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"Faraway, So Close!": The Landscapital Proof-of-Concept Applied of the Terraced Landscapes of the Canary Islands (Spain) and of Val di Cembra (Italian Alps)

«¡Lejos, tan cerca!». La prueba de concepto de la capital paisajística aplicada a los paisajes en terrazas de Canarias y Val di Cembra (Alpes italianos)

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Abstract

This work is focused on analysing two terraced landscapes devoted to viticulture, as well as on finding a way to economically compensate their heroic winegrowers. This becomes possible by combining local agents' and consumers' perceptions of a territory ("landscapital") with the creative yet sincere evocation of beauty appreciable in land that is being worked ("artealization"). The work's methodological approach combines interviews, fieldwork, cartographic and photographic analyses to compare two terraced viticultural landscapes. The results highlight analogies and differences at three different levels, going from the scenic vantage point to the conception of the quotidian landscape in a single vineyard.

Keywords: Landscapital, Viticulture, Terraces, Landscape Marker, Perception.

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Resumen

Este trabajo se centra en el análisis de dos paisajes en terrazas dedicados a la viticultura y pretende encontrar la forma de compensar económicamente a los heroicos viticultores. Esto es posible combinando la percepción que los agentes locales y los consumidores tienen de un territorio (capital del paisaje) y la creación de una evocación sincera de las bellezas percibidas en un territorio pragmático (artealización). En el trabajo se ha adoptado un procedimiento metodológico combinando entrevistas, trabajo de campo, análisis cartográficos y fotográficos para comparar dos paisajes vitivinícolas en terrazas. Los resultados destacan analogías y diferencias en tres escalas distintas, que van desde el mirador hasta el único viñedo donde se concibe el paisaje cotidiano.

Palabras clave: Paisaje, viticultura, terrazas, marcador de paisaje, percepción.

1. INTRODUCTION

Landscapes are the resultant perception of tireless actions carried out in time and space on the basis of the relevant cultural, economic, social, environmental contexts (Council of Europe, 2000;[1] Carrión, 2015; Provincia Autonoma di Trento, 2013[2]). With regard to viticulture and wine, the landscape affects the perception of the quality of a wine (Tempesta *et al*., 2010) and consequently, the value of the wine can be linked in part to the landscape.

The bond between a wine and its landscape can favourably support a territorial identity oriented towards tourists and cultural activities, as in the case of the countless wine routes. *Val di Cembra* (IT) and *Vallehermoso* (SP) are both regions well-known for the production of grapes and wines. The promotion of these two territories benefits from the combination of the quality of their wines and their peculiar landscapes (Figure 1). The origin of a wine is the most influential factor in wine choosing (Gil and Sánchez, 1997), so, keeping in mind that the production of grapes and wines is a primary sector which must be able to guarantee an income for vine growers and winemakers, the ability to link the wine to a unique landscape could further boost the perceived value of the production.

Recently, how a positive perception of the landscape can induce the consumer to pay a bonus price for a bottle of a local wine (Strub and Loose, 2017) or more than a 20% increase in the final price of wine for various distribution channels (Galetto *et al*., 2017) has been investigated.

In both cases, the consumer perceives the concept of *heroic viticulture* as a positive component of the viticultural landscape: the value, and the quantification as a bonus price, acknowledges the difficulties of growing the grapes in such contexts, and the value of the hard work.[3]

1 Council of Europe, 2010: *European Landscape Convention*. CETS No. 176 (Strasbourg: Council of Europe Publishing) [online]. Available at: https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/176. [Accessed: November 28, 2018].

2 Provincia Autonoma di Trento (2018): Servizio Urbanistica e Tutela del Paesaggio. *Sistema delle aree agricole.* [online]. Available at: https://webgis.provincia.tn.it/wgt/?lang=it&topic=5&bgLayer=ctp2000 &catalogNodes=21,20&layers=Sistema_Agricolo [Accessed: November 28, 2018].

3 *Centre for Research, Environmental Sustainability and Advancement of Mountain Viticulture* (CERVIM), 2010 [online]. Available at: http://www.cervim.org/en/heroic-viticulture.aspx. [Accessed: June 21, 2020].

However, there are also occurrences of heroic viticulture that fail to exploit the landscape potential (Zottele and Delay 2014): in this case, the *heroic factor* is perceived as an element of disadvantage by the vine growers. Moreover, there are also territories whose landscape is not perceived positively by the consumer (Tempesta *et al.*, 2010).

Therefore, in the productive vine-growing context, the landscape can be assimilated to a means of production which can be optionally exploited , if available, to improve the value of the production. In particular, because the landscape is not owned by a single vine-grower but is available to the entire community, it should be considered as a limited, common good that evolves unceasingly thanks to the actions taken by vine-growers.

The term *landscapital* was coined to describe this concept concisely (Zottele and Delay, 2017); the concept of *landscapital* was investigated on the basis of two signifiers: the *intrinsic landscapital*, that is, how a landscape is perceived –in terms of value– by the autochthonous actors that live and shape a territory (hereafter, "locals"); and the *extrinsic landscapital*, that is, how a landscape is perceived –in terms of value– by the allochthonous actors that enjoy a landscape (hereafter, "visitors") (Zottele and Delay, 2018a).

When both intrinsic and extrinsic components are exploited consistently, many positive effects are triggered at the economic, social, and cultural level, such as a greater identity and awareness of the territory, a greater cultural attachment that can affect the population's participation in the territory's policies and a greater predisposition for the conservation of local culture. As briefly introduced before, the perception of the *heroic viticulture,* conveying to visitors the idea that the wines produced are unique, transcending the purely oenological quality, is an example of *extrinsic landscapital*. The *intrinsic landscapital* is linked to the traditional viticultural landscape and culture: it is by now a fact that large portions of terraced vine-growing areas are remolded by obliterating or, in the worst cases, by abandoning the traditional cultivars, agronomic practices and even rituals. By *obliteration* we mean those dynamics of territorial transformation that involve the introduction of landscape elements that are out of context in terms of scale, type or aesthetic effect.

Although it is now established that the extrinsic component linked to the heroic viticulture is a very powerful wine marketing factor, the components of the traditional vine-growing landscape tend to be removed or oversimplified by vine-growers in favour of increasing mechanization, decreasing labor costs and increasing margins, to remain competitive in a globalized wine market. These dynamics are taking place both in the Alps (Zottele and Delay, 2014) and in the Canary Islands, where the *intrinsic* component of the *landscapital* is no longer perceived by the locals as a value and is in fact being destroyed, with a consequent loss of identity for the overall territory; in the long-term, this dynamic could lead to the end of heroic viticulture, causing the locals to lose the potential added value (the *extrinsic* component of the *landscapital*) paid by the visitors for their products (Figure 2).

But landscapes emerge not only through their symbols but also owing to

social and cultural relationships, such as the recognition of common goods and cooperative solutions undertaken to manage a territory (Delay *et al.*, 2015). Indeed, identifying the *landscapital* helps the recognition of the "everyday relationships" between a population and its territory, not focusing only on identifying and listing elements of one territory to be protected.

Starting from these considerations, this research uses the *landscapital* as an analytical and diagnostic instrument within the formal framework where it originated (the steep slope or terraced viticultural landscape: "so close"), with the aim of studying the different cultural, agronomic and economic contexts that shape the insular and mountainous viticulture of the Canary Islands and the Alps ("faraway"). Specifically, the focus was placed on the practices of vine cultivation.

2. MATERIALS AND METHODS

Two recurring elements can be recognized in several definitions of landscape: the physical support (a portion of space, a territory) and its perception or the ability of a human being to observe, interpret and understand that place. The different definitions differ in terms of the relative weight of these two components (Mínguez Zubelzu and Allende Álvarez, 2015). For the terraced vineyards, the artefacts that define the rural context guide the perception more than the physical medium by itself and unlike in the case of the natural landscapes (Gómez Orea *et al.*, 2015).

Moreover, the landscape is not the sum of the perceptions of "many single viewers" but it's a collective perception, at a social level (Maderuelo, 2006), (Berque, 2006). To describe how a landscape is recognized, Roger (2014) proposes the concept of "artealization" as a mean to assign values to those elements that help to distinguish one landscape from another. The artealization can be "*in situ*" or "*in visu*".

The "*in situ* artealization" resides in the ability of those who create a landscape with their daily work (farmers, agricultural technical consultants, geographers, architects, anthropologists ...) to transmit the value of a landscape to "the others". The "*in visu* artealization" uses the power of synthesis typical of the arts that acts at the emotional and unconscious level and not at the "technical/practical" level.

In this context, the first operational step for a landscape analysis based on the landscapital is to identify the symbolic elements of a landscape, the "landsmarkers" (markers of the landscape) or "iconema" (Fedato *et al.*, 2017). A landsmarker is a highly perceptible territorial element that contributes to the formation of the landscape and could be tangible (for example dry stone walls, lighthouses, rivers, seashores ...) or intangible: the landscape could emerge from the organization of the space promoted by co-operative strategies optimizing limited resources as for example, water (Delay *et al.*, 2013). The intent of the landscapital is to encompass relevant peculiar information through landsmarkers. Therefore, the landscapital should take into consideration the "quantity" and "quality" of all the different landsmarkers present in a landscape and how such presence can trigger a harmonious or dis-harmonic perception of a territory.

It is important to highlight that a landsmarker –for example a wall that supports a terrace in a vineyard– can be perceived intrinsically (from the local's point of view) both as a value, linked to culture and tradition and identity, and as a dis-value, as it limits the possibilities of mechanization and considerably increases the working hours per unit of production. Likewise, the same landsmarker with said intrinsic dis-value can be perceived by visitors as a value (the "heroic viticulture") or as a disvalue (in the case of terraces that were abandoned or distributed out of the surrounding context). Moreover, the same landsmarker can be perceived differently at various scales because it plays different roles (a sign, a boundary, a working tool...). Finally, a landsmarker could be "latent", that is to say, perceived only by locals or only by visitors: such landsmarker should not concur to the landscapital definition.

We examined the terraces and dry stone walls of two vine-growing areas, one in Vallehermoso (La Gomera, Canary Island, SP) and one in Val Di Cembra (Trentino Alto Adige, IT), focusing on how these elements contribute to the creation of the overall landscape value. We used the assumption that the two landscapes have a "natural" origin (in the physical sense of the word): human intervention in these areas was dictated by gravity, leading to the creation of terraces as a support for human settlements, agricultural production, and human activities.

The consequence of such a simple assumption makes it difficult to fully describe the multitude of strategies that the locals devised in order to cope with such a powerful force, ranging from the necessity to keep the soil in place and control the water flows to the techniques necessary for the planting and the seasonal management of the single vines. Therefore, this study proposes and tests a formal approximation through the identification of different scales to describe how the landsmarkers emerge and become perceivable across the geographical areas, and how the landscapitals of Vallehermoso and Val di Cembra differ. On different scales, the same landsmarker created by the locals could be perceived differently in terms of aesthetic value by the visitors, qualifying the overall landscapital and, in the end, the consumer's propensity to pay more for a product based on the beauty of the landscape. As these perceived values are present in the vineyards proper with spatial organizations linked to various viticultural practices and to the presence of settlements, the formal approximation (scale) should be designed based on human activities, with a focus on viticulture and on the "everyday landscape" (Noguel, 2007) and linked to the different ways in which these spaces of life and work are related.

The correctness and effectiveness of our formal approximation was tested using cartographic interpretation,[4] by consulting territorial planning documents (ITC & HYDRA, 2006a; ITC & HYDRA, 2006b; Provincia Autonoma di Trento, 2018) and by field surveys. A relevant excerpt is provided in Figures 3 and 4.

To strengthen the methodology, the authors met with an informal panel of professionals (architects, urban planners, and land surveyors), vine-growers and the local population, to discuss the results of the research and involve the participants in the definition of landscape components (Figure 5).

We found examples of "artealization *in visu*" (Roger, 2007) in both territories: without being the object of our study, these examples contributed to our

4 IDECanarias, 2015: *Sistema de Información Territorial De Canarias* [online]. Available at: https://visor.grafcan.es/visorweb [Accessed: November 28, 2018].

understanding on how these places, with their similarities and differences, are yet perceived as landscapes and not just as "places". Art, with its high level of abstraction and synthesis, helped us identify those landsmarkers that could impact both locals and visitors at the emotional level (Figure 6).

3. RESULTS

The formal approximation applied to the terraced vineyards of Val di Cembra in the Alps and Vallehermoso on the island of La Gomera allows us to describe these productive viticultural landscapes effectively and in great detail, and to formulate in-depth considerations on the spatial organization of human activities, on how these activities are linked, and on how they have shaped the territory. With regard to the vine-growers' activity, we defined three scales of evaluation: I) the *structural* scale, which deals with the physical and environmental constraints to which human actions can adapt; II) the *relational* scale, which measures the spatial organization of human activities (life, work, entertainment...); and III) the *ergonic* scale, which encompass the human activities, their objectives and their results. Within each scale, the *landsmarkers* provided information on the perceived extrinsic and intrinsic values, and the perceivable value of each landsmarker differs due to the different network of relationships among the landsmarkers. The method proposed here made it possible for us to enhance the understanding of the two viticultural landscapes (Riesco Chueca *et al.*, 2008).

3.1 The structural scale

The structural scale highlights the organisation of the landsmarkers: while the Avisio river in Val di Cembra imposes a linear continuity, the mountainous slopes and the *barrancos*– that is, the accordant drainage of intermittent streams –impose a fragmented discontinuity in Vallehermoso. Therefore, terraces, of different types, materials and retaining power (Zottele *et al.*, 2018b), become necessary instruments to support human activities and contrast the power of the elements, fostering the steric position of the living, working and natural spaces. Nature superimposes its rules by affecting how communities live a territory and organise the various aspects of their life in that territory.

The meteorological phenomenon typical of the Canary Islands known as *mar de nubes* and which consists in the accumulation of low altitude clouds in the valleys due to the trade winds is an example of how natural forcing can be interpreted in *landscapital* terms. The shielding effect of clouds and the transfer of humidity from the atmosphere to the ground have a strong positive effect on viticulture (intrinsic component of the *landscapital*), while the presence of clouds can be unpleasant for visitors who arrive in the Canaries to enjoy the sunny weather (extrinsic component of the *landscapital*).

On the structural scale, the landscape takes on a cultural connotation (Sauer, 1925) and enters the formulation of the *landscapital* as a strong intrinsic value and a potential extrinsic value. In such a cultural context, public administrations

wield the same power as nature itself, setting rules for the community in order to manage and protect the territory. For example, the Urban and Landscape Plan (Provincia Autonoma de Trento, 2018) does not differentiate agricultural areas in terms of landscape value though Val di Cembra (less than 10% of the entire viticultural surface of the region) is known worldwide as a notable example of the heroic viticulture (März, 2013).[5]

So, both nature and territorial planning shape the territory, and build the locals' perception of the landscape first, and then that of the visitors and thus affect the overall *landscapital* (Figure 7).

3.2 The relational scale

On the relational scale, the perception of the connections between human spaces becomes predominant, allowing the visitor to quickly identify the urban, natural, agricultural and production areas and form an opinion about the quality of the landscape (extrinsic value). Moreover, the relationship between the different areas becomes evident and it is possible to collect and analyse each *landsmarker* not only in terms of quantity but also in terms of relations, obtaining a compositional description of the territory.

The precise spatial distribution of the agricultural areas and their broad delimitation follow the rules dictated by the structural scale: on the relational scale, vine-growers implement the strategies for their daily struggle against the force of nature. In both La Gomera and Val di Cembra, the ceaseless reconstruction of dry stone walls that collapsed as a result of gravity and rain gave rise to a form of cooperation between vine-growers, who share their time helping each other to restore the terraces. In Val di Cembra, the management of irrigation water, which is perceived as a common resource by the community fostered the construction and management of a hydraulic system for the distribution of plant protection products that reaches even the most inaccessible vineyards by farming partnerships.

The locals' perception that water is a limited resource, to be managed collectively, deeply affects the organization of the work of the vine-growers and makes the resulting territorial identity an intrinsic value (or dis-value) of the *landscapital*.

Conversely, in La Gomera the water used for irrigation is managed with a different strategy, based on property rights and so as a private good independent of the ownership of the cultivated land (Jerez and Martín-Martín, 2018). In this case, vine-growers must adapt to an imposed constraint: this forcing is comparable, in terms of power and pervasiveness, to the effects that natural forces have on the landscape. Thus, the intrinsic value (or dis-value) of the *landscapital* is made explicit at the level of the structural scale.

5 CERVIM (2010): *Centre for Research, Environmental Sustainability and Advancement of Mountain Viticulture* (CERVIM), 2010 [online]. Available at: http://www.cervim.org/en/heroic-viticulture.aspx. [Accessed: June 21, 2020].

However, both management systems have made it possible to keep viticulture productive even in contexts of considerable property fractionation, which is reflected in the fragmentation of the landscape that can be perceived by the visitors (extrinsic component).

The dry stone wall as a perceivable *landsmarker* is identified in the single vineyards of both Vallhermoso and Val di Cembra: the retaining dry stone walls and slopes concur toward a plastic expression that shapes the overall perception, a fundamental aspect to describe the viticultural landscape (Fabienne, 2005: 23–30) (Figure 8).

The terraced landscape in Val di Cembra preserves its linear trait, consistently with what takes place on the structural scale and, indeed, the terraces follow topographic lines. However, during the vegetative season, most of the dry stone walls are covered with foliage, making the leaf cover of the vineyards the most strongly perceivable element and the planar element that defines the fragmentation of the landscape. In Vallehermoso, the structure of the landscape appears discontinuous, albeit following the topographic lines, and the organisation of the human working spaces with their *escaleras* becomes powerfully perceptible with the dry stone walls of the terraces in full view.

It is important to emphasize that on the relational scale a landsmarker should be considered not only as an object but as a connector between relationships. The retaining walls of the terraces are evident when they are part of the rural road graph, and looking at these elements the visitor can understand the spatial segregation of living and working spaces, with their relative proportions. This builds the perception of how much work is needed to grow vines (the heroic viticulture as extrinsic value).

As highlighted by the vine-growers and agricultural experts, the mere observation of the landscape does not explain how the agricultural spaces, the living spaces, and their connection found their current equilibrium. In order to answer this question, it is necessary to take into consideration a greater scale of detail that encompasses the vine-growers' strategies and the solutions they found to deal with the daily problems of their working life.

3.3 The ergonic scale

Finally, on the ergonic scale, the terrace becomes the support for the viticulture working spaces. The dry stone wall is no longer a *landsmarker* in and of itself, and materials, soils, and the vine prevail in terms of perceptive importance. At the same time, such elements are so detailed that their connotation as *landsmarkers* should be further investigated (Figure 9).

Moreover, Val di Cembra has preserved the consistency between the planar feature of the "pergola" and the surfaces identified on the relational scale, while the linear feature on the structural scale is reflected in the so-called "scaròz(et)", or "spalliera", or, more technically, "guyot". On the other hand, the vine in Vallehermoso, being a punctual feature, remains a strong intrinsic value which

visitors, however, can barely perceive; therefore, this extrinsic value linked to the viticulture should be somehow developed elsewhere.

As mentioned when describing the relational scale, the ergonic scale highlights the daily strategies and struggles adopted to maintain the production in these working spaces. On said scale, the *landsmarkers* also have a social and cultural dimension (for instance, the devotional artefacts inserted in the niches of the dry stone walls) and define a significant part of the whole intrinsic value of the *landscapital*.

As often stressed by vine growers and agricultural technicians, a multidisciplinary approach including geography, architecture, sociology, economy, and agronomy is mandatory in order to understand how these strategies make traditional viticultural landscapes resist the process of abandonment. Conversely, the global economy and climate change cause the transformation of the traditional landscape through *obliteration* (Zottele and Delay, 2017). In a mountainous context, these two drivers play oppositely: growing grapes at higher elevations is a way to adapt to the climate change and to run after those quality standards (linked to "fresher" climates that enhance acidity and aromas in the grapes) that are increasingly difficult to maintain at the bottom of the valleys. Coincidentally, for both Val di Cembra and La Gomera, higher vineyards are on the steep traditional terraced plots, where mechanization is limited if not impossible; the higher management costs due to the enormous number of working hours per hectare put the traditional terraced vineyards out of the globalized, hypercompetitive market that imposes lower prices for the same quality. An increasingly frequent adaptation strategy implemented in Val di Cembra to get rid of the disadvantages and to gain advantages is the destruction of the traditional landscape by trivialization: razing terraces to make mechanization possible, using trellises instead of the traditional "pergola trentina", planting international, more appealing for the market varieties with very thick planting densities but, at the same, time benefiting from the traditional rural setting given by the surrounding context both in terms of common infrastructures (collectively managed roads and irrigation systems...) and landscape identifiability. This is obliteration guided by a climate change that replaces the traditional viticulture to produce attractive wines for the globalized market and pushes new vineyards at higher altitudes in terraced areas where viticulture was traditionally residual (the traditional terraced viticulture in Val di Cembra ranges on an altitudinal gradient between 350 and 700 m a.s.l.) (Figure 10).

The variety of vine-growers opinions on the processes of obliteration of the landscape demonstrates how the intrinsic value component of the *landscapital* is always evolving and in a debate phase. In Val Di Cembra, some vine-growers see the elimination of terraces, the replacement of the typical vine varieties and the introduction of new agricultural practices such as "the future of the farm" and "a way to stay competitive in the world wine market". Other vine-growers perceive these actions on the landscape as "an enormity that has nothing to do with our valley", and "this is our way to grow vines and it must be valued because it is different".

At the same time, some vine-growers feel that the novel interest for the traditional terraced landscape as a "marketing vector" for the wine sector could harm their activity. Stricter, top-down regulations (in wine production disciplinaries or in land-use regulation) that focus on the conservation (as an immutable *de facto*) of just one *landsmarker* –the dry stone walls– to promote the extrinsic component of the *landscapital* as "heroic viticulture" could, on the other hand, enhance the abandonment phenomenon. Some vine-growers feel that such policies could force them to transform their working spaces from an adaptive, "everyday landscape" to a sort of immutable "postcard", irreconcilable with a "productive landscape". In their words: "we want to choose to keep our terraces, not to be told how and where to have them. Rather, *they* should reward those who decide to work in the most difficult way". In our proposed framework, this process can effectively be described as a pauperisation of the intrinsic values in order to try and increase the extrinsic values of the landscapital. Those who work the land fear that the transformation of the landscape into an "immutable postcard" will benefit tourism, regional marketing, real estate rents... and gain no recognition for their work that creates the landscape. A possible solution would be to transfer the added value obtained with the valorization of the extrinsic component of the landscapital to those who keep the intrinsic component alive and active.

Eventually, it turns out that the quantitative description of just one landsmarker (in this case the number, density, height, types… of the dry-stone walls) does not suffice to encompass the perceived values of the *landscapital*. The strategy to be adopted is to build a coherent narrative of how the relationship between different *landsmarkers* (terraces, cultivars, agronomic practices, trellis systems…) can contribute to the formation of the overall *landscapital* and so to building the identity of a productive territory of which the consumer has a positive opinion based on *unrepeatable* characteristics.

4. DISCUSSION

The concept of landscapital is based on the quantification of intrinsic and extrinsic values related to landsmarkers, as perceived by locals and visitors. Indeed, extrinsic values create a robust connection between a territory and its products (Tempesta, 2010), leading to positive economic results. On the basis of the theory suggested by the authors, it is possible to identify where and how the landscapital is perceptible, thus improving its exploitation and integration in spatial planning. Such a promising approach is fundamental for the valorisation of a traditional, viticultural and terraced landscape. The perceptual process is based on the so-called "artealización", that can be translated with the neologism "artealization" (Roger, 2014), that is, the way in which a place becomes a landscape. There are two perceptual processes involved in artealization: 1) the "*in visu*" process, which is mediated by an artist who, by drawing, painting or narrating a place, creates a landscape, narrates the peculiar characteristics of a

place (for example, *mar de nubes* or "sea of clouds" to describe the stratocumulus clouds named *panza de burro*, or the sculpture called "La Isla" by Pedro Zamorano, that carves the shape of la Gomera as a staircase to evoke the escaleras); and II) the "*in situ*" process, mediated by a professional who intervenes directly on the landscape, transforming it. For example, the dry stone walls, as landsmarker, are built *functionally* by the vine-growers to support a portion of cultivable soil, but the vine-growers insert also *non-functional* elements (aesthetic, cultural, devotional...) to satisfy their own sense of beauty while remaining practical.

Since the aim of the approach is to enhance the products of the terraced vineyard, it is necessary to maximise the visibility of both these direct and mediated landsmarkers.

The explication of the intrinsic components of the landscapital –both the material ones (such as terraces, dry stone walls...) and the immaterial ones (co-operative strategies, culture…)– needs to be strategic, and the artealization process needs to be orchestrated between those who plan a landscape and those who live and work in a landscape (for example, vine growers). This aspect is particularly crucial: the analysis of the viticultural territories presented in this work should not be limited to the scenic representation as "beautiful landscapes", but should be considered as a phenomenon emerging from the daily choices of those who live and work in them; however, we also documented the consequences of the arbitrary adoption of particular agronomic innovations that remolded large portions of the traditional viticultural landscape, removing the identifying landsmarkers. The landscapital ends up being modified within a few decades (Zottele and Delay, 2017). Both in Val di Cembra and in the Canary Islands, vine-growers and agricultural technicians feel only marginally involved or, in the case of Val di Cembra, even deliberately ignored when a discussion on the viticultural landscape is held, while in La Gomera initiatives have been put in place to recover "traditional agricultural knowledge" as a founding element of the landscape, for instance, with the project "Rutas - Sabios Guías Intérpretes" started in 2012 (Fundación Canaria Lidia García, 2020).

Moreover, when applying formal approximation to the landscapital concept, it is possible to better understand how the chain of perceived values (intrinsic and extrinsic) of a landsmarker is maintained or lost when shifting the point of view from the structural scale to the ergonic one, passing through the relational one. It is possible to identify two mechanisms of transfer of landscapital values into one scale and across the scales: complexity (Kaplan and Kaplan, 1989) and coherence (Ode and Miller, 2011). For example, dry-stone walls produce a fragmented and complex landscape in Vallehermoso, while in Val di Cembra the landscape is linear and coherent: the same landsmarker on the ergonic scale produces a different "landscapital flavour".

The vine-growers that participated in this study, analysing the intrinsic values of the landscapital, highlighted that it is simplistic to view terraces simply as a human response to a physical constraint (that is, the need to preserve the soil from the erosion produced by gravity). Indeed, vine-growers pursue a functional utility through the use of materials and technologies, creating an artisan culture

while pursuing beauty at the same time. Another aspect that emerged from the discussions is that local vine-growers are acquainted with the territorial planning and managementy regulations, but they consider them as an imposition. The locals legitimately ask to be involved in this legal framework and seem willing to use the landscapital as a participatory tool aimed at identifying agreed strategies to exploit the intrinsic and extrinsic values of their landscape. Indeed, vine-growers acted as "*in situ*" artealizators on the ergonic scale in their own vineyards, with actions guided by their own viticultural knowledge and by the physical cultivation conditions, thus delivering the first elements of the landscape. Since these elements are present in the locals' everyday life, they take on a pure intrinsic value, becoming elements of the cultural and viticultural landscape (Carbonneau, 2005). These intrinsic values can then be easily exteriorized for visitors, since the value of viticulture is recognized in many cultures worldwide. In the authors' opinion, on the relational scale, the artealización "*in visu*" (the artist's point of view) meets the artealización "*in situ*" (the point of view of those who physically intervene on the landscape). This leads visitors to perceive with little effort of mediation all the intrinsic components of the landscapital made extrinsic by the locals. However, not all the interviewed people always agree on which elements contribute to give value to the landscape. This aspect should be further analysed and could represent the focus of a dedicated research project.

We are also convinced that the landscapital should be taken into account in landscape planning, since the policies and rules mold a territory on a structural scale. Recognizing the landsmarkers (and their intrinsic values) as a choral phenomenon emerging from the rural culture should help the planners to: safeguard a "tangible cultural heritage"; support the active conservation of the landscape and the human knowledge linked to it (Romero-Martín, 2020) (Fundación Canaria Lidia García, 2020); reduce the risk of abandoning the activity dictated by the tough competition between territories; and eventually justify that bonus price on wine and ensure an economic return, to be distributed to those who create the landscape with their daily work, closing the loop with the visitor as an active protector of all these values.

5. CONCLUSIONS

This study highlighted that the *landscapital* is a sufficiently abstract and extremely flexible conceptual tool that adapts to very different landscapes: the organisation of the *landscapital* in different territories passes through the careful consideration of its extrinsic and intrinsic components. It is necessary to identify a set of appropriate *landsmarkers* and to understand how they are perceived by locals and visitors. Therefore, this research used the *landscapital* approach to analyse two well-known viticultural landscapes, using a formal approximation in order to identify the proper *landsmarkers* and their relationship.

For example, the dry stone wall –a *landsmarker* present in both Vallehermoso in La Gomera and Val di Cembra– has a comparable intrinsic and extrinsic value

for the local population. In fact, it is acknowledged that this landscape element strongly affects the organisation of work in the vineyards, considerably increasing working hours. However, since it is a highly recognizable element of the territories, the public administrations have provided various "top-down" policies with the aim to protect and enhance the traditional and terraced viticulture, albeit with varying results. For example, in the past decades, the regional government provided an economic contribution for the reconstruction of handmade dry walls of Val di Cembra that collapsed after heavy rains, but only if they were replaced with expensive reinforced concrete walls with exposed stone decorations installed by construction companies. This is one of the reasons that led some vine-growers to abandon the vineyards (due to seniority or economic hardship) or to sell them, in some cases creating those concentrations of ownership that favoured subsequent obliterations. As already mentioned, the regional urban planning document standardizes the vast majority of the agricultural areas as "valuable" without any differentiation based on the higher costs incurred by mountain farms compared to those on the valley floor due to the less-favoured working conditions (Figure 3c), thus justifying obliteration in the terraced landscape. The authors are convinced that such different outcomes are due to the exclusion of those who live and work on the terraces from the decision-making processes. A further in-depth analysis is desirable, as these outcomes of the landscape planning and protection are profoundly counterintuitive when applied to agricultural and productive landscapes.

On the other hand, Vallehermoso and Val di Cembra differ in the relevance given to the development of the link between the locals' intrinsic component and the visitors' extrinsic component of the *landscapital* in order to promote local products and successfully obtain a bonus price to reward uniqueness. For example, the locals in both study areas are aware of the relevance of the dry stone wall *landsmarker* in order to promote their wines. Therefore, they try to convey this particular element maximizing the perceptual experience of such *landsmarker* toward the visitors, who perceive the intrinsic value of a "heroic viticulture" (Zottele and Delay, 2017). However, while in La Gomera the extrinsic *landscapital* is specifically highlighted to visitors, in many areas of Val di Cembra the use of this component is still potential. Indeed, the two overall *landscapital*s are profoundly different.

However, the analysis highlights the need to extend the *landscapital* tool not only to the main *landsmarkers* (terraces and dry stone walls) but also to all other relevant ones and moreover to their relations. The formal approximation defined and developed in this work not only helps to identify the *landsmarkers*, it also helps us to understand the way the landscape is organised in space as a consequence of the struggles of everyday human activities to conquer the spaces of life and work. Therefore, although Vallehermoso and Val di Cembra have a similar viticultural context and some physical and environmental similarities, the *landscapital* concept includes their cultural, social and economic differences: in fact, although the landscapes of the two distant regions seem to be similar, the two overall *landscapitals* are substantially different.

Therefore, as already mentioned, in order to effectively implement the approach described in this study in other territories, it is crucial to understand that the developed scales are decoupled from the geographical scale. However, it is necessary to take into consideration the scale of human activities, because the locals, in achieving their goals (acting as a single entity or as a community) adapt a territory to the physical and environmental constraints as well as to the technological, social, cultural constraints. Again, given that the landscape is the result of human choices during the course of decades, the intrinsic value of one's own landscape resides in both the individual and the community. Therefore, vine-growers become the fundamental architects of the *in-situ* aspect of *artealization,* defining the formal aspects of the landsmarkers and thus affecting the intrinsic and extrinsic values of the landscape.

The authors' future intention is to extend this analysis to other *landsmarkers* that emerge from the landscape and to focus on their relationships to build a more comprehensive value of the overall *landscapital*.

Furthermore, the potential of the *landscapital* concept is not limited to the analysis of the *de facto*. Indeed, it can be used: a) to analyse how the local communities unceasingly model the landscape, finding a dynamic equilibrium between the different social, economic, cultural and environmental forcing; b) to evaluate how this process of adaptation affects and modifies the perceived extrinsic and intrinsic components of the *landscapital*, for both the locals and the visitors, and how this affects the value of a territory's products; and c) to raise awareness concerning the strategies that allow making "intrinsic" capitals "extrinsic".

The results of this research prove that the *landscapital* has a strong potential both for analysing and understanding the perceived value of a landscape. However, it works only when considering the landscape as an emerging phenomenon that springs from the choices and actions that a community implements on its territory, and from the visitors' perception of the landscape on different perceptive scales, which are not geographic, but human. Therefore, *the landscapital*, together with the understanding of the processes related to choices, could also be used by the local communities as a participatory tool, to find strategies aimed at protecting the natural environment and at enhancing socioeconomic well-being. At the same time, it is important to preserve the continuity of productive activities and to adapt them to the new challenges of time, while respecting a community's cultural roots and identity.

Lastly, as the *landscapital* is sufficiently abstracted from the individual features of a landscape, the authors are convinced that our tool is ideally suited for any territorial product and could be successfully adapted to other non-viticultural productive landscapes.

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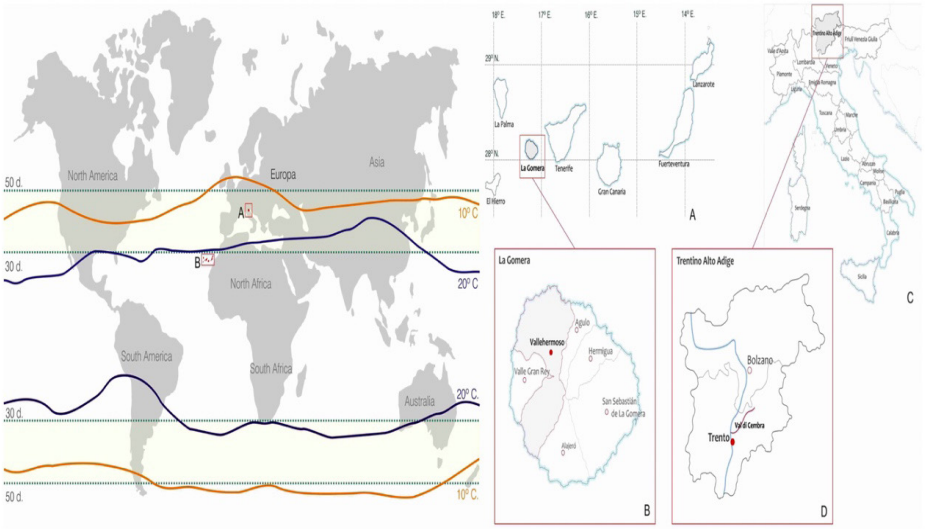

Figure 1. Geographical locations of the two regions considered. Val di Cembra (D) is located in the middle of the Alps (C) and within a temperate climate region (between 10°C and 20 °C isotherms, solid lines), and global temperate latitudes (30d and 50d in both hemispheres, green dotted lines). The region encompassed between the isotherms holds the vast majority of the world's regions suitable for wine production (Fraga et al. 2016). However, heroic viticulture represents a very small niche in terms of both production and cultivated surface: Val di Cembra has a grape-growing area of 700 ha, while Vallehermoso only has 120 ha. It is also important to notice that Vallehermoso (B), in the Canary Islands (A), is outside this expected global grape production strip and benefits from unexpected and unique climatic, environmental and ampelographic characteristics.

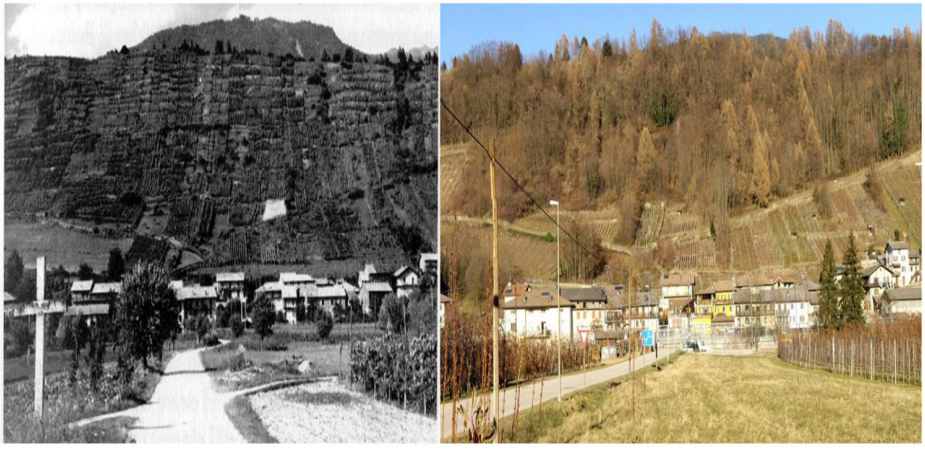

Figure 2. The evolution of a traditional wine growing landscape in the Alps (Colle di Brenta, Valsugana, Trentino, IT). On the left: in the mid-1900s, the steep slope was almost completely covered with vineyards, characterised by a fragmented pattern. The vines in this area were planted perpendicularly

to the contour lines, as in the typical contour plowing and with intensive use of chestnut support poles (Marchesoni 2010) (image taken from Saverio Sartori's archive). On the right: the same production area in 2013. The vineyard in the upper part of the hills has been completely abandoned, while in the lower part the traditional growing methods have sometimes been maintained.

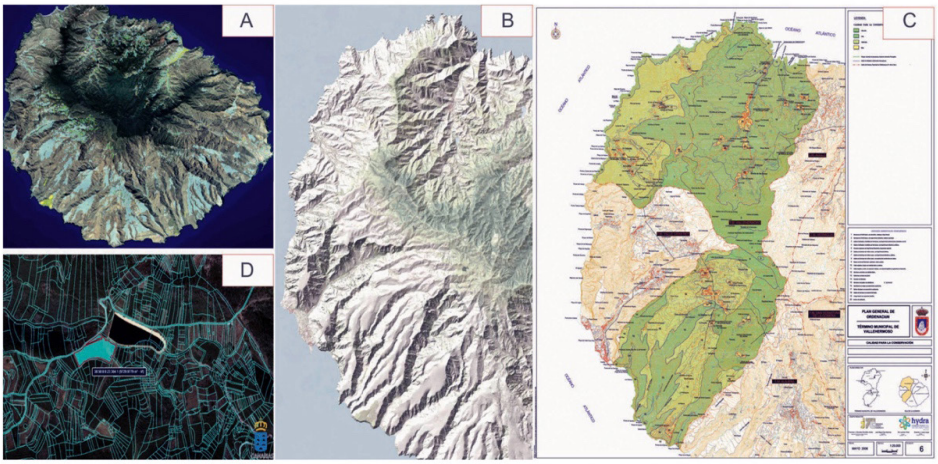

Figure 3. The geographical data used to analyse the landscapital of the Vallehermoso municipality through a multi-scale approach. The green polygons superimposed on the map of La Gomera Island (A) show the spatial distribution of the vineyards in the cultivated area. Hill-shade (B) was used to identify watersheds and *barrancos*. (ITC & HYDRA 2006b) shows the spatial rules for the management and protection of the territory (C). A detail of the vineyards (D) shows the viticultural fragmentation in Vallehermoso.

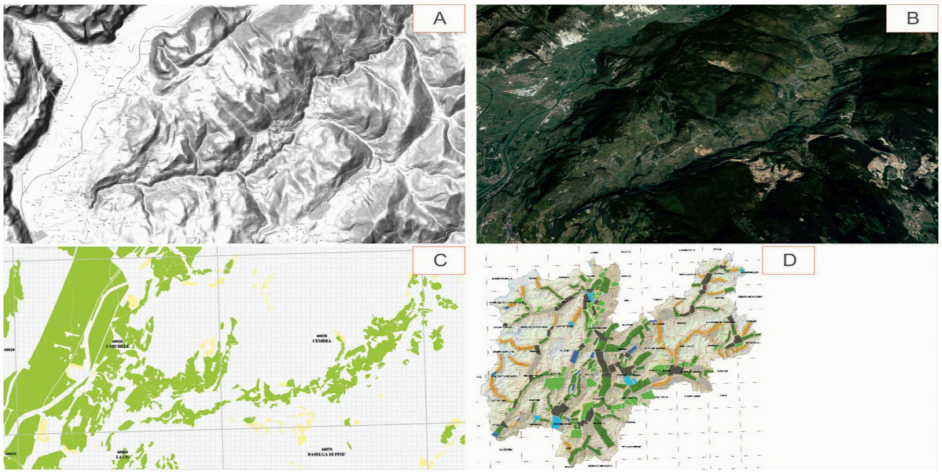

Figure 4. The geographical dataset used to analyse the landscapital of Val di Cembra. The hillshade (A) shows the geomorphological set in which human activities coexist (B). The spatial distribution of the vineyards is shown in (C): the green polygons are defined as "valuable agricultural area" while the yellow are not (Provincia Autonoma di Trento, 2018). The "landscape map" (C) was used in order to consult the territory's legal planning restrictions (Provincia Autonoma di Trento, 2018).

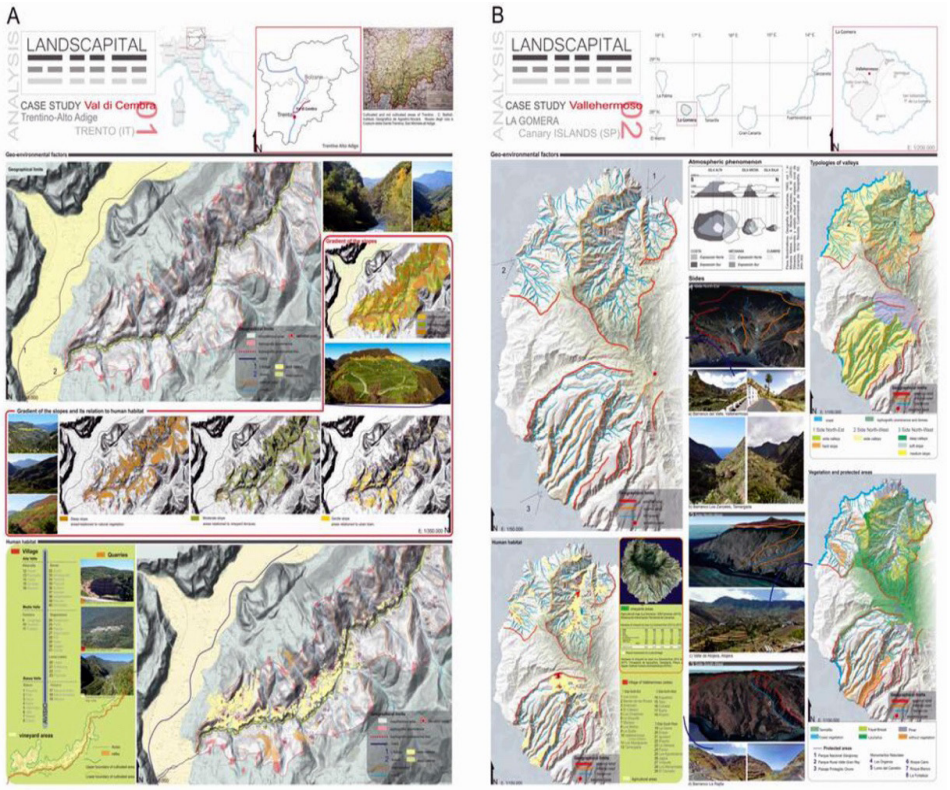

Figure 5. The analyses of the landscape were integrated by the feedback provided by the local vine growers and professionals on 3-5 May 2018 in La Gomera and from 25 September 2018 to 10 October 2018 in Val di Cembra. This led to a wider set of data encompassing landsmarkers, ampelography, viticultural and building practices, history, and anecdotes. Much of this information was summarised in two posters, used to convey the concept of *landscapital* (Val di Cembra is shown on the left, Vallehermoso, La Gomera on the right).

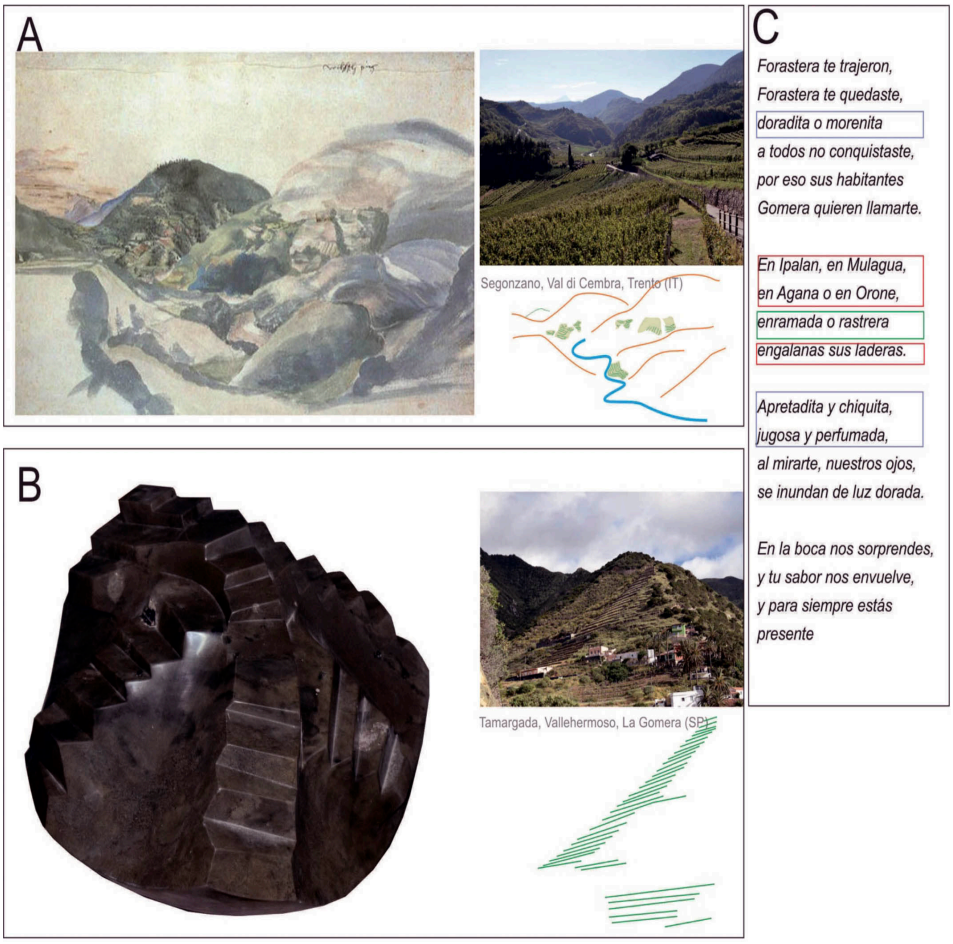

Figure 6. Examples of "in visu artealization". A: watercolor by Albrecht Dürer (1495) of Val di Cembra with a realistic representation of the geomorphological structure of the valley and the spatial distribution of the cultivated area on the steep slopes. B) "Isla": stone sculpture by Pedro Zamorano where La Gomera is represented just with its terraces: las *escaleras*. C) a folk poem about the most cultivated grape of La Gomera: the forastera. Ampelography, cultivation methods and even suitability for cultivation are expressed through art.

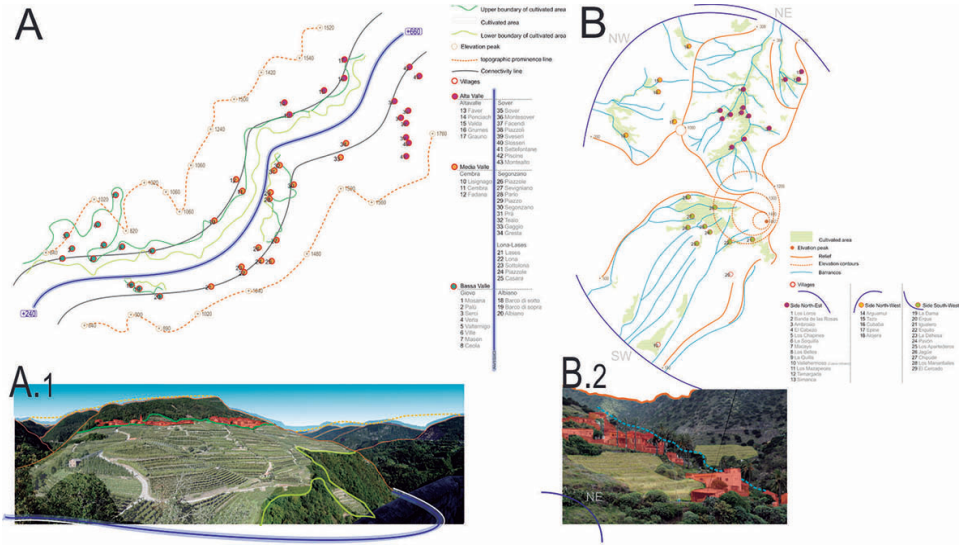

Figure 7. The structural scale shows the physical contexts of both Val di Cembra (A, linear) and Vallehermoso (B, fragmented). The composition and the spatial configuration of the landsmarkers reflect the physical context with regard to the relational scale (A.1 and B.2) showing the linearity and fragmentation in the spatial distribution of the human and natural spaces.

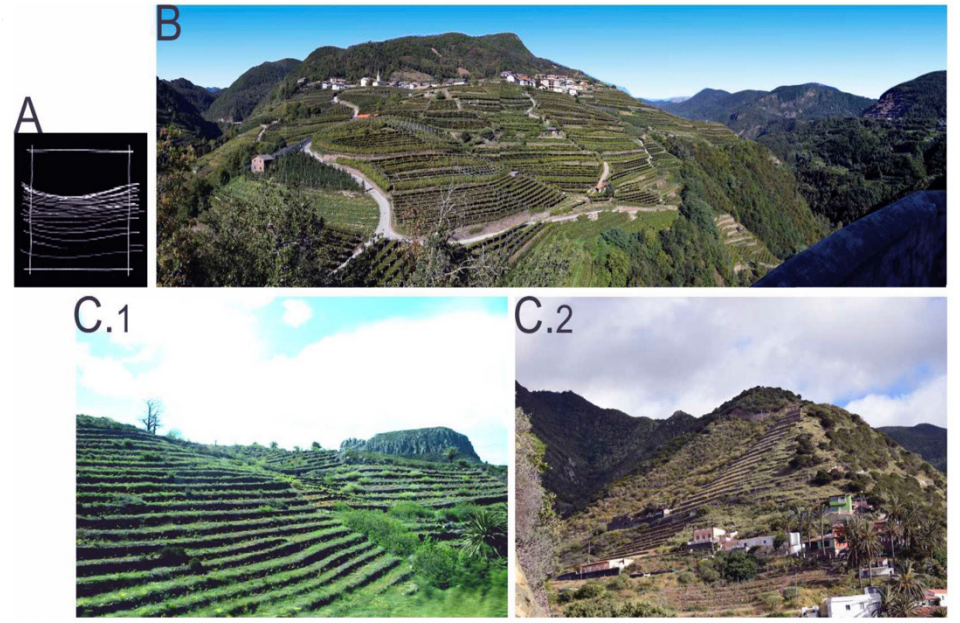

Figure 8. The relational scale of terraced landscapes, together with the theoretical approximation (A), as in Fabienne (2005). Dry walls play the same role in both Val di Cembra (B) and Vallehermoso (C1, C2), with different landscapital values, and they are classifiable in the same way as "terrasse de vigne" or "vigne escalier."

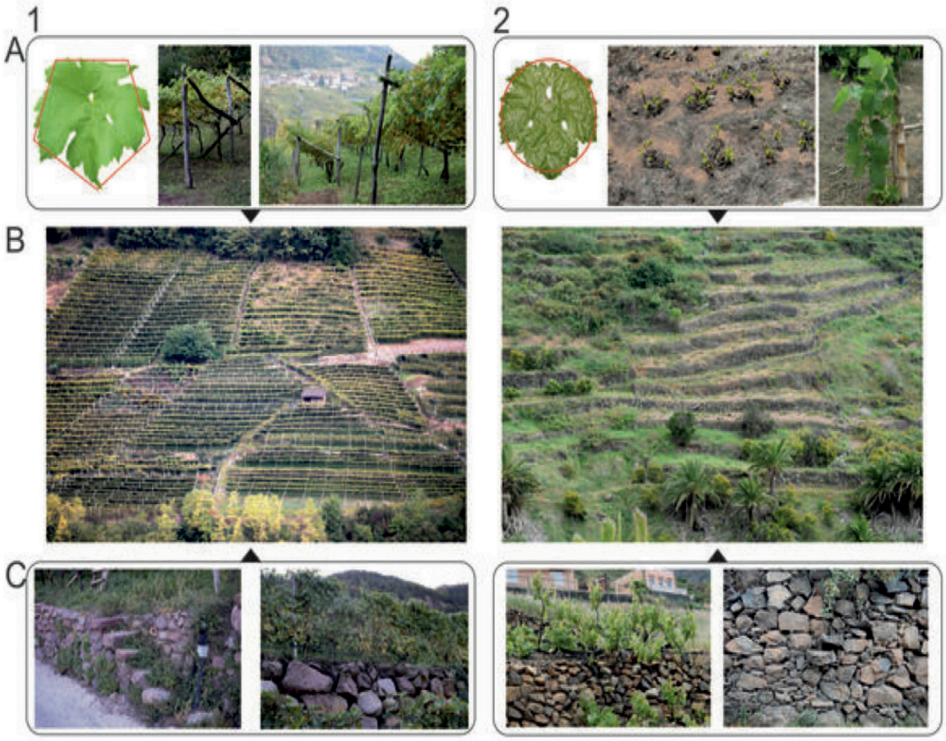

Figure 9. The terraced landscape on the ergonic scale. Column 1 shows Val di Cembra, while column 2 shows Vallehermoso. Row (A) shows the vine and the traditional agrarian practice of the primary elements that build the landscape and affect the landscapital on the relational scale. It is possible to see Müller-Thurgau (A1) versus Forastera Blanca (A2) as ampelographic landsmarkers, and the "pergola trentina" (A1) that follows the architecture of the vine "Toit inclinè discontinu (F05)44" vs the "rastrera" that follows the Nenuphar (C31)14 as found in the classification of Carbonneau (2005, 37-38). C highlights how the dry wall landsmarker evidences the same building process, despite using different materials (porphyry vs. basalt). The combined joint is evident on the relational scale: in Val di Cembra the dry stone wall is hidden by the vegetation (B1), while in Vallehermoso it is fully visible (B2).

Figure 10. An example of the obliteration of the terraced landscape in the upper part of Val di Cembra (827 m a.s.l.). The scale of the territorial remoulding phenomena is so wide that the traditional fragmented, terraced fields, once mixed in the portions of natural territory, disappear from a view that can encompass the scale of the recent transformation. The introduction of the novel landscape element took place on abandoned terraces by eliminating any landsmarker. Finally, this type of process occurs with very fast expansive dynamics. The original situation in 2006, July is shown in (A); first lots in October 2011 (B); expansions in October 2015 (C); further expansion in June 2016 (D).