



## FRAGMENTATION AND DEGRADATION OF THE URBAN LANDSCAPE IN HERGLA, TUNISIA

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### Abstract:

This research proposes to identify the factors of the urban landscapes degradation in Hergla's city (Tunisia) according on the citizen participation. It is based on the survey method which is developed around two axes: the citizen perception of urban landscapes and the factors of their degradation. According to the responses obtained, "the sea" represents the particular value of the landscapes identified as "quality" in Hergla. Citizens don't appreciate landscapes of urban sprawl which makes the city lose its identity. Moreover, the lack of citizen participation in the urban actions and the non-observance of the urban regulations are the most cited factors of the landscape degradation. These results highlight the importance of involving the citizens in the planning process for a sustainable territory.

**Keywords:** Landscape Degradation Factors; Hergla; Perception; Citizen Participation; Survey.

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### 1. Introduction

Given the recent developments of the international economy, the landscape dynamics, result of territorial development, are becoming a research question to deepen, not only for industrialized countries, but also for the developing countries [26]. The Mediterranean area, in particular Tunisia, has been occupied by an ancient civilization that has been transformed by pastoral and agricultural activities [5]. Socio-economic changes, soil erosion and arid climate have led to a massive abandonment of farmland, since the last century [5].

Since its independence in 1956, Tunisia has undergone profound transformations which have made it necessary to redefine the regional planning policy. The latter reflects the State's economic and social development strategies [15].

In fact, Tunisia's economic development policies had the dominant benchmark to catch up with the industrialized countries. The government founded its development policies, heavily influenced by Western models, on industrialization (Sfax, Gabes) and centralized national planning [24]. During the first thirty years of independence, land-use planning was part of a sectorial approach to state action and rather vertical economic planning. The disparities between regions inherited from the colonial period are amplified [15].

The territorial planning, linked to the economic plan, became autonomous in 1961 through the creation of the Planning and Urban Development Department within the Secretariat for public works and housing. This action has allowed a relative openness to "inner" Tunisia. During the "planned economy" period (1962-1969), the State expanded the industrial space by planting factories in the remote regions as Kasserine, Kef, Beja, El Ksour and El Hamma [3, 15]. In 1969, a Ministry of Land use Planning and Tourism was established. This association between land use planning and tourism explains the rapid rise of the tourism sector and the need for a specific sectorial planning [15]. Then, Land use policies began with the creation of the Tourism Development Directorate in 1969 within the Ministry of Land use Planning and Tourism and attached, later, to the Ministry of Equipment and Housing (in 2002).

Since 1970, the Tunisian State has been following a policy of progressive liberalization of the economy through the encouragement of the private sector. The laws of April 1972 and August 1974 reflect the Liberal strategy and openness to private capital in the form of direct investment [15]. However, this policy remains in favor of coastal cities, especially the cities near the decision center, Tunis. These cities benefited, then, from strengthening their urban frameworks, making them more attractive. But inland cities have remained away from private investment despite the State's efforts [3, 15].

To this end, tourism activity in Tunisia has grown since 1970. It dated from the colonial period, where it was heavily supervised and limited to the territories under guard [20]. Tourism was then considered as an essential component of the state's economic policies. It has been contributing for years to the socio-economic development of the country, as stated by M. Rifai (the general secretary of the World Tourism Organization (2015)).

However, the tourist activity in Tunisia is limited to the littoral zone. This area, which has attracted the State, the promoters and the researchers, has been the focus of attention in the programming of development projects at national and international level [21].

Thus, the liberalization policies of the economy and tourism development of the State have contributed to the evolution of the landscapes of the Tunisian coastline from the 1970s [9, 18].

In addition to the geographical position of the coastal cities, the technological innovation of the twentieth century facilitated the intensification of economic, cultural, political, social and demographic flows and exchanges between these cities [4]. Urban spaces have undergone radical changes to transform into communication nodes [6].

As a progressive standardization phenomenon of these spaces [17], globalization has a huge impact on urban landscapes, culture, quality of life, and on societies [6]. Most often, international models of urban planning have imposed themselves [18] and have removed the diversity of landscapes and lifestyles and hence the landscape identity [29]. The search for the characters of a territory [18] that identify its landscape is an action of retreat in the face of globalization [29] and the transformations of space resulting (land cover and land use changes, new human activities, etc.).

Moreover, the uncontrolled development of tourism has jeopardized the natural and diversified potentials and cultural and human resources of the territories (African Charter of Sustainable and

responsible tourism, 2016). Land use changes caused by spontaneous urbanization and irregular occupation of public and private land have created urban and landscape dynamics in the territories [15]. The coastal Tunisia is urbanizing rapidly today, but it is the villages, the small and the middle cities that know the most significant extensions [21]. These urban mutations led to the fragmentation of landscapes, in terms of breaking the architectural style between the urban core and the new urban extensions, and the degradation of living environment [9].

In the face of this problem, awareness of the importance of the landscape is developed in society [19, 7,10] that express its desire to live in a quality living environment: a landscape free from visual pollution and sporting aesthetic qualities some of which refer to an ideal of nature.

In this context the European landscape Convention (Florence 2000) defines the concept of landscape as "an area, as perceived by people" (Article 1. A.). Thus, the social dimension is required in landscape practices, in particular in the identification and qualification of landscapes, which "taking into account the particular values assigned to them by the interested parties and the population concerned." (Article 6.C.b.) [13].

The present research proposes to evaluate the urban landscapes of the Tunisian coastal city, Hergla, and the factors of their degradation, based on the perception of the citizens of their living environment, by means of a questionnaire.

## 2. Materials and Methods

### 2.1. Territory of Study: The City of Hergla

This study is based on the case of the Tunisian coastal city, Hergla, for the peculiarity and diversity of its cultural and natural landscapes. This city is located at the north end of the tourist area of Sousse and south of Hammamet (Figure 1). This geographical position has given it an increasing importance in the process of economic and social development of the region [16, 9], which has accelerated the urbanization process in recent years.

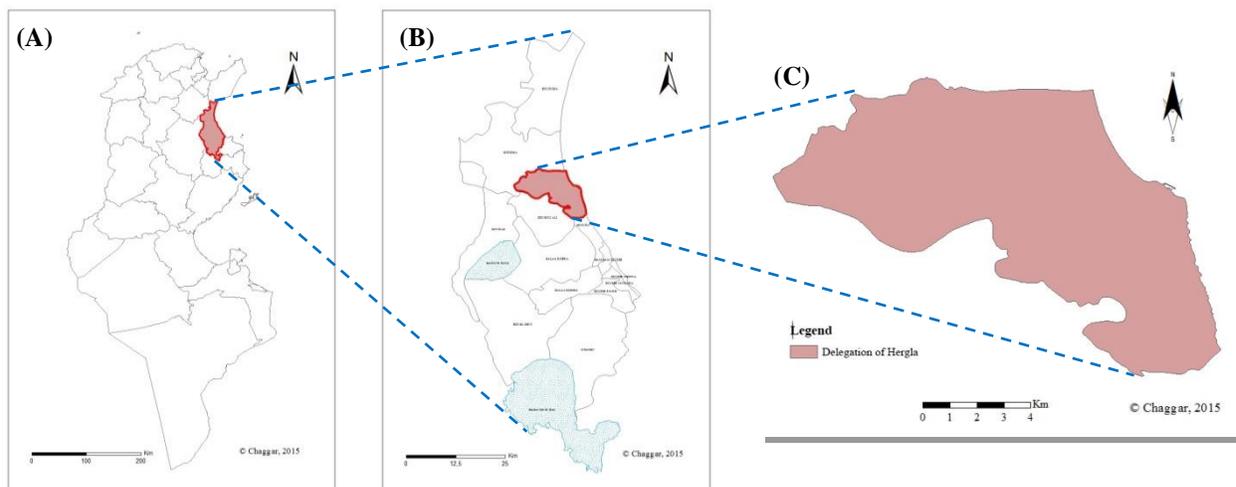


Figure 1: Situation of the delegation of Hergla

(A) National Geographic Context (B) Regional Geographic Context (C) Geographical limits of delegation (Chaggar, 2015; DGF Tunis, 2010)

## 2.2. Spatialization of Changing Spaces

Hergla is endowed with an invaluable natural and cultural wealth in landscapes that are considered by the population as an essential factor of identity, well-being and social link, as well as a decisive component in the attractiveness of the Territory [12].

Hergla has in recent years (especially from 2010) strong landscape mutations consequences of urban sprawl policies. In fact, this urbanization is developed according to the Urban Development Plan of Hergla (Figure 2: UDP, 2003) and the Development Master Plan of the sensitive area "Bouficha-Enfidha-Hergla" in long-term 2030 (Figure 3: DMP, 2010).

Thus, the spatial mutation and land-use change have been developed on the basis of land cover map topographic maps (scale: 1/25000) dating from 1990 and subsequently compared with the Urban Development Plan (2003) and the Development Master Plan (2010-2030). This work was developed using ArcGis10.1 (Figure 4). The land cover map of 1990 is developed using topographic maps (scale: 1/25000) that are retrieved from the National Centre for Cartography and Remote Sensing of Tunis, are scanned, then geo-referenced and digitalized according to the WGS\_1984\_UTM\_Zone\_32N system.

## 2.3. Questionnaire

The questionnaire method is used in the perspective of applying the principle of citizen participation in landscape actions. It concerns [25]:

- the definition of the problem to be treated,
- the choice of a population,
- questionnaire design,
- the choice of the sample,
- the collection of information,
- data processing,
- and interpretation of the results.

The purpose of this questionnaire is to identify issues involved in the evolution of Hergla's landscapes. It was made in July 2016 during 3 consecutive days. The representative sample, randomly selected, has approximately 40 inhabitants of Hergla, varying in terms of gender, age, profession and reason for presence in the city (Table 1).

Table 1: Sample distribution by gender and reason of presence in Hergla

reasons for being in Hergla	Resident	Holydays	Work	Total
<b>Gender</b>				
Men	18	4	1	23
Women	8	7	2	17
<b>Total</b>	<b>26</b>	<b>11</b>	<b>3</b>	<b>40</b>

The questionnaire is structured along two axes (Table 2). The first axis evaluates the citizen perception of urban landscapes in Hergla. The variables study the appreciated, degraded and those improved. The second axis treats the factors of landscape degradation. The study of variables is based on three hypotheses, namely the Urban Development Plan, the society and the economy. The different questions are of a closed type, either single choice or multiple choices. We should note, however, the presence of a single open question which allows the observer to discover the improved landscape at Hergla.

The elaboration of the questionnaire, the interpretation and analysis of its results, was carried out using the Sphinx Plus2 (V5) software.

Table 2: Structure of the questionnaire

Axis	Hypothesis	Variable
<b>Citizen perception of the landscape</b>	Landscapes of "quality"	Evaluation?
		Landscape appreciated?
		Landscape identifier?
	"Degraded" landscapes	Evaluation?
		Reviews / AFH?
Improved landscapes		
<b>Factors of Landscape Degradation in Hergla</b>	Urban Development Plan	Study area
		regulation
	Society	Activities
		Civil liability
	Economy	Property price
Tourism		

### 3. Results and Discussions

#### 3.1. The Landscape Dynamics in Hergla

Since the twentieth century, cities have represented the mirrors of territorial change and landscape transformations [14]. For several decades, the rapid expansion of large cities in the world, and the transformations of the urban landscapes that it engenders, is among the challenges facing modern man [23].

Urbanization in Tunisia has experienced a remarkable, rapid and obvious upheaval in recent decades [22]. The various urban extensions are the result of economic, social and mainly demographic changes [28].

Being a form of particular urban growth [1], urban sprawl has been a worldwide phenomenon in Tunisia since the years 1970s [18]. The main factors were the liberalization of the economy [15] and the development of tourism activity [20].

It is therefore a greedy and inefficient use of space that leads to rapid, monotonous, and discontinuous development [1]. In fact, real estate developers are seeking to introduce standard urban forms and an international way of life in developing countries [30].

The magnitude of the phenomenon of urban sprawl and its modalities can vary from one city to another depending on the geographical, social and societal factors [1]. A first aspect is characterized by the formation of periurban areas where land use practices are informal and infrastructure and public services are inadequate. The other aspect is the expansion of the suburbs hosting affluent population categories [30].

These two aspects embody two forms of urban expansion: i) uncontrolled growth of cities in dispersed peripheral areas, having a negative impact on their infrastructure and viability, this requires more consumption energy and natural resources (UN Habitat, 2010); (ii) a development according to an urban sprawl scheme, i.e. an Urban Development Plan or a Development Master Plan [1].

The landscape dynamics in Hergla are the results of development policies planned in the Urban Development Plan of Hergla (2003) and the Development Master Plan of the sensitive area "Bouficha-Enfidha-Hergla" (2010) in long-term 2030.

### The Land Cover/Use State in 1990

The spacialization of land cover/use changes in Hergla was referred to the land cover map of 1990. On that date, land cover is dominated by agricultural areas, namely annual crops (mainly olive groves) and arable land (Figure 2). In total, the themes are distributed as follows:

- The artificialized territories cover an area of 150.8 hectares, that to say 2% of the Hergla delegation.
- Agricultural territories occupy 5649.1 hectares, that to say 61% of the study area.
- Forest and semi-natural areas over 1525.3 hectares, that to say 17% of the total area.
- Hydrographic environment covers an area of 1845.4 hectares, that to say 20% of the Hergla delegation.

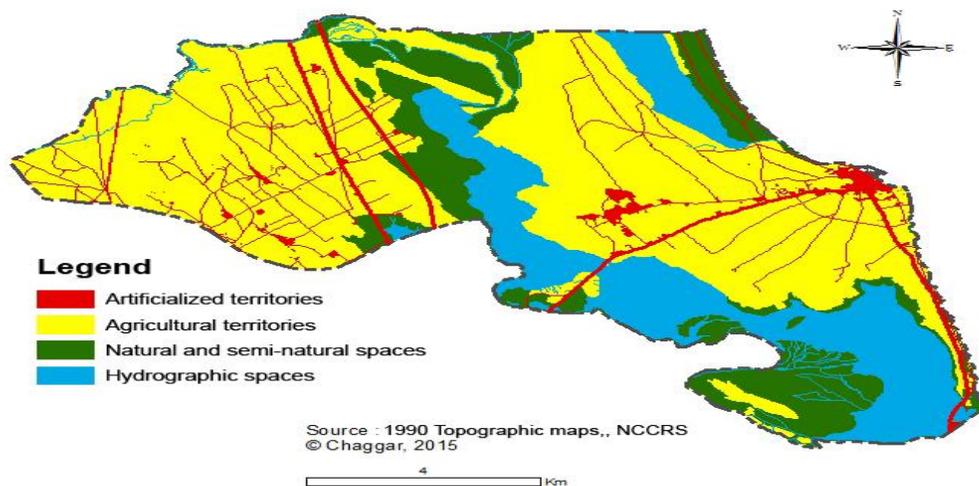


Figure 2. Land cover/use map in 1990

**The land cover/use state in 2030**

The programming of the urban development scenario of the Hergla region contains various projects with large space-intakes: these are residential subdivisions (the AFH district, urban extensions in EssouayahandManzelMahata), tourist and industrial projects (tourist area with hotel and residential vocation, Enfidha airport).

The land cover/use themes are distributed as follows:

- The artificialized territories cover an area of 3414.3 hectares, that to say 36% of the Hergla delegation.
- Agricultural territories occupy 3539 hectares, that to say 40% of the study area.
- Forest and semi-natural areas over 769.4 hectares, that to say 8% of the total area.
- Hydrographic environment covers an area of 1445.8 hectares, that to say 16% of the Hergla delegation.

Thus, the long-term land cover/use map 2030 (Figure 5) shows the dominance of artificial territories in the Hergla delegation.

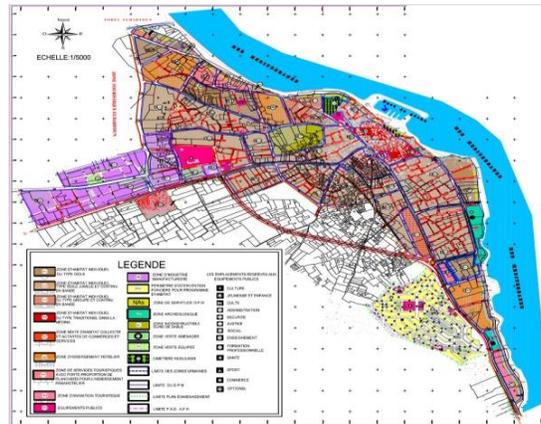


Figure 3: Urban Development Plan (Municipality of Hergla, 2003)

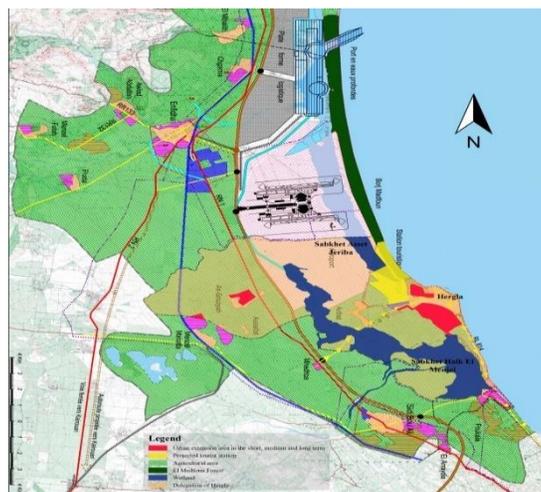


Figure 4: Extract from the Development Master Plan of the sensitive area "Bouficha-Enfidha-Hergla" in long-term 2030 (Ministry of Equipment, 2010)

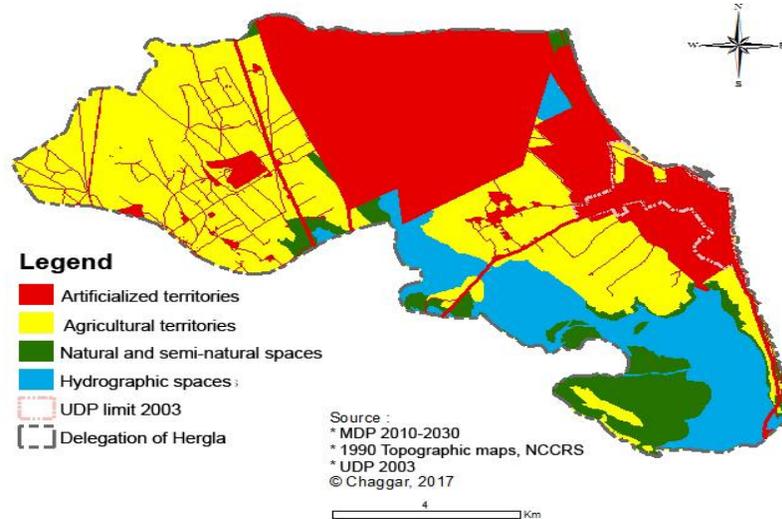


Figure 5: Land cover/use map in long-term 2030

As a result of the development projects, urban areas will increase by 34%, (Figure 6) to the detriment of agricultural territories (-21%), natural spaces (-9%) and hydrographic spaces (-4%). This observation reflects the impact of urban sprawl, in the long-term 2030, through the erosion of the majority of El Medfoun forest and part of SabkhetHalk El Menjel. The artificialization of natural and agricultural territories due to urban sprawl, leads to the dynamics of landscapes and the fragmentation of their structure.

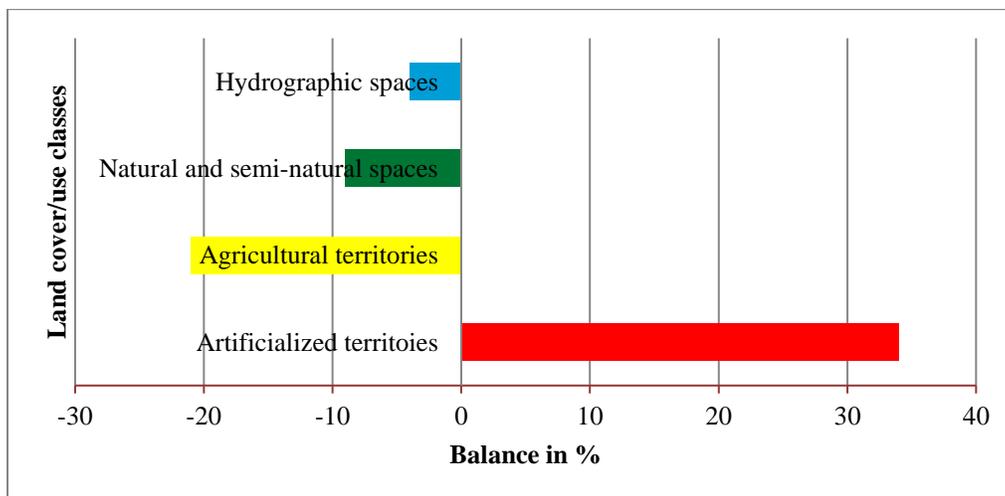


Figure 6: Assessment of changes in land cover/use between 1990 and 2030

### 3.2. Citizen Perception of The Urban Landscape in Hergla

The characterization of the landscapes of the city of Hergla varies according to the observer; it takes into account the particular values of the territory. Indeed, the majority of these landscapes are considered "of quality" (72.5%), while 27.5% of the population fined them "degraded" (Figure 7). "Quality" landscapes are perceived as "identity" or "remarkable" for most citizens (Figure 8).

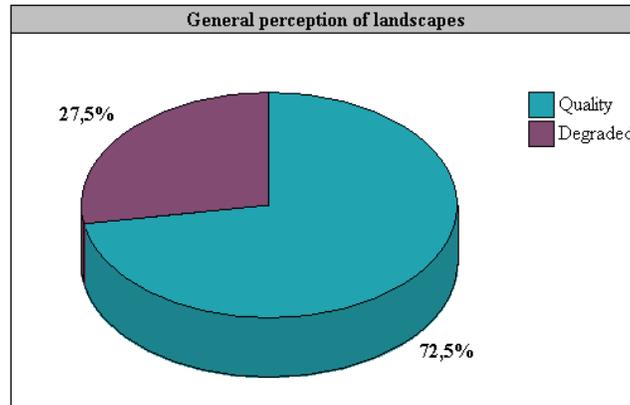


Figure 7: Qualification of the landscapes of Hergla according to the citizen perception

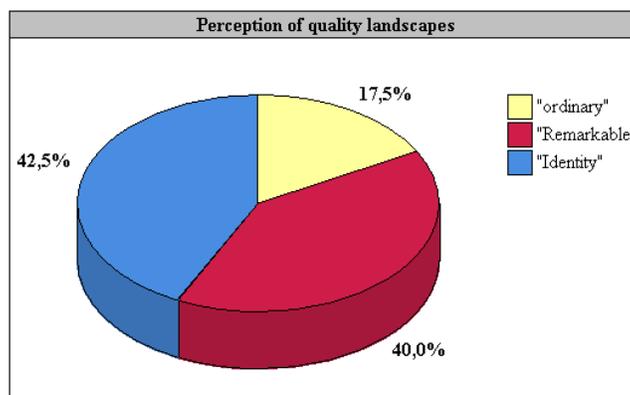


Figure 8: Qualification of "quality" landscapes

The results of the variables "landscape appreciated" and "territory identifier", as well as their relationship to the variable "landscape qualification" are illustrated in Figure 9. The interpretation of these results shows that, on the one hand, "the sea" is the value, characteristic of Hergla, the most appreciated and whose landscape is considered "of quality". On the other hand, the heritage value of "Roman remains" characterizes the "identity" landscapes of the territory (Figure 9).

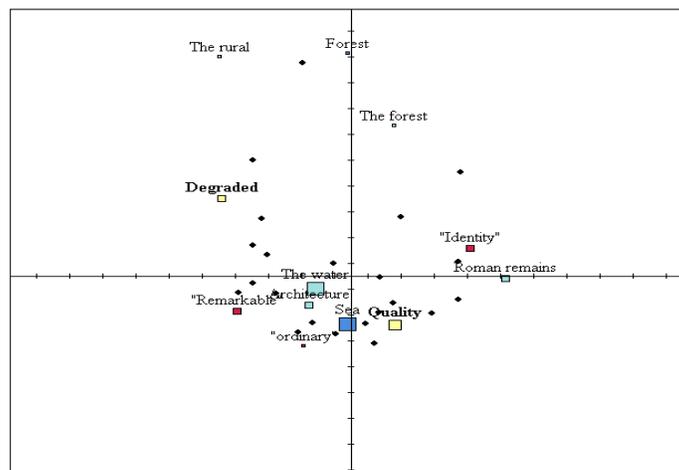


Figure 9: Factorial analysis of the variables "landscape qualification", "Quality landscapes qualification", "most appreciated Landscape" and "Identity landscape".

The analysis of the relationship between the variables of the deteriorated landscape and the reason for its degradation is interpreted in Figure 11. The questioning was based on a series of photographs (Figure 10) which illustrate some deteriorating landscapes, namely the entrance to the city, new constructions, urban sprawl (AFH district) and road infrastructure. In fact, urban sprawl (AFH district) is the most deteriorated landscape, judged by most of the population (55.9%) as a degraded living environment and a disfigured place compared to the traditional architectural landscape of Hergla. These results imply the loss of the identity of the territory.



Figure 10: Photos of testimony accompanying the 7<sup>th</sup> question "degraded landscapes"

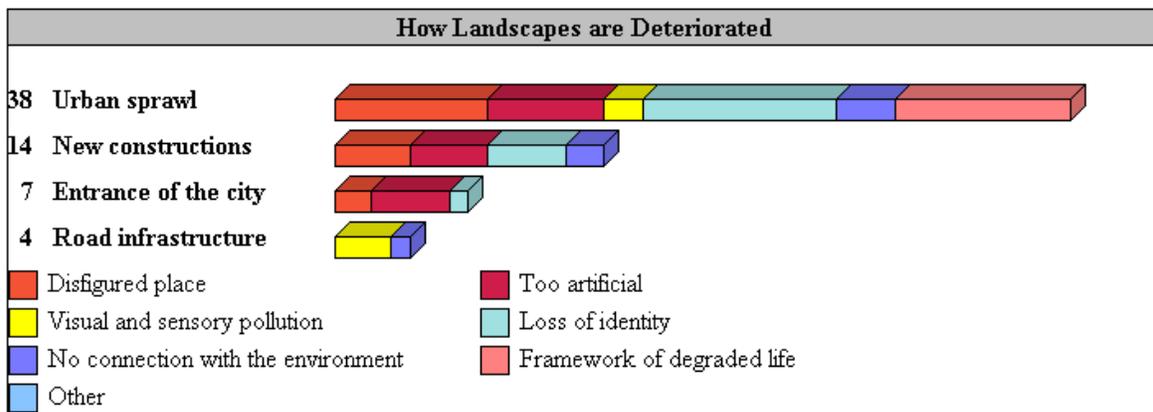


Figure 11: Identification and qualification of degraded landscapes in Hergla

The analysis of the citizen perception of the AFH district shows that most of the population questioned (40.7%) attributed to it the character "landscape disfiguration". However, 18.6% considers it a "typical urban landscape" (Figure 12). On the other hand, the road infrastructure, then under construction (July 2016), constitutes the landscape qualified as being "improved" (Figure 13).

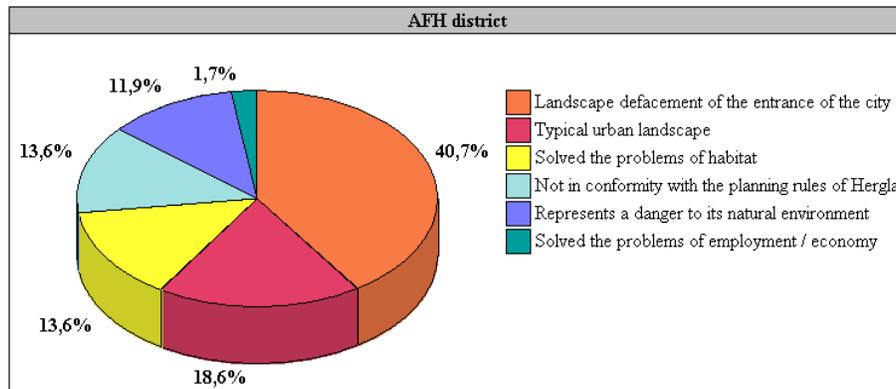


Figure 12: Citizen perception of the AFH district

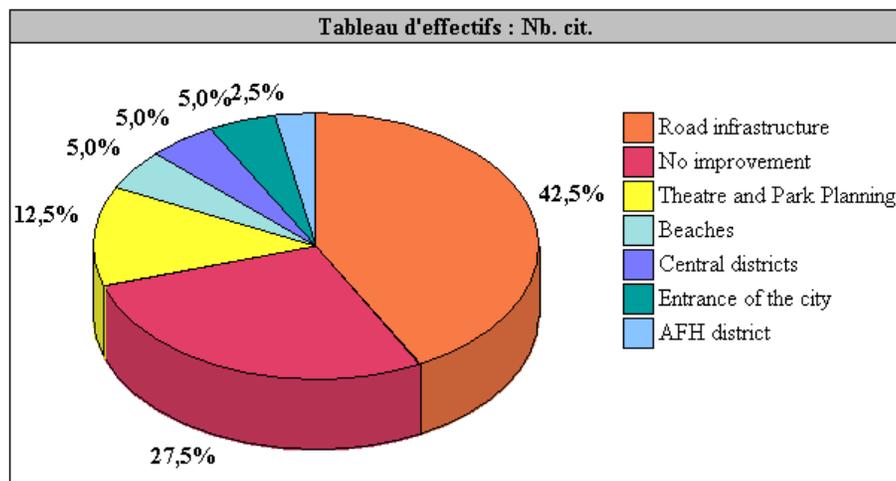


Figure 13: Identification of improved landscapes in Hergla

This axis of the questionnaire, on "the citizen perception of landscapes", is one aspect of the social dimension of landscape practices, to identify and qualify landscapes in their territory. Thus, the sea is the characteristic value of Hergla qualified "quality". The population identified the landscape of urban sprawl (AFH district) as a degraded landscape that leads to the loss of the city's territorial identity. Then, in the second part of the questionnaire, we sought to identify the factors of this landscape degradation.

### 3.3. Factors of Landscape Degradation

The urban territory of Hergla is in degradation despite the particular value that characterizes its seascape. The search for degradation factors is based on different variables oriented according to three hypotheses, namely the Urban Development Plan, the society and the economy.

The first hypothesis, the "UDP", is developed around two variables, namely the study perimeter and the planning regulation. With regard to the study perimeter of UDP, 77.5% of the population found that agricultural land shouldn't be urbanized. However, building alongside natural environments is no dangerous for 36.2% of surveyed. Thus, the scope of study is not an important factor in the landscape degradation of Hergla. But the variety of answers to this question highlights the need of public awareness to the importance of their territory's naturel areas.

In addition, the majority of the population questioned considers that this city has a typical architectural style that must be preserved imperatively (Figure 15). 82.5% of these people insist on the conservation of the white and blue colors of the buildings, in reference to the Mediterranean urban landscape.

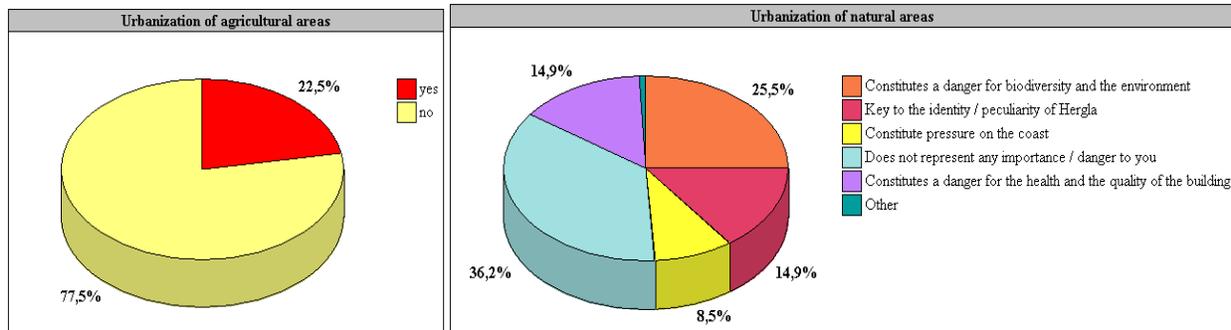


Figure 14: Urbanization of natural areas

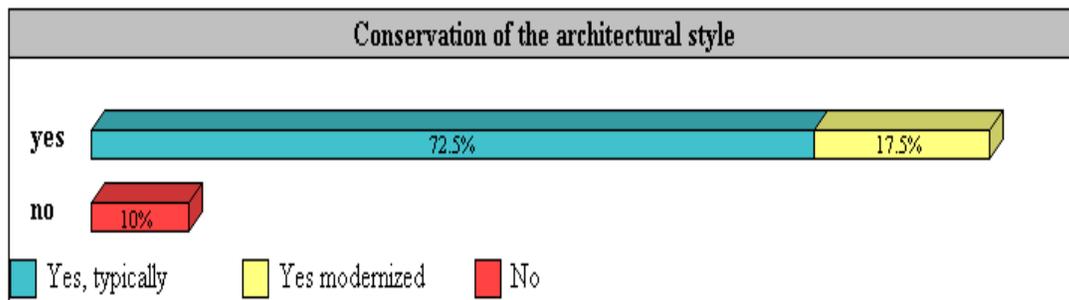


Figure 15: Conservation of architectural style

With regard to the Hergla planning regulation, more than half of the sample, (55%), found that it had some flaws (Figure 16). The increase in the number of floors of buildings is due, according to 57.5% of the questioned, to the growth of the property price (Figure 17). Thus, these results show that it is necessary to revise the urban planning regulation in consultation with the citizens.

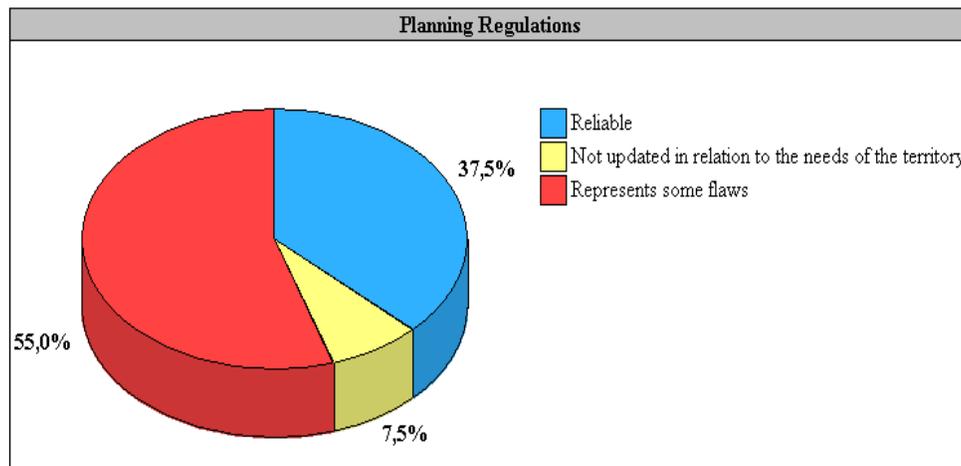


Figure 16: Qualification of urban regulation of Hergla

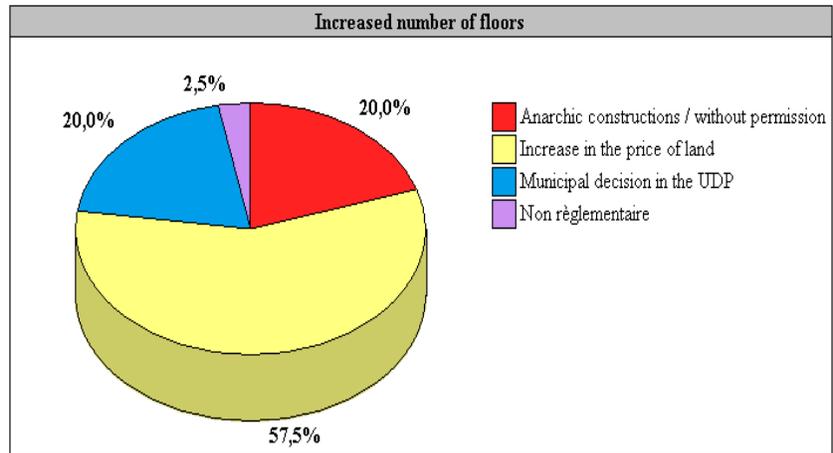
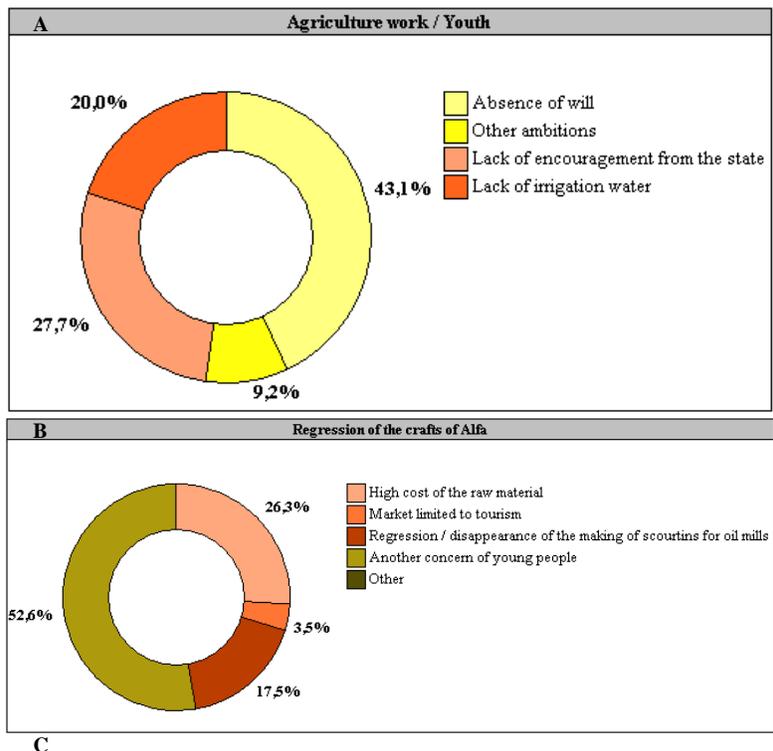


Figure 17: Causes of increased number of floors

The second hypothesis, the "society", is developed around two variables: areas of activity and civil liability. In fact, the abandonment of the field of agricultural activity is mainly due to the obvious disinterest of young people (Figure 18.A). The regression of Alfa's handicraft, an identity activity of Hergla, is also due to the concern of young people in other fields (Figure 18.B). This variable "youth will" can therefore be considered as the cause of the disappearance of these two activities.

On the other hand, 47.5% of the surveyed find that the development of the real estate field can cause social mixing issues (Figure 18.C), because of foreigners who come to reside or rent housing in Hergla especially in summer. This social mix leads to cultural diversity, very often not accepted by the inhabitants, because it risks influencing traditions and customs; causing social fragmentation.



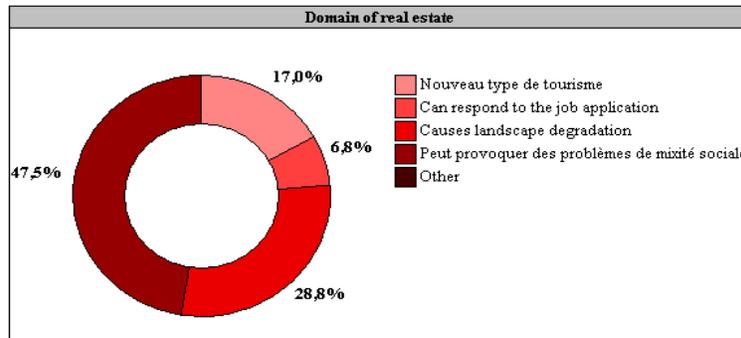


Figure 18: Citizen Perception of Activity’s domains: (A) Agriculture/ Youth; (B) Regression of Alfa handicraft; (C) Development of real estate domain

With regard to the variable of civil liability, 55% of the sample found that the action against pollution (solid waste) is a shared responsibility between the population and the municipality. Also, 65% of the questioned are ready to participate in public actions to improve the landscape of Hergla.

The third hypothesis, the "economy", deals with the two variables "land prices" and "tourism". Indeed, 75% of respondents see that the growth in land prices may be the main factor in land cover/use change, and hence urbanization of agricultural territories. Thus, the frequency of this increase is estimated at triple by 32.5% of the sample, while 30% finds that it has multiplied by five in the last ten years (Figure 19). Regarding the “tourism” variable, 72.5% of the population thinks that tourism projects can be successful at Hergla and 52.5% explain the lack of investment in these projects by the deterioration of the state's economic situation since the revolution (Figure 20). In the Face of this situation, 30% of respondents believe that the development of agricultural activities can be promising in Hergla, while 27.5% of these people, of whom 22.5% are under 45, are oriented towards the industrial sector (Table 3).

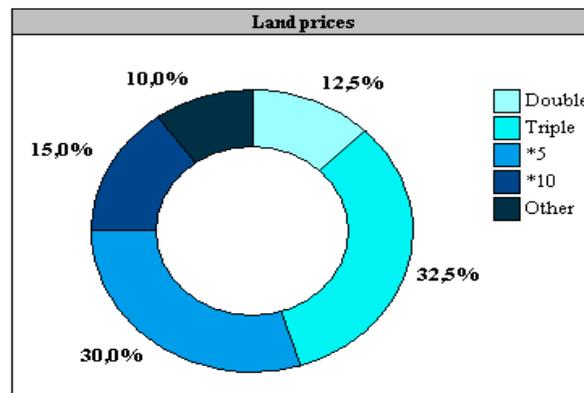


Figure 19: Frequency of increase in land price

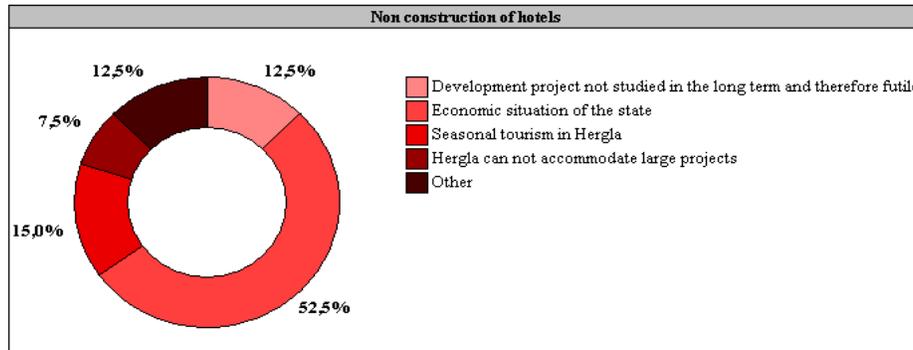


Figure 20: Assessment of lack of investment in tourism projects

Table 3: Identification of the promising activity in Hergla in relation to the age of the respondents

Promoting activity	Age	Under 45 years	46 years or older	TOTAL
Craft		10,0% ( 4)	15,0% ( 6)	25,0% (10)
Agriculture		20,0% ( 8)	10,0% ( 4)	30,0% (12)
Industry		22,5% ( 9)	5,0% ( 2)	27,5% (11)
Ecological tourism		7,5% ( 3)	10,0% ( 4)	17,5% ( 7)
TOTAL		60,0% (24)	40,0% (16)	

To synthesize, the main factor of landscape degradation, according to the questioned, is the lack of social participation in municipal decisions about urban and landscape actions (37.5%). Whereas 27.5% of respondents believe that this is due to the non-observance of the planning regulation by the builders (Figure 21).

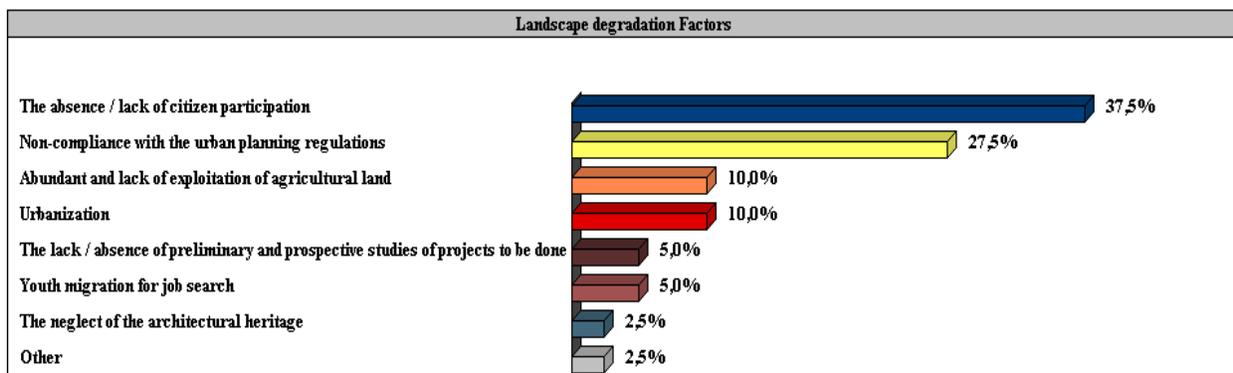


Figure 21: Landscape degradation factors according to citizens

To address this problem, 25.6% of the sample proposes to ensure compliance with the regulations to improve the Hergla landscape and maintain its identity (Figure 22). The other respondents insist on raising awareness and educating citizens about the quality of the city's landscapes (18.9%) as well as the development of sustainable development actions (15.6%) and landscape mediation (16.7%).

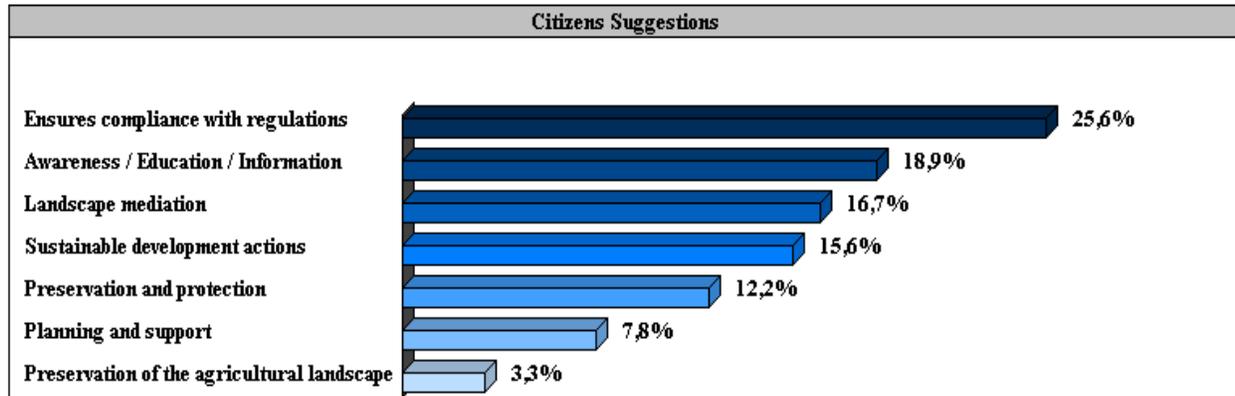


Figure 22: Citizens suggestions for improving the landscape of Hergla

#### 4. Conclusions and Recommendations

This study shows that the questionnaire tool proves to be an effective way to integrate the inhabitants in territory actions, through the landscape perception to understand their territory issues. Indeed, the city of Hergla holds its "quality" landscape character of the particular value of its seascape. The citizens are committed to the conservation of their architectural, natural and cultural heritage. They identify the factors of the urban landscape degradation as, essentially, the lack of citizen participation and the non-observance of the urban planning regulation. Other social and economic factors contribute to this unappreciated territorial change.

Thus, the landscape is an important instrument of territorial mediation to improve the living environment and to ensure the sustainable development of a city; through its principles of perception, citizen participation and governance [18].

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