism deeply linked to the context, from the landscape to local knowledge and traditions. Slow tourism intercepts a tourist demand more oriented towards non-hotel accommodation, which in the case of Sulcis Iglesiente requires strengthening interventions. Furthermore, the organization and image of the non-hotel structure is the basis for the promotion of the slow network. The analysis of the spatial distribution of the elements of the slow network of the Sulcis Iglesiente, make possible also to observe how the walk community mainly crosses the abandoned mining sites, highlighting a cultural motivation, while the bike community is distributed over the whole territory of the Sulcis Iglesiente, according to a sporting motivation.

The evolution of the mining landscape of the Sulcis Iglesiente is correlated to the danger deriving from the ordinary and extraordinary geological instability connected to the abandonment of the mines. In this sense, the smart community plays and can play an important role also in reporting dangerous situations to allow an immediate knowledge of the most significant environmental changes. For this particular evolutionary condition of the landscape, the authors in agreement with the National Research and Innovation Roadmap on Smart Communities (2016), aim to promote and consolidate the slow network in the Sulcis Iglesiente, even with the recent Santa Barbara Walk, considering that the management of risks based on voluntary information is of particular importance. Following these guidelines and ideas, further step of the present work will be the development of an application that allows to register the dangerousness of the places and at the same time to update the information layers related to the hydrogeological risks, to better govern the danger of the evolving landscape of the Sulcis and of the path of Santa Barbara in particular. More in detail, the idea is to propose the creation of a sort of 'digital hub' able to collect the information deriving from the different already existing social networks to share not only the available information but even the request of information, among the smart community users of the Santa Barbara Walk. In the same vein, the Santa Barbara path have to evolve also towards a more structured and integrated typologies of management (i.e. quality

certification for all the infrastructures and facilities of the network) in order to promote the transition from seasonal tourism towards more sustainable and resilient forms in time and space. Finally, the present research, under the agreement protocol between the Universities of Cagliari and Sassari, the Regional Centre for Planning and the Santa Barbara Walk Foundation (signed in December 2018), intends to develop further analysis to define governance actions and to favor the diversification and integration between new and traditional forms of tourism.

## References

1. Greffe, X.: Is rural tourism a lever for economic and social development? *J. Sustain. Tourism* **2**, 23–40 (1994)
2. Olsen, M.: Tourism themed routes: a Queensland perspective. *J. Vacation Mark.* **9**, 331–341 (2003)
3. Meyer, D.: Tourism routes and gateways: key issues for the development of tourism routes and gateways and their potential for pro-poor tourism. Overseas Development Institute, London (2004)
4. Csapo, J., Berki, M.: Existing and future tourism potential and geographical basis of thematic routes in South Transdanubia, Hungary. In: International Conference of Territorial Intelligence, Besançon 2008, Besançon, France, October 2008, p. 10 (2009)
5. Battino, S., Balletto, G., Borruso, G., Donato, C.: Internal areas and smart tourism. Promoting territories in Sardinia Island. In: Gervasi, O., et al. (eds.) ICCSA 2018. LNCS, vol. 10964, pp. 44–57. Springer, Cham (2018). [https://doi.org/10.1007/978-3-319-95174-4\\_4](https://doi.org/10.1007/978-3-319-95174-4_4)
6. Majdoub, W.: Analyzing cultural routes from a multidimensional perspective. *Almatourism* **2**, 29–37 (2010)
7. Corinto, G.L.: Food and gastronomic tourism for developing rural areas around the via Francigena in Tuscany. *Almatourism* **7**, 106–122 (2017)
8. Katsoni, V., Dologlou, N.: ICT applications in smart ecotourism environments. In: Stratigea, A., Kyriakides, E., Nicolaidis, C. (eds.) *Smart Cities in the Mediterranean*. PI, pp. 225–244. Springer, Cham (2017). [https://doi.org/10.1007/978-3-319-54558-5\\_11](https://doi.org/10.1007/978-3-319-54558-5_11)
9. Pinna, G.: *Il cammino minerario di Santa Barbara. A piedi in Sardegna tra storia e natura*. Terre di mezzo editore, Milano (2017)
10. Balletto, G., Michele, P., Giuseppe, B., Naitza, S.: Sardinia Geopark and smart tourism network. The project of the ‘pilgrim way’ of Santa Barbara. In: TICCIH CHILE 2018 CONGRESS Patrimonio Industrial: Entendiendo el Pasado, Haciendo el Futuro Sostenible, CHL, June 2018
11. Servizio Geologico d’Italia: Carta geologica d’Italia in scala 1:50000. Foglio 555 “Iglesias” (2015)
12. Gordon, J.E.: *Geotourism and Cultural Heritage*. Edward Elgar Publishing, Cheltenham (2018)
13. Del Chiappa, G.: *La sostenibilità del turismo: prospettive di analisi e casi concreti*. FrancoAngeli, Milano (2018)
14. Caffyn, A.: 16 slow tourism. In: Agarwal, S., Busby, G., Huang, R. (eds.) *Special Interest Tourism: Concepts, Contexts and Cases*, p. 183. Cabi, Boston (2018)
15. Turner, A.J.: *Introduction to Neogeography*. O’Reilly Media, Sebastopol (2006)
16. Battino, S., Lampreu S.: La carta a portata di click: web mapping, itinerari e condivisione. In: ASITA 2018, pp. 103–112. Federazione ASITA, Milano (2018)

17. Todde, E.: The evolution of the mining village of Montevecchio from archival sources to museum reconversion. *RiMe. Rivista dell'Istituto di Storia dell'Europa Mediterranea*, 83–100 (2018)
18. Salvatore, R., Chiodo, E.: *Non Più e non ancora. Le aree fragili tra conservazione ambientale, cambiamento sociale e sviluppo turistico*. Franco Angeli, Milano (2017)
19. Mossa, A., Camúñez-Ruiz, J.A., Morandi, F.: Current state of the first Unesco Global Geopark: a case study of the geological and mining park of Sardinia, Italy. *GeoJ. Tourism Geosites* **22**(2), 403–418 (2018)
20. Bollati, I., Coratza, P., Panizza, V., Pelfini, M.: Lithological and structural control on Italian mountain geoheritage: opportunities for tourism, outdoor and educational activities. *Quaestiones Geographicae* **37**(3), 53–73 (2018)
21. Mureddu, A.: Research and data processing activities preparatory to the drafting of the Sinkholes Map of the regional territory, on a geological basis at a scale of 1: 250,000. *Mem. Desc. MapGeol. D'It.XCIX*, pp. 385–400 (2015)
22. Caredda, P., Mariolu, E., Nisio, S.: I sinkholes in Sardegna meridionale. Alcuni esempi dal Sulcis-Iglesiente e possibili correlazioni con le attività antropiche. In: 2 Workshop internazionale: I sinkholes. Gli sprofondamenti catastrofici nell'ambiente naturale ed in quello antropizzato. ISPRA, Roma, 3–4 dicembre 2009 (2009)
23. Destination of Sardinia 2018–2021: Strategic Development and Marketing Tourism Plan of Sardinia. [http://www.regione.sardegna.it/documenti/1\\_231\\_20181221121007.pdf](http://www.regione.sardegna.it/documenti/1_231_20181221121007.pdf)
24. Yang, Y., Tan, K.P.S., Li, X.R.: Antecedents and consequences of home-sharing stays: Evidence from a nationwide household tourism survey. *Tourism Manag.* **70**, 15–28 (2019)