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## TOWARDS A NEW VALUATION OF CULTURAL TERRACED LANDSCAPES: THE HERITAGE OF TERRACES IN THE CANARY ISLANDS (SPAIN)

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### ABSTRACT

*The objective of this work is to promote a change in the assessment of cultural landscapes of agricultural terraces on islands where tourism development and the neglect of agriculture have led to changes (territorial, socio-economic, environmental and cultural) to their marginalization, which endanger their conservation. To do so, documents of the instruments for management of protected areas, land and heritage management are analyzed besides the scientific literature, in which various aspects of such cultural landscapes are addressed.*

**Keywords:** agricultural abandonment, cultural terraced landscapes, multifunctional, active conservation, land management

## VERSO UNA NUOVA VALUTAZIONE DEI PAESAGGI CULTURALI IN TERRAZZE: ABANCALADO PATRIMONIO DELLE ISOLE CANARIE

### SINTESI

*Lo scopo di questo lavoro è quello di promuovere un cambiamento nella valutazione dei paesaggi culturali dei terrazzamenti agricoli sulle isole dove lo sviluppo turistico e l'abbandono dell'agricoltura hanno portato a cambiamenti (territoriali, socio-economici, ambientali e culturali) per la loro trascuratezza, che mettono in pericolo la sua conservazione. Per cui, si fa l'analisi dei documenti e Atti di aree protette, la gestione del territorio e del patrimonio, inoltre l'informazione scientifica, in cui i vari aspetti di tali paesaggi culturali sono oggetto di discussione.*

**Parole chiave:** abbandono agricolo, paesaggi culturali delle terrazze, multifunzionalità, conservazione attiva, pianificazione

## INTRODUCTION

Terraced agricultural landscapes are the result of a long process of transformation of the natural environment by the societies to face their strong physical limitations (topography, soil, climate) and get the necessary resources for their survival.

Many scientists recognize their multifunctional and sustainable features, at both in their construction (Grove, Rackham, 2001; Tarolli et al., 2014), and also in their past and future management (Scaramellini, 2005; Fagarazzi, 2005; Lasanta et al., 2011, 2013; Romero et al., 2004, 2006, 2015; Romero, 2015; Varotto, 2015; Noriyuki, 2015). Their first role was productive, to provide food and resources to many inhabitants of mountain areas who invested an immeasurable time and effort (human capital). For this reason they are known as the “hunger landscapes” (Gómez, 2007) and the “land hunger” (Martín, 2000); although in many mountains of southern Europe and America they are called the “landscapes of abandonment” (Lasanta et al., 2013). All kinds of agricultural products have been cultivated in them, with high levels of productivity, so agrodiversity and agro-productivity are also among their qualities.

A second function is the environmental one, because they were built to encourage infiltration and water erosion control (water streaming and mass movements) (Fontanari, Patassini, 2008; Tarolli et al., 2014). They are highly efficient infrastructures in water regulation of slopes, waterways, watersheds and aquifers (Arnáez et al., 2015) that, on many occasions, complemented with complex drainage and bypass systems of surface and subcortical runoffs (García and López, 2009), and also in fire prevention (Lourenço, Nave, 2007; Lourenço, Filho, 2007).

The terraces are also culture elements of cultural identity (cultural function), culture of subsistence, the scarcity of soil, water economy, in short, the culture of necessity. They are territorial documents, pieces of history that tell about the needs of people at different times, which are resolved with different models of terraces (great physiognomic diversity) (Grove, Rackham, 2001; Colomar, 2002; Romero et al., 2003; Kendall and Rodríguez, 2007), where its builders-users have shown a deep understanding of the peculiarities of the terrain and the technique of dry stone masonry<sup>1</sup>.

Additional functions that can serve to current social demands may be added to those mentioned above. We may highlight, among others, its use as a tourist resource (productive function) linked to agrotourism, rural tourism, experiential tourism or as heritage resources to be integrated in themed routes; as classrooms or laboratories where research and teaching everything related to these agricultural systems (scientific-educational fun-

ction); as green filters (swells) for wastewater treatment in poor rural areas (assimilative function) or, for the mitigation of the climate change (Kendall, Den Ouden, 2008) (environmental function).

## THE GEOGRAPHICAL FRAMEWORK AND THE STUDY AREA

The Canarian archipelago is a Spanish group of seven volcanic islands located in the eastern Atlantic. It has a surface area of about 7,500 km<sup>2</sup> and, as general physical features, we may highlight its lack of soil and water resources with its limited arable land. The change of the economic model experienced in the second half of the twentieth century has shifted population from agriculture to the tertiary sector (services and tourism) (Figure 1), the abandonment of agriculture and increased the dependence of food from abroad.

Terraced agricultural landscapes are present in all the islands although it occupies larger areas in the most mountainous; La Gomera is the island most widely terraced.

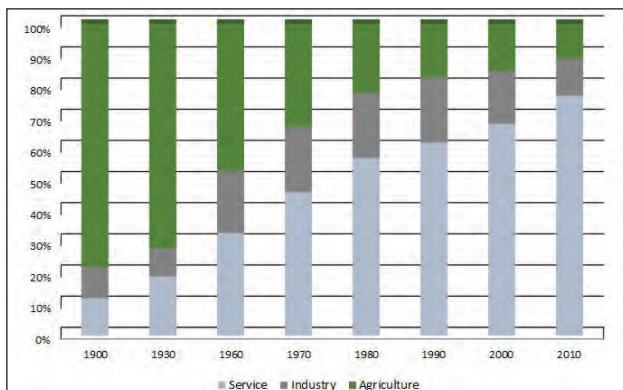
The test of this method is performed in the medium-low segment of the Guinguada watershed (northeast sector of Gran Canaria) representing a fifth of the basin (Figure 2). Terraced agricultural landscape has, despite its small size, a wide variety of crops and types of walls. The recent history of this area is marked by the agricultural abandonment (50% of the terraced surface) and the island capital city growth that leads to blockage of multifunctionality, loss of visual-aesthetic quality, anti-erosive efficiency and the consequent degradation of landscapes with undoubted heritage value.

## TERRACED LANDSCAPES IN THE CANARIAN SCIENTIFIC LITERATURE

Terraced agricultural landscapes of the Canary Islands have been little studied. Although there are many works that deal with agriculture and the rural world, made by geographers, sociologists, economists and historians, a study of their socioeconomic characteristics, types, surface area and problems in the Canaries has not yet been made.

The first contribution made from the *Geography* to the knowledge of the terraces is referred to as the cereal model (Afonso, 1984). This author argues that this was the culture with greater surface area and the one providing the mainstay of the population, through the development of gofio. The existence of terraces at mid-height and summits of the highest and high slope islands is indicated (western and central islands of the Canaries). This author also reports that the peasant has had to broaden the fields occupying the slopes of ravines and

1 Use of the intrinsic properties of dry stone: retaining moisture, moderate but continuous ventilation, thermal inertia with maintenance of temperature (thermoregulatory effect) and effective drainage of soils (Lasanta et al., 2013, 313).



**Figure 1. Evolution of the occupied population in the different economic sectors at the Canary Islands (1900-2013).** Source: Population censuses and municipal registers. Spanish Statistics National Institute.

marginal areas, thus causing the unique and spectacular scenery of the terraces.

On the other hand, we have the altitudinal geographic model (Álvarez, 1976, 1983 and 1993), which criticized the previous and proposed an explanation of farmland floors, where terraces are preferentially located in the mid-height lands of both the windward and leeward of the island, though without discarding their existence in summits and coasts. This author suggests that terraces are made to reduce the slope and facilitate the irrigation.

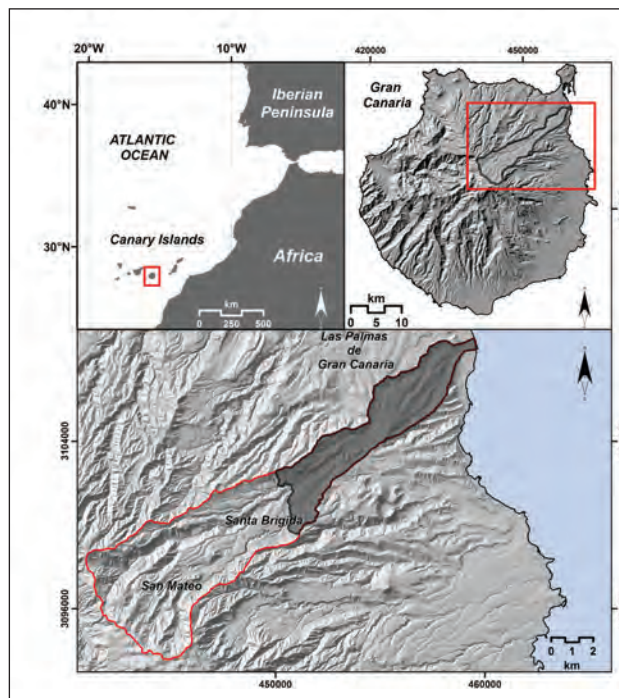
Eugenio Burriel (1982), based on the dualistic theories formulated by various development and underdevelopment economists (Amin, 1976) proposes a new explanatory model that distinguishes a rich agriculture from a poor one.

This theory is criticized by Martín and Díaz (1981), who propose a system based on production methods, with a clear Marxist approach model. These authors identify three modes of production in the Canary social formation: the small merchant or pre-capitalist production, the capitalist, and the sub-capitalist.

Rodríguez (1982, 1986 and 2012) analyzes the social and economic problems of the production model of mid-height lands that contrasts, by its technical backwardness and economic marginalization, with the agriculture practiced on the coast.

Instead, Martín (1993 and 2009) makes a typology of agricultural landscapes, using for his classification the following factors: the nature of the cultivated soil, the altitudinal location of crops, the building techniques of agricultural farmland, the form and the size of the plots, the water regime, the cultivation system, the fate of agricultural production and the structure of land ownership.

Finally, among the contributions made by geographers, we highlight the proposal by García and Pestana (2010) who conducted a comparative study of various authors on the concept of mid-height lands. They ana-



**Figure 2. Area of study for the methodological test. Mid-low sector of the Guinguada watershed (Gran Canaria, Canary Islands, Spain).**

lyze the mid-height agriculture in the western Canaries and make a particular reference to the technical, economic and social aspects of the rural life in these island areas.

An interesting aspect of the study by García (2011 and 2013) is the abandonment of landscapes associated with many types of agricultural landscapes, among which are those of terraces. He notes that with the outsourcing of the Canarian economy, the “construction boom” and the development of tourism, many plots and farms are abandoned while in other cases a work at full time is changed by another at partial-time. This phenomenon particularly affects terraced landscapes, which start a process of degradation that affects mostly the leeward side of the Islands and in particular at their mid-height lands.

Among the contributions made from the *History*, we may highlight the one by Macías (1981) who reveals the complexity of the traditional agricultural system at mid-height lands (self-supply and internal market) and its linkages with the coastal agriculture (oriented to exportation) through the workforce reserve. He points out, as do many of the geographers cited, that terraces predominate in the mid-height lands.

Finally, it should be noted that from the edaphologic point of view (Fuentes, 2003; Arbelo et al., 2006), studies on the degradation of the terraces after agricultural abandonment have been conducted (erosion and loss of

**Table 1: List of Protected Areas of the Canary Islands which have the terraced landscapes among their declaration elements.**

PROTECTED AREA	ISLAND	REGULATORY PROVISIONS AND OBSERVATIONS
L-9 PP Tenejúime	LZ	Terraces recovery is regulated.
F-12 PP Vallebrón	FV	Ethnographic, cultural and landscape values (ridged reliefs with terraces, very beautiful) are recognized.
C-11 PR del Nublo	GC	Conservation, restoration and new terraces are allowed.
T-20 MN Roque de Jama	TF	New terraces are allowed (with traditional techniques); the restoration is regulated and the maintenance of terraces linked to agricultural use is encouraged.
T-32 PP Ifonche	TF	Restoration and new terraces are regulated. The terraces with dry stone walls and jable deposits are considered as landscape and ethnographic values.
T-35 PP La Resbala	TF	New terraces are allowed (with traditional techniques) and restoration is regulated.
G-4 PR Valle Gran Rey	LG	New terraces are allowed (with traditional techniques), the restoration is regulated and the alteration of the existing terraces is prohibited. The existence of terraces is used as criteria for zoning. The restoration of terraces should be prioritized according to the agricultural landscape and interest of each place. The activities of conservation and restoration of terraces are included in Title 7 of Basic Actions.
G-13 PP Orone	LG	The restoration of terraces is regulated.

Key:

Island: L, Lanzarote; F, Fuerteventura; C, Gran Canaria; T, Tenerife; G, La Gomera.

Type of Protected Area: PP, Protected landscape; PR, Rural Park; MN, Natural Monument. Prepared from the management tools of the respective Protected Natural Areas (ENP).

fertility) and from the physical geography, on the type of the erosion affecting the degradation of these cultural landscapes (Arnáez, Pérez-Chacón, 1986; Romero, 2015). They focus on the environmental and landscape functions of the Canarian terraced landscapes and promote their conservation.

#### CANARIAN TERRACES: THEIR CONSIDERATION AND TREATMENT IN THE TECHNICAL DOCUMENTS OF SPATIAL PLANNING AND HERITAGE INVENTORY

Through the document review of the management tools and heritage inventories and catalogs, the assessment received by the spaces with terraces in the Canary Islands on the part of public bodies is analyzed.

#### INSTRUMENTS OF MANAGEMENT OF PROTECTED AREAS

In the Canaries, some kind of arrangement related to the terraces is contemplated in only 69 of the 146 existing protected areas. The mountainous islands (central and western islands) are those that have a larger number of protected areas with terraces. Generally, its restoration is regulated in relation to its landscape relevance and environmental benefits (anti-erosive effectiveness).

However, very few documents include the terraced landscape between their protected elements (Table 1) or as basic and priority objectives (Table 2) (Figure 3).

It is frequently observed in the regulation of protected areas that conservation and maintenance of terraces is allowed, the restoration work as authorizable uses are included and new terraces are expressly prohibited. These guidelines, which are repeated on many occasions, particularly appear in the *Rules of Conservation of Natural Monuments. Guidelines* allowing "The new exploitation of ancient terraced farmland which are now abandoned" are also common to many documents or maybe those governing its implementation as follows:

- "The height of cut or fill shall be consistent with the existing terraces in the environment".
- "The restoring of walls or containment terraces must always have a rustic stone finished of the environment".

Therefore, it can be concluded that the consideration of the terraces in the management tools of protected areas is scarce, although there is a clear tendency to consider their conservation, as landscape highlighted elements (landscape function), especially in *Protected Landscapes*, and also to understand their anti-erosive effectiveness (environmental function).

**Table 2: List of Protected Areas that have, among their objectives, the protection of terraces.**

PROTECTED AREA	ISLAND	REGULATORY PROVISIONS AND OBSERVACIONES
T-12 PR Anaga	TF	Promoting terracing is an objective of the Plan (art. 9, paragraph 8). Restoration of walls and terraces is regulated (art. 67). New terraces are allowed (with traditional techniques) in area of traditional use and SRPA category (in the terms provided in the Insular Plan of Arrangement). The terraces constitute a criterion for delimitation of homogeneous units. Alteration of existing terraces is prohibited.
T-33 PP Acantilados de La Culata	TF	Maintain terraces as a measure to prevent soil loss and maintain agricultural activity are goals of the Plan (art. 8). New terraces allowed (with traditional techniques), and the restoration of walls and terraces is regulated.
G-9 MN Barranco del Cabrito	LG	Restoration of terraces is regulated.
P-14 PP Barranco de las Angustias	LP	Keep existing agricultural uses and promote the reuse of abandoned terraces are goals of the Plan. New terraces allowed (with traditional techniques) in SRPA. Restoration of walls and terraces is regulated.
P-15 PP Tamancas	LP	Keep existing agricultural uses and promote the reuse of abandoned terraces are goals of the Plan. Although listed as a goal, there is no type of regulation.

Keys:

Island: T, Tenerife; G, La Gomera; P, La Palma.

Type of protected space: PP, Protected landscape; PR, Rural Park; MN, Natural Monument.

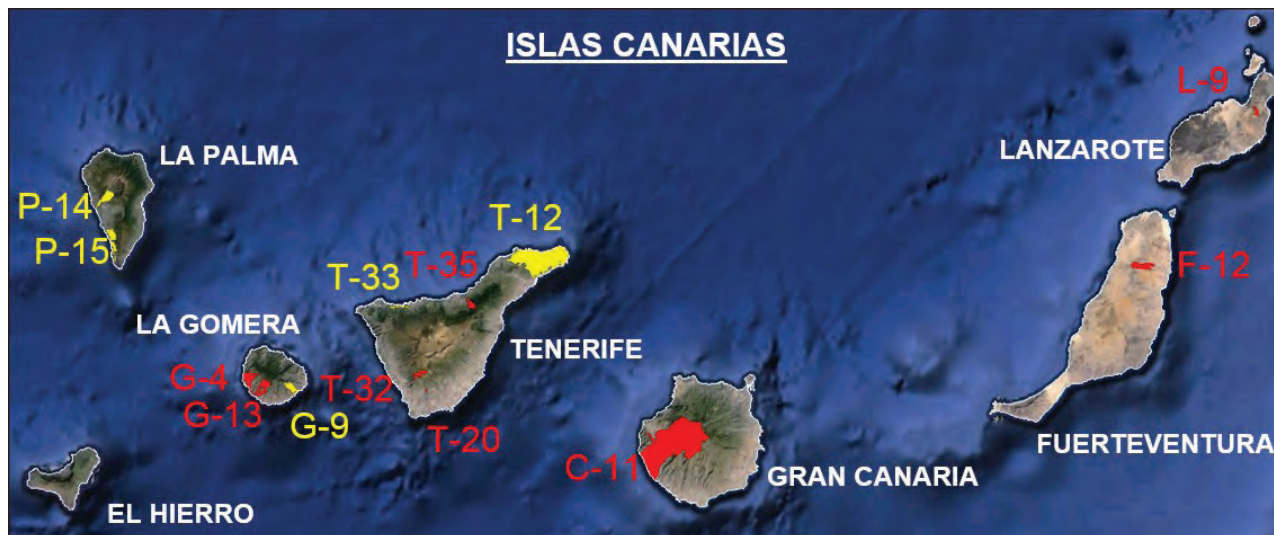
SRPA: Rural soil of agrarian protection.

Prepared from the management tools of the respective Protected Natural Areas (ENP).

SPATIAL PLANNING INSTRUMENTS

The *Island Management Plans* (IMP) highlight among the documents of regional planning instruments that include regulatory provisions regarding the terraces and terracing.

In the IMP of La Palma it is contemplated the need to maintain the existing terraces as protection of soil (art. 35), but without clarifying how to carry out this measure; however, new terraces are regulated (art. 184). In El Hierro, new terraces are allowed using traditional



**Figure 3: Protected Natural Areas of the Canary Islands with references to the terraces on its declaration elements and / or one of its conservation objectives.**

techniques, while activities that may alter the existing terraces are prohibited.

In La Gomera island where terraced landscapes have a high ethnographic value, the IMP promotes terraces as a formula for plant recolonization and erosion reduction. It is the only *Insular Plan* that put forward the need to take measures against the abandonment of terraces and restoration of those already abandoned (art. 22). To this end, it proposes a ‘program of restoration and maintenance of terraces’ and refers to the *Special Territorial Plan for the Agricultural Sector* (AOR-1 PTE-1). This initiative deserves to be highlighted because it is an exceptional event in the Canary Islands and that includes, among its objectives, both the necessary soil retention, such as the protection of traditional landscape, attributing to the terraces, in addition to its environmental value, the ethnographic (cultural) and architectural (landscape). From the heritage point of view, the IMP of La Gomera Island defines the *Island Ethnographic Territorial Areas* (ATIPE) and ‘Unique Elements’, in order to propose measures to protect the ethnographic heritage of terraces through the corresponding *Special Plans*. The fifty four ATIPE considered include the *Island Rural Areas* and ‘Gomeros hamlets’ where the traditional house is understood together with the terraces, as a form of traditional local landscapes and, therefore, as an entity to protect.

The IMP of Tenerife regulates new terraces, limiting them to the traditional areas and provided ‘to adapt them to the characteristics of the environment’ (p. 1.4.2.5., Section 2). In addition, the existing terraces are protected, prohibiting actions that could damage them and the adoption of incentives ‘for the restoration of terraces’ (p. 3.4.2.7); in the end, this regulation do not produce concrete actions.

In the IMP of Gran Canaria, although cultural landscapes are valued in its proposal, no explicit mention is made of those with terraces. New terraces are allowed ‘in areas where this technique has been traditionally used’ and warns to be implemented ‘in accordance with the arrangement and traditional aesthetic criteria’ (art. 161) or by a tree blend (art. 179). This provision suggests that the terraces are considered as a landscape condition, rather than a feature of the landscape with its own value. IMP also presents a regulation to conserve existing terraces to slow the erosive dynamics. One fact that stands out from reading that document is that it is possible to locate tourist facilities on the coast of the northern Gran Canaria, provided that the ancient terraces of banana are preserved (art. 527).

Finally, in the *Island Management Plans* of the eastern islands (Lanzarote and Fuerteventura) the unique mention to the terraces is that terraces can be reused as a property to build housing on rural land (PIOF, art. 97).

In the *Director Plan of action for sustainable development of rural areas in the mid-height lands of the Canary Islands* (2000-2006) there are grants for the recovery of

terraced landscapes (BOC-2005/241, Monday December 12, 2005).

As for the territorial and sectoral planning, there are several examples that include landscapes with terraces among its regulatory determinations. It is noteworthy the case for the *Special Territorial Plan for the Landscape of Gran Canaria* (PTE-5) and the *Agricultural Special Territorial Plan* (PTE-9). In the first one, terraced landscapes are considered as a value to protect, sending any kind of determination to the respective municipal plans, ‘recommending’ them to allow the terraces. In the second, new terraces are prohibited on hillsides with slopes greater than 30%, or the restoration of those who experience an advanced plant recolonization process; there is no mention to the need to conserve and protect these structures for their productive, cultural or scenic value.

In this section, the island of La Gomera is again the one that, on an institutional level, shows a greater consideration to their heritage of terraces. This is demonstrated by its participation in the cooperation project *Island Agro-Landscapes*, a land stewardship project on tourism and rural islands (2010-2013). It is an initiative of the Association for Rural Development of La Gomera (AIDER La Gomera), which aims to assert the value of traditional agricultural landscapes. It is a pilot project which aims to defend terraces by their huge landscape, economic, ecological and heritage values and it incorporates a new concept of ‘agricultural custody’. This is done by basically testing the commitment of farmers on the island to maintain these structures in good condition, in exchange for incentives and technical advice, and also a reduced financial support. This is, in essence, to experience new ways of compensating them for being the real makers of traditional landscape, since this is an important tourist-productive resource.

Consideration of the terraces in the instruments of spatial planning is scarce, being limited in the best case to prohibit the alteration of existing terraces as relics to be preserved. The construction of new terracing is regulated and limited, which leads us to interpret that terraces almost have more consideration as landscape condition than as a value worthy of protection, conservation and recovery.

### C. HERITAGE TECHNICAL DOCUMENTATION

The current *Law on Heritage in the Canary Islands* (BOC No. 141 of July 21, 2006) makes no explicit reference to cultural terraced landscapes, or to them as heritage elements.

In Gran Canaria, the *Special Territorial Plan for the Historical Heritage Management* (PTE-6) is under progress. Although there is still no regulatory document, landscapes considered by the ethnographic value of their terraces, among others, are included in the catalogue of heritage. This documentary is based on the *Plan of the Gran Canaria Ethnographic Catalogue*

(Ramón, 2003), which assigns to the terraces a secondary and complementary value within the ethnographic landscapes, without an explicit mention of relevant meaning; this makes us think that little can be expected from the PTE-6 regarding the future protection of the terraces.

In the case of Tenerife, the production of the island ethnographic catalogue is in its initial phase. The few initiatives undertaken on heritage are at municipal level, as only three municipalities (Granadilla, Guía de Isora and Arona) have a complete inventory of their ethnographic heritage. Beyond the actions of public institutions, the cultural association Pinolere published the only one global project of ethnographic inventory of that island (Hernández, 2011), although terraced landscapes are not included in the list of heritage elements.

References to the heritage of terraces in the smaller islands are very scarce. On the island of La Palma, the council includes only the *Goods of Cultural Interest*, four of which are intangible ethnographic goods, but there is no reference to terraced landscapes. On the island of El Hierro there are not rigorous and comprehensive ethnographic inventories. Their IMP refers to municipalities to produce those inventories and territorial areas of heritage interest are delimited (archaeological and palaeontological, ethnographic and architectural). There is no reference to terraced landscapes as structures of ethnographic interest, beyond making a generic reference to them as “elements of the rural landscape” (section 1.3.3.5 of the volume V of the Informative Report), including the following elements: “stones for protecting the fruit trees, house of shepherds, wineries, eras, ovens, boundary walls of enclosures, etc.”.

La Gomera has a small inventory included in the documentation of the IMP, where “singular elements (in ethnographic and architectural interest)”, including wells, lighthouses, windmills, davits, warehouses and kilns, are considered. The most important documents are the already mentioned *Ethnographic Island Territorial Areas* (ATIPE) and the *Regional Island Rural Areas* (which includes the “Gomeros Hamlets”), since those are entities that allow for a joint protection of terraces by a *Special Protection Plan* (Article 37.2 of Decree 1/2000).

Fuerteventura has a catalogue of heritage which records a large number of ethnographic goods (ovens, lighthouses, windmills, huts, stores and lime kilns); agricultural landscapes are omitted, highlighting the marginalization of topsails and water harvesting systems, agricultural structures with a great significance on this island.

Finally, Lanzarote has a catalogue for their *Historic-Artistic Heritage* in its current IMP. In this document, little value is given to the ethnographic heritage. It only includes architectural structures (including some mills) and elements of the natural heritage (palms of Haria) but nothing is mentioned regarding agricultural terraces or

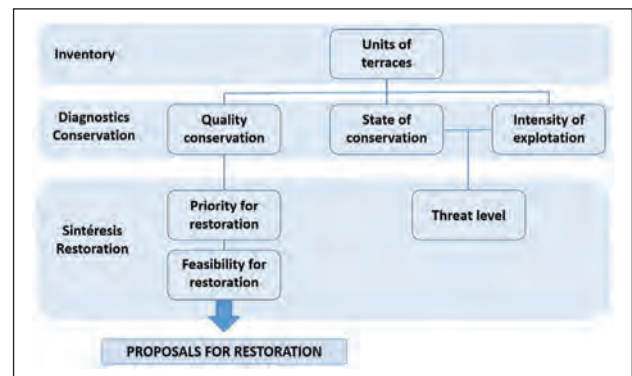


Figure 4: Methodological framework for the assessment of terraced landscapes.

any other structure (topsails, water harvesting systems and drinking trough).

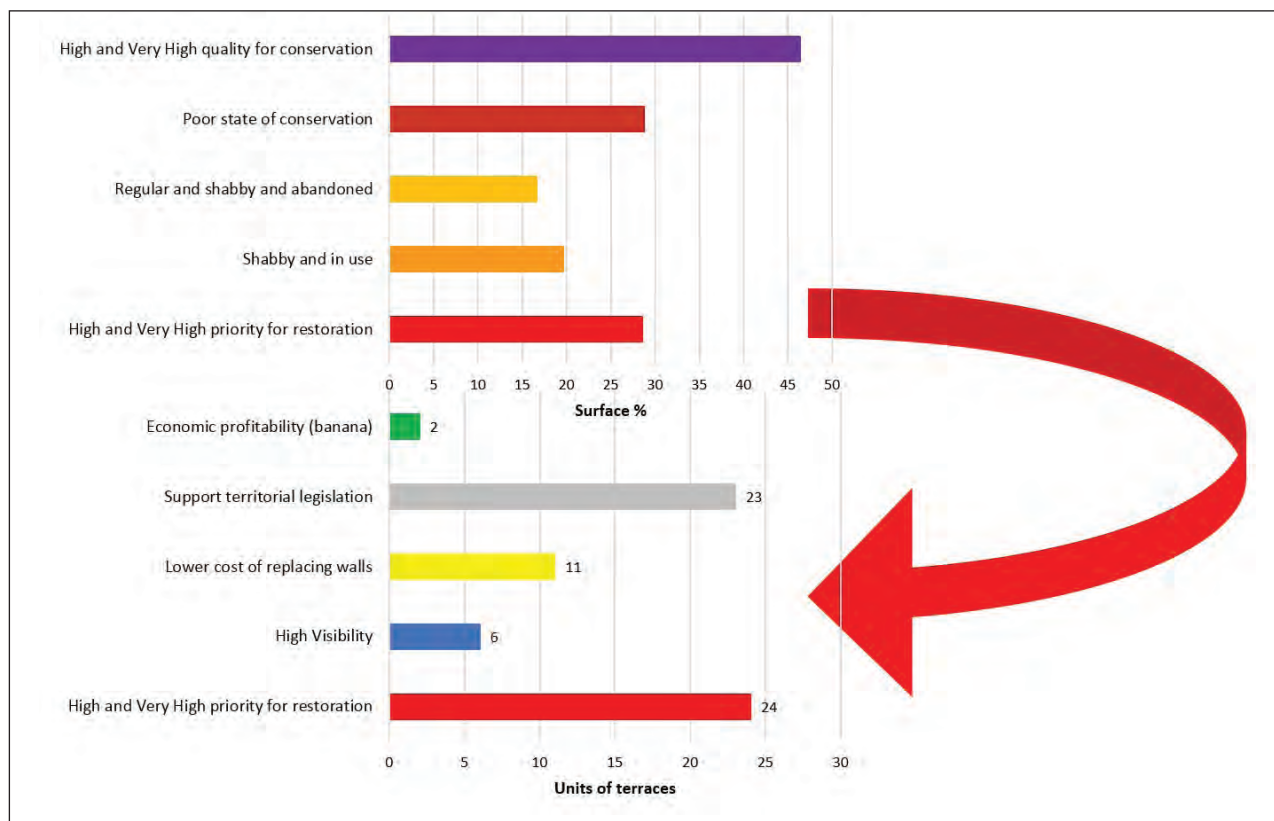
In short, and with respect to the terrace heritage of Canarias, there are few references within the heritage catalogs as elements of ethnographic heritage. We may highlight the inventories of the islands of Gran Canaria and Fuerteventura and to a lesser extent La Gomera and El Hierro. It is very striking that where there are inventories of ethnographic goods, structures with a much smaller footprint than terraced landscapes as pens or house of shepherds are included.

The terraces, as elements of ethnographic heritage and as landscapes, do not have an important role in the heritage conservation policies in the Canary Islands, with the exception of the island of La Gomera where conservation strategies are defined.

#### METHODOLOGY FOR MULTIFUNCTIONAL VALUATION OF TERRACES. TEST AT GUINIGUADA RAVINE (GRAN CANARIA, CANARY ISLANDS, SPAIN)

The starting premise is that all terraces do not have the same quality and that if the ultimate goal should be to preserve as many of them as possible, a process that is at the same time evaluative and selective must be set, and which contemplates its multifunctional character, its strengths and weaknesses. The method designed for the assessment and recovery proposal is based on the multifunctional nature of terraced landscapes, and it seeks to integrate the various functions (production, environmental, cultural, and aesthetic) in different phases. The method takes place in four stages (Figure 4): i) an inventory of landscape units with terraces, ii) diagnostics for quality conservation and conservation status, iii) priority of preservation before restoration, and iv) a feasibility study for restoration.

The work begins with the identification and location of the landscape units with terraces using aerial photographs and field surveys. These terraces are defined by their use (in operation or abandoned) and by their



**Figure 5: Diagnostic results (quality and conservation status) and sinteresis (priority and feasibility for restoration) in the areas of the methodological test.**

constructive similarities (type of masonry). The work continues with the design and filling of an inventory record of each unit in which basic characteristics and eco-anthropoc descriptors considered as useful in the later stages of diagnosis and purposeful are included. The digitization of terraced units, the import of the information inventory in a spreadsheet and its implementation in a GIS allow us the processing of data, in addition to the graphic and cartographic output results.

The quality analysis for conservation evaluates the multifunctional terrace units in an integrated manner. For this purpose, an algorithm where the partial assessments of the production function (agricultural quality soil) is introduced, as long as the environmental (regulatory role of the hydrological dynamics of the slope), cultural-environmental (building characteristics is strength—beauty of the walls) and the aesthetic-landscape (visual quality) functions. The last factor added is the level of integration of human activities in terraced units. Five categories are finally obtained, from very low to very high quality for conservation (Romero et al., 2004).

The conservation status analysis provides a diagnosis of the degree of involvement of the terraces to the mass movements of its walls, which are the dominant erosion processes in this type of agricultural structures (falling rocks, landslides and mudslides). The average percentage of walls affected by erosion is evaluated and three categories are established: good, fair and poor condition (Romero et al., 2003).

The priority of preservation before restoration allows the selection of terraced units depending on the urgency of restoration according to the degree of threat (maximum deterioration and in use as a maximum value and well preserved and abandoned, as minimal threat) (Cadiñanos, Meaza, 1998) and its quality for conservation (Romero et al., 2006). The final assessment of the priority is obtained from the product of both parameters (threat x quality), with a previous weighting of quality for conservation (x2) to facilitate the discrimination in similar situations in the degree of threat. Five categories are obtained, from low to very high priority for restoration.

The method ends with the step of applying viability indicators for restoring. The first idea is that the main

2 The intrinsic visibility reports on how much terrace unit is visible for its proximity to villages or roads. Extrinsic expresses how much visibility can be seen about the scenery around the unit (its strategic location is valued for obtaining panoramic views).





**Figure 6: Unit n°103 (Finca El Galeón) before and during the execution of the conditioning of the Guiniguada Agricultural Park in Santa Brigida.**

goal is the sustainability of terraced areas from their active conservation, with an economic use and the enjoyment by residents and visitors. These proposals are useful if they are implemented in policies or rural development plans, with their corresponding transversal character with sectoral policies in agricultural, environmental, heritage and landscape matters.

Viability criteria are three: visual, economic and territorial. In this phase, the selection is intended for those terraces which bring greater benefit, among those units with high and very high priority for restoration, lower costs and those whose recovery is compatible with the existing territorial legislation. The benefit is calculated from visibility of the terraced units, so the more visible they are, more people can benefit from their contemplation. It is calculated from the intrinsic<sup>2</sup> and extrinsic visibility and their accessibility (Romero et al., 2015). The algorithm considers, as added values, those obtained for the two types of visibility and accessibility, assigning a greater weight to the intrinsic visibility (x2). There are finally three categories of benefit visibility: low, moderate and high.

The economic viability analysis is performed following a double process: first, from the cost of the replacement of the walls at the units selected for their high priority for restoration and, secondly, by calculating cost-benefits of the restoration in relation to the productivity of the two types of dominant cultures in the area: bananas and potatoes. The aim is to calculate the profitability of the restoration (payback time) related to the profitability of these crops, so two separate analyses of economic profitability were consulted. For the territorial viability, documents of different spatial planning tools are reviewed to assess the degree of compatibility of uses and activities allowed in these areas, with the restoration of the walls of the terraces and productive recovery.

#### RESULTS OF THE APPLICATION OF THE METHODOLOGY OF VALUATION OF THE TERRACES

The results of this methodological test show that 46.3% of the terraced surface has high and very high quality for

3 Unit n°103 (Finca El Galeón), restored by public initiative, is one of them.



Figure 7: Unit n° 103 (Finca El Galeón). Restored and in operation with vegetables in the Guiniguada Agricultural Park in Santa Brigida.

conservation. These units terraces are characterized by the good agricultural quality of their land, the beauty and strength of its walls (row masonry and *rajuela*—unworked and thin stone used in buildings), the highest rating in its hydro-regulatory function (profusely terraced slopes) and, the most outstanding feature, their high visual quality for the important cultural and natural heritage that they contain or are present in their environment (Figure 5).

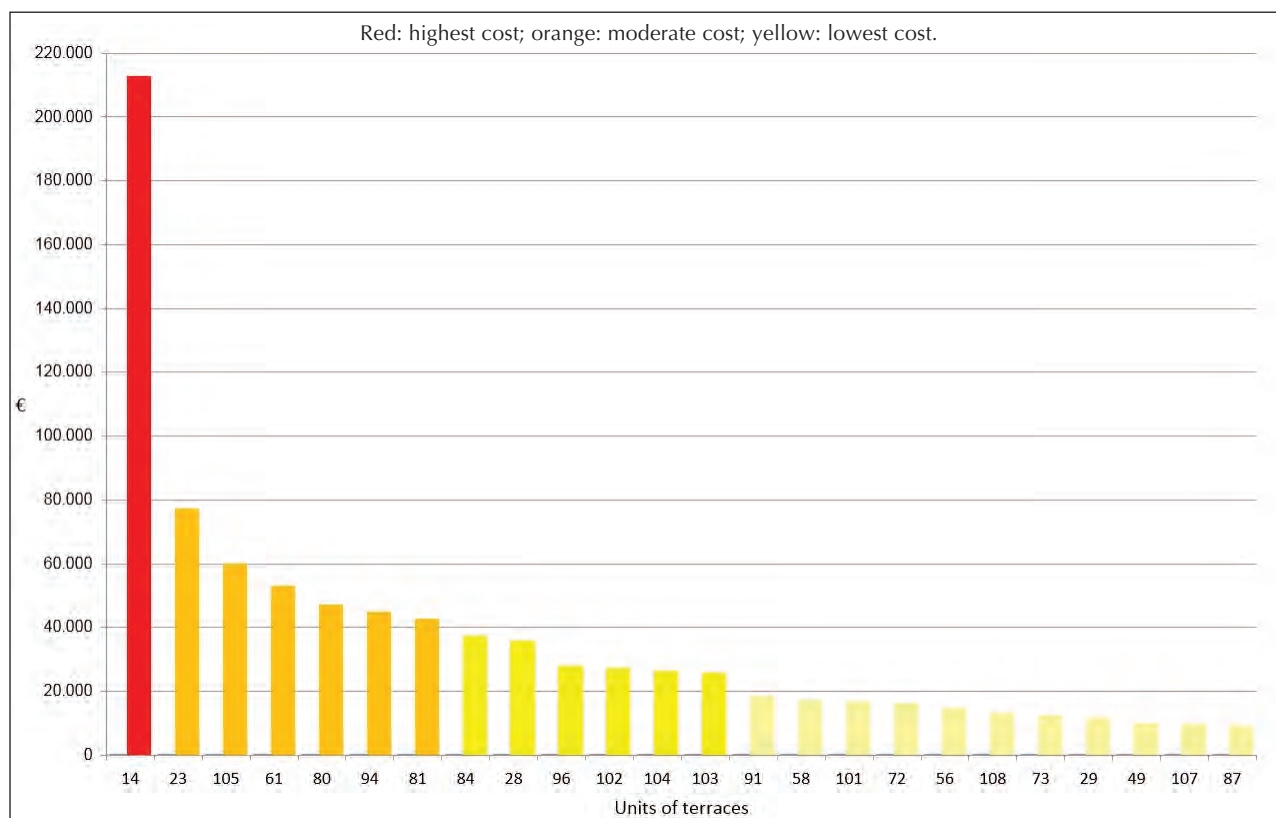
28% of the terraced surface is in poor condition, with more than 75% of their walls affected by erosion, abandoned between 1960 and 1996 and placed on lithological substrates very waterproof (phonolitic lava) or very brittle (alluvial sediments).

With regards to the urgency of restoration, 28.5% of the terraced surface is high and very high priority for restoration. This is 24 units out of the 111 sampled, which have in common a medium-high quality value for the conservation, and where more than half of their walls were destroyed. Among these, four are the units with very high priority for restoration, which are partly cultivated and their walls are in very poor condition. These were with the maximum quality for conservation due to the natural and ethnographic heritage that exists at both their environment and inside them (palm of *Phoenix ca-*

*nariensis* and hydraulic heritage elements such as dams, ponds, wells, ditches and water splitters). It should be noted that one of them has been restored by the initiative of the Cabildo de Gran Canaria based on indications of the European project *Pilot Urban-Guiniguada* (Romero et al., 2000) and it has become an Agricultural Park (Figures 6 and 7).

The number of units of terraces where restoration would bring the overall maximum social benefit is reduced to 6, 3<sup>3</sup> of which have maximum visibility intrinsic values (proximity to the town of Santa Brigida) and accessibility (busy insular road and the existence of numerous viewpoints where terraces can be viewed from).

The results of the calculation of the replacement cost of the walls of the terraces selected as priority restoration show very high values, ranging from € 9,179.40 for 144.6 meters of wall as the lowest value, and € 212,751.50 for 3350.9 meters of wall as the highest one (Table 3). Those are very high costs, despite the possible existence of institutional support, and are insufficient for being undervalued (the grant would cover a proportion of the actual spending of replacement and further away from the actual price). These costs are highly burdensome for the owner of a farm that practiced a part-time



**Table 3: Replacement cost of walls at the terracing units with high and very high priority for restoration.**

family agriculture, as it is the case for most of the farmers who dedicate their terraces to the dominant crop in this sector of Guinguada, which is the potato.

The economic viability analysis conducted in terms of “profitability” for the most important crops in the area (potato and banana), shows that, despite both are receiving subsidies for production and marketing, the restoration of the walls to the potato farmers is not feasible, while for the banana it is profitable, despite the fluctuations in its production and marketing.

Finally no “significant” inconsistencies are found between the proposed restoration of the walls of the terraced units with high and very high priority for their restoration and the current territorial legislation.

## DISCUSSION

The validity of the designed method for multifunctional valuation of terraces is demonstrated as it has allowed classifying terraced landscapes based on the comprehensive assessment of their functionalities and select a few of them, given their high quality and high priority and viability, to be restored. Its pragmatic nature is demonstrated when one of the terraces units proposed for restoration (Romero et al., 2000) is selected by public institutions to its active conservation as Agricultural Park.

This method can be improved in the future by incorporating criteria for the identification of types of multi-functionalities of the terraces to report on potential uses, for example, following the Japanese model of type of multi-functionalities (Noriyuki, 2015).

This work promotes the multidisciplinary scientific studies and the mainstreaming of sectoral and territorial policies that contribute to the conservation and proper management of terraced landscapes. It is therefore desirable to take advantage of the integrator role or as “mediation” of the terraces (Lasanta et al., 2011; Varotto, 2015) in that they are elements of the landscape and landscapes by themselves, closely related to the conservation of natural resources (soil, water), with the economic production and landscape creating activities, besides being large areas inhabited by a significant number of people.

## CONCLUSIONS

The few references found on the terraced landscapes of the Canary Islands legislation on land use planning, natural resources and industry regulations on heritage reflect their marginalization by public institutions that contrast sharply with what is perceived internationally.

It has also been demonstrated little interest of the Canary terraces among scientists. A few references to

them have been found in the field of social and economic sciences, associating them to marginalization, abandonment, a poor family and subsistence agriculture, located in the mid-height lands of the most mountainous islands; these have evolved into a part-time farming and they have also been classified as a single type of canary agricultural landscape. Many of those works are superficial, descriptive and show a skewed view of these landscapes by their authors. Works performed with a physical geography and edaphologic views have focused their interest on some of their environmental sub-functions: the preservation of agricultural soils and the hydro-geomorphologic stability of

their slope. In any case, they refer to the true extent and spatial imprint of these terraces or the importance of conservation in relation to the sustainable development of rural areas nor the diversification of tourism Canary Islands.

The methodological test performed for assessing the terraced landscape has shown its abundance, diversity and construction quality that contrasts with their current status of environmental and landscape degradation. This situation stems from agricultural abandonment, the impact caused by poor agricultural practices in many of those still in operation, the development pressure and its suburban character.

## K PONOVNI PRESOJI KULTURNIH TERASIRANIH POKRAJIN: DEDIŠČINA TERAS NA KANARSKIH OTOKIH V ŠPANJI

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### POVZETEK

*Namen raziskave je spodbuditi spremembe pri ocenjevanju kulturne pokrajine kmetijskih teras na otokih, kjer sta razvoj turizma in opuščanje kmetijstva povzročila spremembe (ozemeljske, družbeno-gospodarske, okoljske in kulturne) in marginalizacijo te dejavnosti, hkrati pa otežujeta njeno ohranjanje. Zato smo analizirali dokumente, instrumente za upravljanje zaščitene območij, upravljanje zemljišč in nepremičnin ter znanstveno literaturo, ki obravnava različne vidike tovrstnih kulturnih pokrajin. Predstavljena je metodologija vrednotenja, ki temelji na večfunkcionalnosti teh prostorov (produktivni, okoljski, kulturni in estetski). Rezultati kažejo na institucionalno in znanstveno marginalizacijo teh pokrajin na Kanarskih otokih, kar pa je v nasprotju z mednarodnimi težnjami. Predlagana metoda spodbuja aktivno ohranjanje, lahko pa tudi koristi pri uvajanju instrumentov v politiko upravljanja terasastih pokrajin. Predlagana metoda je lahko koristno orodje pri uvedbi aktivnega ohranjanja v politiko upravljanja terasiranih pokrajin.*

**Ključne besede:** opustitev kmetijskih površin, kulturne terasirane pokrajine, večfunkcijski, aktivno ohranjanje, upravljanje zemljišč

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#### LIST OF ACRONYMS

FAO: Food and Agriculture Organization  
 ITLA: International Alliance for Terraced Landscapes  
 ONU: United Nations Organization  
 PIOF: Insular Management Plan of Fuerteventura  
 SIPAM: Ingenious Agricultural Heritage Systems World  
 TKWB: Traditional Knowledge World Bank  
 UNCCD: United Nations Convention to Combat Desertification  
 UNESCO: United Nations Educational, Scientific and Cultural Organization