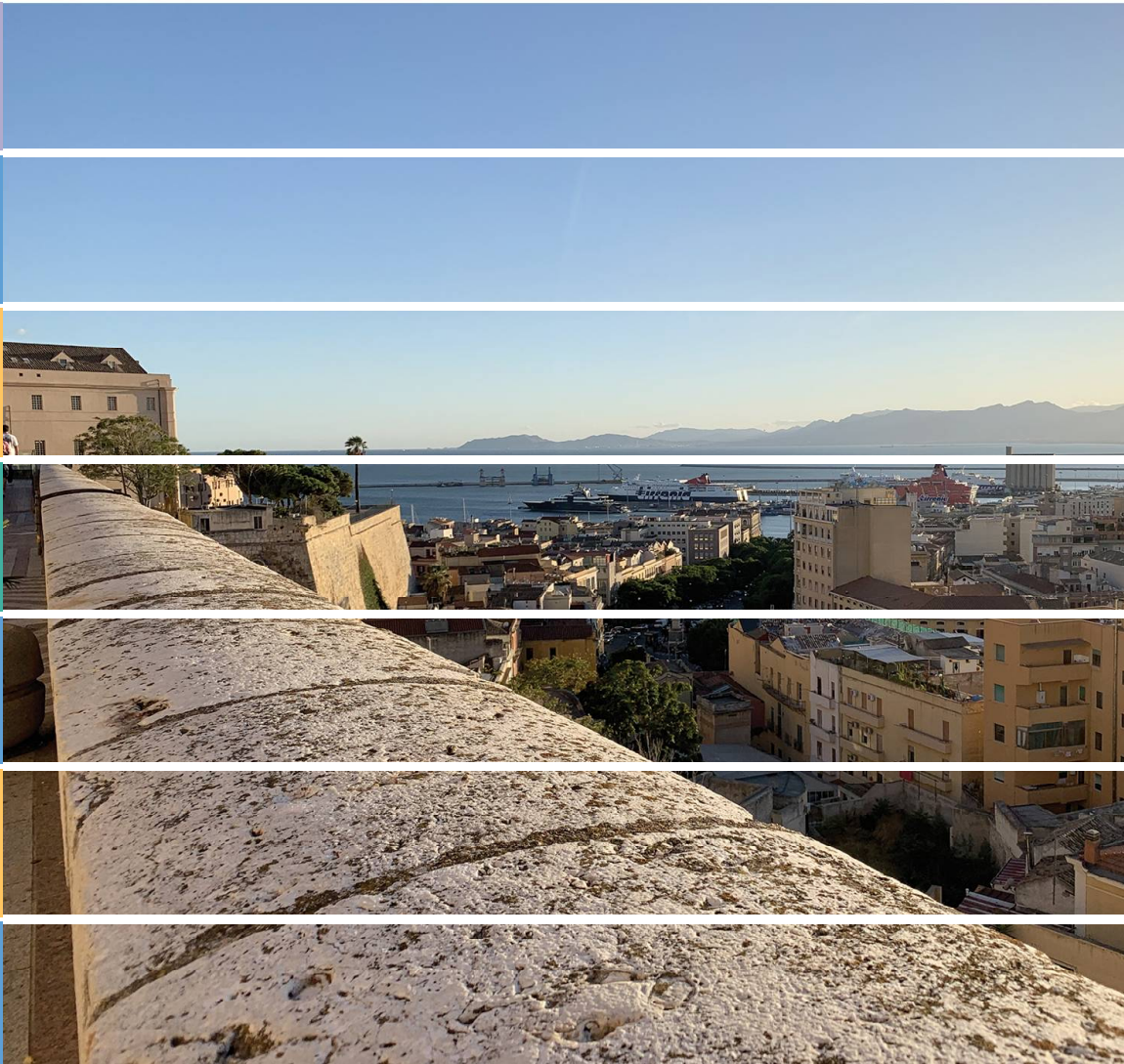


Carmela Gargiulo Corrado Zoppi
Editors

Planning, Nature and Ecosystem Services



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Scuola Politecnica e delle Scienze di Base

Smart City, Urban Planning for a Sustainable Future

Carmela Gargiulo Corrado Zoppi
Editors

Planning, Nature and Ecosystem Services

INPUT aCAdeMy 2019
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This book collects the papers presented at INPUT aCAdeMy 2019, a special edition of the INPUT Conference hosted by the Department of Civil and Environmental Engineering, and Architecture (DICAAR) of the University of Cagliari.

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This book is the most recent scientific contribution of the "Smart City, Urban Planning for a Sustainable Future" Book Series, dedicated to the collection of research e-books, published by FedOAPress - Federico II Open Access University Press. The volume contains the scientific contributions presented at the INPUT aCademy 2019 Conference. In detail, this publication, including 92 papers grouped in 11 sessions, for a total of 1056 pages, has been edited by some members of the Editorial Staff of "TeMA Journal", here listed in alphabetical order:

- Rosaria Battarra;
- Gerardo Carpentieri;
- Federica Gaglione;
- Carmen Guida;
- Rosa Morosini;
- Floriana Zucaro.

The most heartfelt thanks go to these young and more experienced colleagues for the hard work done in these months. A final word of thanks goes to Professor Roberto Delle Donne, Director of the CAB - Center for Libraries "Roberto Pettorino" of the University of Naples Federico II, for his active availability and the constant support also shown in this last publication.

Rocco Papa

Editor of the Smart City, Urban Planning for a Sustainable Future" Book Series
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PROPOSALS ON THE AGRICULTURAL LAND USE IN ACCORDING TO THE FEATURES OF THE LANDSCAPE: THE CASE STUDY OF SARDINIA (ITALY)

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ABSTRACT

The purpose of this paper is to contribute to the landscapes planning, considering those of Sardinia in Italy, that are rich in natural, morphological and structural factors. In addition, the visualization of agricultural and pastoral lands are an important component to understand the social and economic dimension that characterizes the different sites. To this end, the authors propose an evaluation grid to offer to planning regulations alternatives for the rural areas that are an integral part in the composition of the Sardinian landscape. Therefore, the authors propose to adopt a treatment of cultures, keeping in mind the most favorable options, in order to guarantee a balance in the landscape and, at the same time, considering the cultural factors and the anthropized components. The topic is current because it wants to integrate the guidelines of the Regional Landscape Plan - RLP (2006) of Sardinia in relation to its Inner Areas as the RLP shows great attention only to the coastal areas. The latter in fact represent the most important natural heritage also for tourism purposes. The different types of rural territory are in Sardinia to be evaluated taking into account the changes in the landscape, due to changes in the cultures and seasonality. More specifically, attention is given to rural habitats and conservation prospects, despite the demographic contraction of the entire region and the irreversible aging of many inhabited centers. This aspect should not be underestimated because the rural landscape strongly participates in the cultural identity of the places and therefore is sensitive to the direct degradation in cultures and the environment and to uncontrolled building and to disfiguring impact.

KEYWORDS

Landscapes; Agricultural and Natural Landscape; Agricultural Land Use; Sardinia

1 INTRODUCTION

This contribution aims to activate for the region of Sardinia (Italy) a methodology for the treatment of agricultural soils in relation to landscapes bound by important urban tools such as the Regional Landscape Plan (known in Italian as "Piano Paesaggistico Regionale - PPR") approved in 2006 by the Autonomous Region of Sardinia. In fact, the RLP, respecting the forecasts of the European and national regulations, places a very strong attention on the coastal zones, recognizing the various nuances and defining the requirements, measures and directives for their protection and their enhancement. Only in 2012, in implementation of the provisions of the Code of Cultural Heritage and Landscape, the Regional Council of Sardinia approves the new Guidelines for landscape planning, in which, in addition to the reaffirmation of the importance of safeguarding and of coastal landscapes enhancing, for the first time, the focus is placed on the landscapes of the internal areas and on the rural landscapes, as elements that strongly characterize the identity of the Sardinian people, because they have been closely linked for millennia to the agro-pastoral activities. There have been projects, analyzes and recognition of the Sardinian rural landscapes and the relationships between the coastal areas and the internal areas, but never matured into an effective regulation of the same internal areas. However, this paper aims to discuss the determining factors related to the rural landscape in an urban key, without entering in the skills of the complex agro-zootechnical system. "The rural landscape is becoming a strategic part of the territory not only because it represents the connective of the wider landscape scenario, but also because its state of wellbeing has many effects on the rest of the territory. In this sense, the rediscovery of the rural landscape is not linked to a nostalgic desire to restore bucolic settings and ornamental economies, but to the multiplicity of functions that can benefit the entire territorial system [...]. The management of the rural landscape is intertwined with different issues: i) the root of cultural identity in the places; ii) the widespread need to regenerate the conditions of a growing land degradation; iii) the construction of local development projects, and iv) the need to safeguard the environmental dimension of space" (Balestrieri, 2018). In addition, the rural landscape is a mosaic of natural and human managed land uses that vary in size, shape and arrangement (Zaizhi, 2000; Biasi et al., 2016).

In Sardinia, three types of rural landscape can be considered: 1) the pastures in rocky terrain with the presence of the Mediterranean woodland, 2) cultivated land, and 3) arboreal land (from rows of trees along the road to the woods). Each of these types participates in the composition of the landscape in a decisive way, but often its effects are underestimated. In other words, the rural landscape is characterized by an integration between the fixed factors and mobile factors of the territory: the first ones have no variations except in very rigid

seasonal periods, when they can cover themselves with snow, while the second ones vary not only with the seasons but also with the types of plants that, especially in spring, participate in the chromatism of the environment with the various florescences.

For this reason, the authors believe it is important to study a methodology that can lead to a grid of evaluation of the treatment hypotheses of the rural territory and, in particular of what can affect the nature of the landscape and the visual, cultural, geographical, environmental and identity composition of the landscape itself. For example, the region of Marmilla in Sardinia is not only valuable for the nuraghes or retabli of the Master of Castelsardo (active between the end of the fifteenth and the beginning of the sixteenth century), but also because the Marmilla region identifies itself as an anthropized rural landscape with a symbiosis between environment and history, where the landscape represents the fusion of eras and memory (Garau, 2015). Natural, cultural, and environmental attractions enhanced by the morphology of the hills, the historical value of the local urban centers, and local traditions. Therefore, a landscape set of open fields (Meeus, 1995) cannot be linked to conservation reasons because it is the result of a spontaneous agricultural activity that integrates perfectly with the morphological component, so as to characterize the most beautiful areas (without the sea) of Sardinia. This status could change if the cereal cultures, which contribute to the chromatism of the whole, were replaced by tall trees that could affect the "soft" reading of the landscape, creating discontinuity and even chromatic contrasts. Based on these premises, the article is divided into three parts: the first one describes the structural characters of Sardinian agro on the margins and within the landscapes classified according to literature; in the second one, an evaluation of the agro-landscape determinants is made with a proposal for integration and compatibility of the same. Finally, the paper presents the conclusions, hoping for political proposals and application techniques.

2 THE RURAL LANDSCAPE OF SARDINIA

The dominant rural landscape in Sardinia is therefore characterized by the extensiveness, which can be summarized in the three types described in the previous paragraph. The Mediterranean woodland and permanent natural pastures cover almost half of the island, while the woods and agricultural crops occupy specific areas (Fig. 1): mainly in the hills and mountains the first ones, often managed in agro-forestry systems; in the plains, in the areas equipped with a network of consortium irrigation and in the crown of rural villages and urban centers, the second ones (Camarda et al., 2014).

These considerations on the composition of rural landscapes, in which nature and anthropology play their specific role, must be added to another interpretive line of the natural environment and the landscape that refers to the distant pastoral world of Sardinia, when for

the shepherd the horizon of affections and interests was defined by the territory that they could control (the country, the fields and the pastures) moving on foot or on horseback. The distance between the country, social focus, and the most distant pastures marked the limit of identity space with its rules of coexistence (Mistretta, 2012). The attention to the historical process is fundamental to understand the substantial modifications of the way of life and the relationships of the inhabitants with the new dimension of the space of relationship.

Today it is possible to regulate the type of intervention in rural and agricultural contexts, obviously without creating penalties of any kind, not even implied by productivity, especially by the profitability of investments made in agriculture, with already existing markets and with those that can be activated. It is evident that the attention on the landscapes of Sardinia and on the modalities of interpretation, representation, and safeguard are strictly connected to the geographic-structural identifying aspects, so much to characterize Sardinia on a world scale, for its identity values. However, it is necessary to understand in what way today's rural landscape is the result of a transformation of cultures due to the modernization of work tools in the fields or is a result of an overload of tourist flows that is sometimes incompatible with the most authentic expressions of the same habitats. In other words, the control of changes in the Sardinian territory took place with attention to coastal areas with beaches and the reconversion of illegal "bathing" buildings, without any reference to the very strong relationships between the countryside and the destinations of use for tourism purposes. In fact, the pastures, agricultural, wooded features and in particular the monumental morphology of the geography of the places have been neglected. However, it should not be underestimated that on the perception and "capture" of the environment and of the landscape today, more than yesterday, some factors of frenetic modernity intervene: the little time available for a reflexive or commentary stop, the speed of the vehicle (car or bus) that produces an extemporaneousness without soul of the sequence of views; the increasingly sophisticated photographic and filming tools that memorize images without history. All this makes the rural *continuum* as a monotype field, without factors of interest, despite being diversified by cultures and plantings. Therefore, cultural education is important for understanding the environment, landscapes and for developing a harmonious synthesis. In this context, the contextualities of the landscape and the foreseeable and regulable margins of change should be evaluated, without neglecting the productive modifications of the rural system that, as already mentioned, participate in the perceptual synthesis composition. Thus, culture becomes absolutely central to understand over time the place-based dynamism and the mediation between nature, places and people of countries and fields.

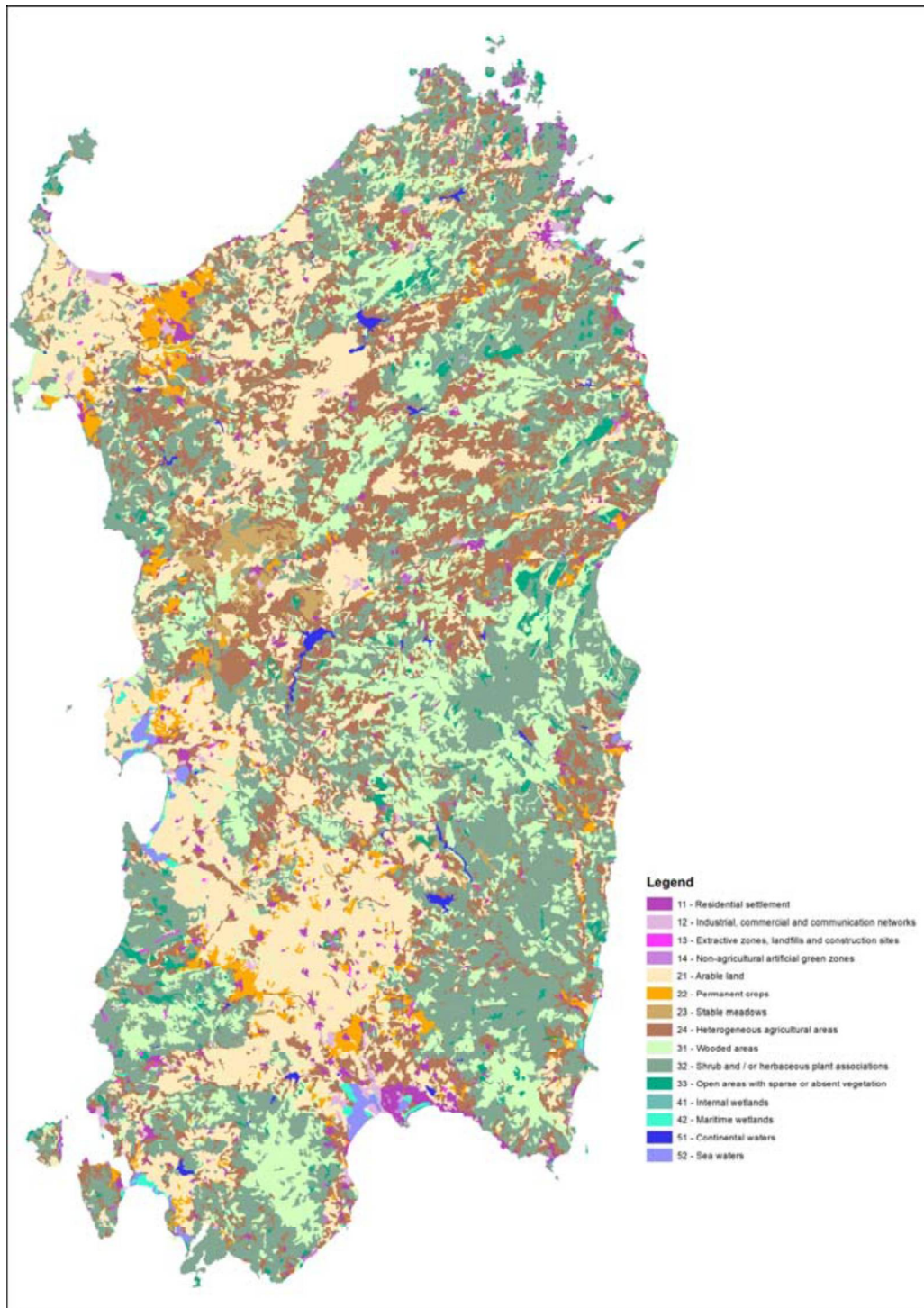


Fig. 1 Corine Land cover (Source: Corine 2018)

In order to do this, the Region, as a superordinate public body with respect to the municipal autonomy, has to formulate the methodology of analysis and proposal, with the indicators of intervention and of organization, also for the management aspects. In fact, it is necessary to understand if tables can be produced that describe the different forms of soil treatment, in order to distinguish and suggest certain cultures (for example vegetable gardens) compared

to others (for example vineyards) more suited to ensure the balance of landscapes. Or it may be necessary to suggest arboreal cultures, the fruit ones or wood or cork ones, as long as there are no secular trees that constitute the focal point of the landscape to which they belong. This reasoning, in its expository simplicity, wants to give importance to the physical component of the rural product, because in addition to the plant type, the "body" connotations of the essences must not be ignored: heights, depths of roots, ramifications, foliage, growth times and of life, knowing that the green component of the territory is the essential habitat for insects and for birdlife. Moreover, the production results of the agro are influenced by the pedology and geology of the places, which enter into the finalized evaluation of the contexts of which the regional and urban planning must pay attention to formulate the choices of plan. It is, therefore, necessary not only a cultural sensitivity that links man to nature (Turri, 2008), in its most varied expressions, but also a corresponding legislative activity that assists, without prejudice, the economic activities already in place and those most suitable for development. It is also essential to define the current conflicts of vocation of the areas (right or false) through flexible use destinations, supported by a smart infrastructural network. This project is obviously multidisciplinary with the indispensable presence of agronomists and experts in rural law. In fact, the bibliographic reference documentation and the taxonomic description of cultivated soils, especially for promiscuous crops, should facilitate the investigation of the territory and the visualization of the perspectives of use¹. Obviously, the rules that regulate the use of rural territories cannot be the same throughout Sardinia (cubic meters per hectare), but, having to interpret the environmental and identity context, they will not be neutral because they affect the value of soils and their susceptibility.

In many cases the recent suppression of typological differences led to the impoverishment and undifferentiation of rural landscapes (Franceschetti, 2009), underestimating the effects because the landscape is not monotypic but is the result of the different cultural and disciplinary matrix that contribute to differentiate places and recognize them. Unfortunately, in Sardinia, the depopulation of internal areas certainly affects the future on structural balance and also on the landscape. So that is an irreversible factor, it will be necessary immediately to make concrete proposals sustainable even with guided interventions for objectives aimed

¹ "The landscape of Mediterranean promiscuous crops is the result of the practice of polyculture: intercrossed cereal crops, legumes, vines and fruit trees (a little less densely, and only in the most recent age, forage plants). On the same field are associated three types of crops: the herbaceous ones (cereals, fodder plants and renewal plants), a shrub, that is the vine, and the guardian tree. Sometimes the vine is only associated with trees (peaches, almonds, figs, walnuts and olives), even when they do not serve as support; in most cases it is, or was, "married" to the tree. The "married" vine to the tree in the middle of the wheat constitutes the classical landscape of the promiscuous culture" (Balestrieri, 2018).

(for identity and tourism purposes). In this case, it is necessary to activate relationships of collaboration with public and associative subjects that have activities of direction and of management in the production system (among which Confagricoltura, Coldiretti, Regional Councilor, Companies, etc.). Therefore, it is urgent to reconsider the different types of cultures and their impact on the landscape, contextually activating specific forms of monitoring to evaluate the guided and spontaneous transformations, taking into account the effects not only of the sector but also on the socioeconomic system of the areas under study. In the analysis of the contexts it is important to take into account, on one hand, the design formed by the dry walls that become goods classified by UNESCO, and on the other, the natural hydrogeological system and the existing engineering works, to avoid the devastating effects of natural disasters². It should be noted that a series of decisive indicators to which reference is not yet available, in order to achieve a classification of cultural scenarios and their effects on the perception of the landscape (Cherrill, 2014).

3 METHODOLOGY

The goal of this paper is to propose guidelines that, through an evaluation grid, can arrive at a targeted treatment of cultures, keeping in mind the most favorable options to guarantee a balance in the landscape. To do this, the cultural factors of the settlement and rural habitats and the anthropized components that diversify case by case must be kept in mind, even if they are not directly involved. In this regard, Mara Balestrieri identifies "34 types of landscape grouped into nine categories ("arctic", "boreal", "Atlantic", "alpine", "Mediterranean", "continental", "Anatolian", "steppic"), starting from climatic, topographic, lithological and land cover data. The landscape typology is obtained from a hierarchical nomenclature organized on four levels. This nomenclature includes: 8 classes for the climate, 5 classes for the altitude, 3 classes of lithology, 10 classes for covering the ground" (Balestrieri, 2018). However, to understand how environmental factors interact with the interventions to be adopted, it must

² "Many efforts have made at European level in an attempt to classify the Community landscape, especially after the ratification of the European Landscape Convention in 2000. The identification and evaluation of European landscapes are explicitly mentioned as a specific measure in Article 6 of the Convention (Council of Europe, 2000). Already, in 1996 at the Sofia Conference (Council of Europe 1996), it was recognized the need to define a European Landscape Map (Pan-European Landscape Map) with the aim of distinguishing different types of landscape and to represent its geographical location. However, the difficulties in making such a map appeared immediately evident. So that there are extremely diverse natural and cultural conditions on the European territory, it is difficult to classify the landscapes according to an elementary hierarchy to be applied to the entire continent. Very few papers were therefore actually produced. The European Landscapes Map developed by Meeus is one of the few valid examples, although it should be considered more like a sketch based on expert knowledge since there is no spatial accuracy and a rigorous background analysis" (Balestrieri, 2018; p. 63).

be considered the manipulation of the field operator, in order to evaluate how much has changed over time and on which hypotheses it is possible to think.

A significant example is the terracings organized by cultures, like vineyard in steep slopes, in fact it can happen that the advent of unpredictable climatic factors, can change the state of the places and in this case, regardless of the loss of production, would change also the reference coordinates with the need to review the landscape design. At the same, in Sardinia frequent fires in the summer months heavily weigh on the landscape; in these cases, the classified landscape loses its motivational requirements, above all due to its substantial and chromatic impact and must be redefined. Among the many indicators extrapolated from the classification of Mùcher et al. (2010) the following groupings can be used for the geography of Sardinia: parent materials (rocks, sediments and waste materials); altitude (plains, hills and mountains); land cover (arable land, permanent crops and pastures, Mediterranean woodland, open fields). Some of these are distinguished by the presence of scattered settlements typical of Gallura and Sulcis in Sardinia. With the necessary in-depth analysis and considering the literature on the topic (RAS, 2013; RAS, 2017), one or more grids can be activated for a functional and cultural coordination, aimed at making the "voices" that characterize the landscape integrable with the "voices" that characterize the agricultural land. The authors propose a grid (Tab. 1) that wants to have a methodological meaning without the precision that only the specialists of the agricultural land and cultures can classify in a close dialectic relationship with town planners and landscape designers, taking into account the types already described in the RLP.

4 CONCLUSIONS

The purpose of the contribution is to compare the productive component of the soils and the economic component to which the tourist fruition contributes together with the identity, landscape component. Because it is a matter of different disciplinary subjects, even if they are "bordering" and integrable, a cross-reading of the determinants of the agricultural land and the landscape is proposed by constructing a grid of address with the representation of the options aimed at contributing to the harmonious composition of the landscapes. It is specified that it is only a research proposal because every context, of which Sardinia is rich, assumes its own landscape identity, functional not only for tourist use, but also for a "presence" of inhabitants and operators of the agricultural land. A conclusion of the analysis and impact assessments, planners should prepare to address consistent standards and implementation rules.

lands	coastal landscapes with degrading rocks and coves	coastal landscapes with beaches	coastal landscapes bordering the countryside	inner landscapes characterized by "monumental" rocks	hilly inner landscapes	flat inner landscapes (valley floor and plateaus)	mountain landscapes ³
Uncultivated land with rocky boulders	X			X			
Pasture (hills and mountains)	X		X	X	X	X	X
Forage plants				X	X	X	X
1 Arable land (vegetables and similar)					X	X	
2 Arable land (cereals and similar)					X	X	
Terraced vineyards					X		
Fruit trees (Citrus, peach, etc.)					X	X	
Mediterranea n woodland, junipers and prickly pears	X	X		X		X	
Dried fruit trees						X	
Wood trees			X	X		X	
Forest (oaks, cork oaks, conifers)		X		X		X	X
Others							

Tab. 1 Addresses for the treatment of agricultural territory to participate in the composition of the landscape

Naturally, the objective of this proposal is to affect the quality of life by keeping the settlements alive and the relationship with the rural territory, within the framework of a healthy economy and a dynamic territorial function. Moreover, this hypothesis of research proposal can be a first step to consider again the great problem of depopulation of the countryside and the decay of small villages, without which it would make no sense to insist with temporary instruments, and with financial incentives in the concrete little incisive.

The future research proposal of this paper is a cross-reading of the different types represented in Tab. 1, in order to obtain an overall value of the "landscape-agriculture" determining factors on which to set the Regional programming lines and the suitable implementation tools.

³ To be evaluated case by case, taking into account the structural component of the rocks and the chromatic effect, as well as the height excursions that contribute to "move" the perceptive framework

AUTHOR CONTRIBUTIONS

This paper is the result of the joint work of the authors. 'Methodology' was written jointly by the authors. Pasquale Mistretta wrote the 'Conclusions'. Giulia Desogus wrote the 'Introduction'. Chiara Garau wrote the 'The rural landscape of Sardinia'.

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