EVOLUTION OF COASTAL VILLAGES IN THE CENTRAL PORTUGUESE COAST.
THE CASE OF ESMORIZ AND CORTEGAÇA.

EXTENDED ABSTRACT

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ABSTRACT

The Portuguese geostrategic location has allowed a huge sea related tradition, which making the coastal territory attractive face to other regions. With 900 km of a diverse coastline, extending from Minho River mouth to Guadiana River mouth, it is possible to observe variations between the rocky shore, sandy shore and high cliff coast what is related to the geological formation. Each type of coastline reacts in a different way to erosive agents and the human occupation.

Therefore it is important to know the genesis of a coast before any action is taken for shore protection. In addition, this information allows the definition of specific policies and guidelines for each particular type of coastline. In a sandy shore type, similar to case study, the effects of climate changes bring new expectations and challenges for costal management specialists to planning this territory. The increase of coastal hazards as well the frequency and intensity of storms during the winter can make these places less attractive to human settlements.

With these concerns in mind, it is intended to understand what led to the emergence and development of settlements along the coastline. The study was based on a complete analysis to the coastal villages of Esmoriz and Cortegaça, located at the Portuguese central coast, which are affected by severe erosion.

Through analysis several plans and multiple information sources it was possible understand the settlements evolution along time, finding a relationship between the development of those villages and the coastal management plans.

KEY WORDS: coastal management; coastal settlements; coastal erosion; liveability; shoreline retreat.

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INTRODUCTION

Climate change will impose new challenges in the management of coastal areas. The changes in climate patterns will cause different effects on the location and severity of heavy storms, frequency of floods as well increasing the level of the sea (EEA, 2012) and cause hazards coastal settlements increasing. In Portugal where the process of “littoralisation” is rooted since mid/20th century, here will be many areas affected by these erosion problems. The intense occupation of coastal areas in Portugal precede the 70’s decade, but became more pronounced after Portuguese revolution (April 25 1974) with return of people from ex colonies and internal migrations from interior to littoral (Rodrigues, 1984).

Actually, it is estimated that about 75% of Portuguese population currently living in the coastal zone and that number could likely to increase significantly in the coming years (Pereira, 2013). This information demonstrates the importance that the coastal territories were assuming in recent decades, finding there the main job opportunities and main urban dynamics of the country.

In a coastline expose, on majority of cases, to the same ambient conditions of climate and sea, why some sectors have more erosion problems than others? The answer it is not as simple as we pretend, but we can simplify and base on coastline characteristics, which can vary along the space, exist differing responses to these agents. Portugal has several types of shoreline along its 900 km. From the mouth of Minho river to Guadiana river’s mouth a variation in the geological characteristics of the shore can be found, creating different types of coastline: rocky or sandy, low-lying or presenting high cliffs.

The study area is the Aveiro sandy coast, which is a low-lying region and therefore vulnerable to erosion and sea-level rise. Yet, in this type of coast and with the current changes in ocean dynamics, caused not only by climate change but also by anthropogenic factors, the sediment budget at beaches has been changed. The beaches in this region are classified by the Portuguese Water Institute as at high/very high risk of erosion (INAG, 1999).

The retreat of the shoreline becomes a serious problem when it starts to endanger properties and infrastructures, and thus affecting human settlements along the coast. With this, coastal erosion becoming a concern for Portuguese Government, getting this expressed in Resolution Nº 38/90. That diploma was published in 1990 to define guidelines for create a regional plan with emphasis on controlling coastal development for municipalities with a seafront. Notwithstanding this, the few coastal villages continued to develop and expand its urban area.

Taking also into account the factors of the liveability of the coast, this research analyses the evolution of two coastal villages (Esmoriz and Cortegaça), located at the Portuguese central west coast, very close to the Oporto metropolitan area. These case studies were selected due to their particular characteristics, namely the recent evolution from the primitive coastline to the present coastline based on fishing activities.
Despite the low liveability of the place, the development of Esmoriz and Cortegaça was induced by coastal management plans that were supposed to have the opposite effect with results that happening nowadays.

**OBJECTIVES AND METHODOLOGY**

With this study we intend to make a characterization and analysis of developing process that lead to recent urban occupation on the coast of Aveiro, specifically in Esmoriz and Cortegaça settlements, exploring the possible influence of Portuguese land management instruments on that same process. After defined the main objective and to make the research process better structured, were defined several intermediate objectives:

1. Understand the main legislative documents about coastal areas management, and instruments and strategies used to manage those territories;
2. Presenting the shoreline formation of the coastal territory from the central region of Portugal, as well as their evolution over time;
3. Understand the concept of liveability of a territory and seek to apply it to the coastal settlements of Esmoriz and Cortegaça;
4. Identify the multiple stages of evolution of the coastal settlements of Esmoriz and Cortegaça, analysing how occupation of theses beaches become effective and the relationship between planning and land management;

In order to get an answer face to the proposed objectives it was necessary to adopt a methodology inclusive and structured, based on the research questions. For this research the settlements’ history information was crucial, where old records, bibliographic references and newspaper articles played a main role. Since the date when geographic information of the settlements became available attempted to create, in geographic information systems, several maps to show the evolutions of the settlements. To complete the analysis was used some statistic information where demonstrate the recent growing trend in coastal settlement of Esmoriz e Cortegaça.

**TERRITORY FRAMEWORK**

The study area is located on the Central Portugal coast between Esmoriz and Mondego Cape. It is known that this coast sector is a very recent formation at a geological scale, presenting gentle sandy beaches and small dunes (Cunha, 1930).

The case studies present, in what concerns to beaches formation the characteristics of a barrier sand spits coast. The barrier spits are a particular type of beaches that develop in parallel towards to the coast, without any rocky support in all their extension (Paskoff, 1985). They are therefore exclusively sedimentary zones, and their formation and maintenance depends on the material that comes from the
erosion process, by the swell action, and from continental origin by fluvial erosion. Thus the sand spits formation depends mainly on a strong and well defined littoral drift.

**The growth of the barrier spit between Espinho and Mondego Cape**

In the past the coastline shape was completely different (Girão, 1922). The entire coastal territory between Espinho and Mondego Cape did not exist in the 21st century. Therefore, the Aveiro lagoon was still not formed and from Esmoriz to Mondego Cape, a large bay existed and allowed the Vouga River to flow directly into the ocean (Cunha, 1930). The question arises on the evolution of the primitive shore to the current situation, so it is relevant to notice the importance of strong littoral drift. Some studies indicate that sediments transported by the ocean currents and winds were converging along the coast and created two large sandbanks (Cunha, 1930), where one of them grew from Espinho southwards and another one grew up in the opposite direction, from Cape Mondego northwards. However due to the ocean swell north-westerly dominant direction it is most likely than the sand spit grew from north to south to close the bay.

Commonly the main sources of sediment to the littoral drift are the rivers. In this case, sediments have their origin in the Douro River, due to the watershed large size, and also in a lesser extent in the Vouga River. For the sediments to become increasingly available in a sufficient quantity to allow the formation of the barrier spit, human interference had to occur. The removal of vegetation from the basin slopes to create grazing lands (Ferreira et al., 1994) and large forest fires (Cunha, 1930) has led to a higher soil erosion and sediment yield by surface runoff. With the rivers silting, regular floods were needed for their sediments to be transported to the coast, while the ocean swell would move sediments alongshore.

**History and location of coastal settlements**

The Portuguese coast is still mostly undeveloped. This reality is present between Esmoriz and the Mondego Cape, where main towns and villages are on the primitive coastline: Esmoriz, Cortegaça, Estarreja, Aveiro, Ilhavo, Vagos and Mira. Actually in some of these places the coastline is 10km offset from the primitive one (Figure 1).

In this context arise the “old” settlements of Esmoriz and Cortegaça. Thus are villages belonging to the Ovar municipality, which had its origins way from the coastline, and an economy based on the agricultural activity. Over the years Esmoriz assumes greater importance in terms of population and "wealth" than Cortegaça, including won in 1993 city status. This city status was due to industrial growth, closely related to fishing activity, which has developed several years ago on the coast.

In the Aveiro region the history of the coastal villages development is quite peculiar. Generally, they start as small fishing communities that took advantage of the summer for the fishery activity. In this location the fishery was and still is so-called “Arte Xávega”, which uses animals (bulls) to pull the nets to the shore. Over the time this settlements have evolved to other main activity during the summer season, beach tourism.
The first houses appeared on the coastal settlements of Esmoriz and Cortegaça by the end of the XIX century, creating the “new settlement”. They were the “palheiros” (haystacks), with roofs made with straw, built in wood, and designed in such a way that allow them to be moved from one place to another place using rolling logs. This demonstrates clearly how local population perceived the liveability of the place. These locations are exposed to a severe wave climate, a fluctuating shoreline and also to periods of intense rainfall and wind. This type of climate and the lack of basic life conditions pushed away the people of those coastal areas during the year, except in the summer time, making “old” settlement the main village over the time.

**FIGURE 1.** Aveiro region on west coast of Portugal. Relationship between primitive coastline (12th century) and present coastline. Location of the Esmoriz-Cortegaça villages, old and new settlements (Souto, 1923)

**LIVING ON THE COAST**

First of all, it is important to clarify the concept of liveability as introduced by Anglo-Saxon literature (VCEC, 2008; McCrea & Walters, 2012; Newton, 2012). Although there is no single definition for the concept of liveability, it reflects the community’s well-being and comprises the many characteristics which make a location as a place where people want to live now and in the future (VCEC, 2008). In a broad
sense, this concept includes a range of factors that influence the personal decision to live in a certain place.

The liveability quantification is usually obtained through the living cost (based on the products basket price in a given geographical area) and quality of life, where social, environmental and economic data are included. When we are discussing the issue of human occupation in the coastal area, there are some matters to consider. As already mentioned, the coastal areas differ in social and ecological levels from rest of the country, being also areas exposed to different vulnerabilities. In a coastline like the Portuguese west one, where settlements are so heterogeneous, some of those show a large growth along the coast and others grow as small villages. It is important to identify the reasons that make a place more attractive than another. It is in this context that the liveability concept is used in this study.

**Liveability concept**

The concept of liveability is multidimensional and complex, reflecting the broad range of factors and their interactions that different individuals, communities and businesses have in mind when thinking about liveability (VCEC, 2008). Now it is time to introduce the attributes that help characterize the liveability of a place. Some factors such as residential amenity, human capital, social capital, human health, and the more qualitative elements of personal satisfaction and happiness, can be considered attributes which support the decision of a person to choose a place, a city, or a country to live in (Newton, 2012). Regardless of its location, a city, village or urban centre should ensure a set of values and services that guarantee comfort to citizens, encouraging them to live in that place. This approach encompasses those place-based attributes of an urban location (home; neighborhood; city) that contribute to the individual's quality of life and well-being.

The indicators chosen to characterize the liveability depend on the researcher, the objectives of the study and the characteristics of the areas to be compared. However they must have a scope in different levels (social, economic and environmental), because regardless of values and services that a place (city, urban centre, village) can offer to improve the comfort of their citizens, there are maybe natural factors (climate, terrestrial dynamics...) which restricting the choice to inhabit these places.

**Planning at Portuguese Central Coast**

The coastal areas regulation appeared in Portugal only in the 1990’s, so until then only was needed the permission from the municipality to construct near the coastline, absence of any reasons that would prevent licensing these constructions. With the worsening of the issues related to coastal erosion, mainly at the end of 1980s, the Portuguese Government needed to take some measures about these concerns.

The Resolution No. 38/90 was the first step to regulate the coastal territory, promoting the Regional Plan for Portuguese Central Coast. This instrument had as intention the help to resolve the problems related to human pressure on coastal areas, defining occupation and defining use rules to those territories. Further, in 1993, comes the Coastal Area Planning to 9 sectors of the Portuguese coast. The intention was
regulate all private uses on the maritime public domain, namely to support beach activities and give to municipal plans some guidelines and rules to organize their coastal territories.

Ovar’s municipal land use plan was prepared in 1994, which is responsible for the planning of this coastal area. At this time there are several buildings along the coast what was influenced the management and classification of land use in the area, so these areas was classified as develop land (soil to construction) seeking to consolidate these coastal settlements and avoiding the construction along the coast. With that allowance and based on municipal strategies for these areas, tourism, occurs an exponential growth of that settlements.

More than 15 years after the first guidelines for the coast, appear the National Strategy to Coastal Areas Management (Resolution No. 82/2008) that has created with the intention to protect and enhanced landscape. This way presents a strategically vision, to qualify and make sustainable the economic activities that develop in this area.

Actually are nearing completion the review of coastal area plans, presenting concerns about the coastal hazards and coastal settlements vulnerability.

**THE DEVELOPMENT OF ESMORIZ AND CORTEGAÇA COASTAL VILLAGES**

Actually the place where the coastal settlements are a reality, to 200 years ago there were only sand dunes newly formed by the extension of the sandbank. Excess sand was so high that it would eventually be harmful for the crop fields around the Esmoriz and Cortegaça villages, leading the need of pine plantation for establish the dunes. This plantation was a private charge which needed to acquire land along the new shoreline, which is the process that led to private poses of place.

The development of these settlements can be explained in three phases. In first one there was an informal occupation in those places to support economic activities. Secondly, where there is a high demand of the place for beach use, forcing to a better disposal and organization of buildings at area, although this planning was done so archaic. In phase 3, for which one has more and better information and data for characterize these period, occurs consolidation of Esmoriz and Cortegaça coastal villages.

Along the first phase, occupation was done primarily to support fishing activities, only practiced in summer. Thus, some homes were being built, the typical “palheiros” (haystacks), not only for fishermen stay overnight at this location but also serve as warehouses for fishing material and save the animals (bulls were used to pull fishing nets to land). Throughout this stage didn’t exist good access to the beach, so these places were not very attractive to the meteorological conditions that were felt there.

These constructions had the particularity that can be moved to a different place. Supported over wood rolls and pull by animal forces (bulls), this system shows that people knows what dangerous can expect of occupying the coast line, demonstrating lack of liveability from that places.
The transition to phase 2 occurs not only with the opening of the road linking the towns of Esmoriz and Cortegaça to the beaches but too the influence of a new trend: “Sea bathing used as a medical therapy”, under the belief that sea bathing would strength the body. These factors have increased the demand on the place, and begin to emerge some typical houses with the function of host families during the summer holidays. Even in the summer season, bathing was dangerous and was made with the assistance of experienced staff, the so called “banheiros” (bath men).

In these period buildings had better conditions than the first ones because played different functions, but with increase of the two types of construction rise the necessity of organize the place. This manner was created the first plane to that place for the only purpose of organizing housing disposal and set street network. However, growth was not as great as expected as can be seen by the beginning of phase 3.

The weather and wave climate were elements that have always distanced populations. In addition, fresh water supply, sanitation and shops took a long time to arrive. The sandy nature of the coast made the access difficult to vehicles and carriages pulled by horses. All these factors contributed to keep those coastal places without a permanent human settlement, in opposition to the old and more inland villages of Esmoriz and Cortegaça.

At phase 3 its possible to see the settlement evolution from the cartographic analysis, so in this phase we have three important moments, 1967, 1984 and 1991, that correspond to date of aerial photography’s used to analysis. During this phase disappear almost for entire the fishing activities and construction it’s dedicated to second house or holidays home. This was the period when occur the biggest occupation of this coastal territory. Witch date, as can be seen at result analysis, mark a different evolution stage, whereas crossing with historical data can characterize and justify the development of settlements.

**DISCUSSION**

The 1967’s map (Fig. 4) resumes the evolution of settlements during the previous phases... This map shows two roads almost perpendicular to the coastline which leading to both settlements on the beach. As observed the new constructions appears along the main road, tend to be aligned with this one and also organized along the incipient roads. It is clearly visible a more informal area close to the seafront where the two beaches are not yet linked by a road. There is still the same safety margin between the coastline and the first houses and no coastal protection works are visible.

The few number of buildings and several “palheiros” still remain from the beginning of occupation slightly away from these new constructions. The no access to drinking water and the non-existence of basic infrastructures coupled with the inclement weather in winter, contributed to this place’s liveability were lower than in the neighbourhood (more far away from coastline), and thus not encouraging people to settle.

The period between 1967 and 1984 was undoubtedly the most problematic in terms of land occupation. During this period, important political changes occurred in the country. With the dictatorial regime fall, in
April 74, there was an anarchic period regarding the occupation of the territory. The delays in establishing a housing policy to solve problems that lasted over time, worsened with the massive return of populations from former colonies, contributed for a substantial process of illegal settlements. These places along coastline, where surveillance by the authorities was difficult, was the first places where that kind of occupation began to growth.

The “Fishermen Hood”, group of several houses along the coastline, was established at this period. At first the area close to the old “palheiros” that were there since the first phase, on the border between Esmoriz and Cortegaça and from here the number of houses continued to grow. Nobody was able to control and manage this dynamic, and now this is the most exposed area to coastal erosion.

Aerial photographs and census surveys show an evident large growth in non-planned housing soon after the revolution. New houses were informal, but started to be built in masonry. However it was in the late 1980s and early 1990s that the highest urban growth on these settlements took place, with the publication of national legislation, which regulates and sets the scene for modern coastal zone management.

A map in Fig. 6 depicts the situation of the Esmoriz and Cortegaça Beaches settlements in 1991. In this phase, a marginal road now connects the two beaches. The road network increased compared with the 1967’s reality and a great amount of informal housing is now present on the seafront. Two camping sites were created. A groin field was built to sustain coastal erosion, which started to threaten these two locations. During ocean storms, waves were able to reach the houses.

The entire urban growth, from 1991 to present, has been done under the influence of urban planning and management. The result of all the planning was a continued growth and consolidation of the coastal settlements (beaches) of Esmoriz and Cortegaça. The land use in the area is categorized as beach space (Resolution No. 66/95), either existing or potential, which means an urban area where activities are restricted to the natural space and tourism. Therefore, all the constructions built illegally in the 80s remained in the place and the recent Coastal Master Plan did not restrict urban development.

Municipal urban planning started to be done also on a regular basis. These plans focused on traditional settlements: villages and urban areas. In their enthusiasm to legalize situations that were illegal (or informal), areas where houses could or could not be built were defined in the plans. The door was opened to build in places that traditionally were perceived by humans as having very low liveability. A paradox appears after these analyses: planning permission pushed/allowed people to settle in high erosion risk and no-liveability areas.

Statistics demonstrates that the population on the settlements increased 27% (INE, 2011) from 1991 until 2011, which is quite significant. That value results from the relationship between housing demand and supply in the coastal areas. It is important to note that the supply of new housing was guaranteed by the municipal spatial plans terms, which allowed the emergence of new buildings at sea front line during 90’s.
For understand the town evolution it is important to know better the changes that have taken place in the main economic activities of the site. Fishing activities, which led to the founding of the town, were losing importance over the last decades and today have a small importance to the local economy. Analysing employment statistics for Esmoriz and Cortegaça beach settlements shows that secondary sector (transforming industry) was the main employer of residents until 2001, confirming the industry as the main employee in those locations. Esmoriz and Cortegaça main agglomerations have some tradition in industry, this means that those who live on the beach have to move to the main towns to work, making the settlements at the shoreline as "dormitories". In the last decade, between 2001 and 2011, a new modification occurs in the economic activities of these settlements, with the tertiary sector being now the main employer. This new trend follows specialization in services occurs in Portugal over the last decade, but with greater dedication to the economic structure based on tourism, local shops and restaurants.

However, the level of villages in analysing this growth meant a specialization at the level of tourist offer, restaurants, accommodation and shops.
FIGURE 2. Portuguese West Coast. Beaches of Esmoriz and Cortegaça in 1967 (compiled from aerial photographs)
FIGURE 3. Portuguese West Coast. Beaches of Esmoriz and Cortegaça in 1984 (compiled from aerial photographs)
FIGURE 4. Portuguese West Coast. Beaches of Esmoriz and Cortegaça in 1991 (compiled from aerial photographs)
CONCLUSIONS

The Portuguese Central Region sandy coast, considered one of the most threatened by coastal erosion in Europe, has witnessed in recent decades a substantial growth of its urban areas. The problems resulting from the existence of these villages near sea are known and, when they occur resulting from strong sea waves and storms, are widely disseminated in the media.

The occurrence of more frequent and violent storms in latest winters has cause serious problems at coastal villages all over Portuguese coast, damaging seawalls and groins, buildings and public spaces of beach areas. These situations cause every year, discussions about the best solutions to mitigate the problem of coastal erosion. In this context, Esmoriz and Cortegaça beaches in Ovar municipality, have been the places most affected by this problems at national level.

With this in mind, was attempted to examine in historical terms, the evolution of these coastal villages, trying to understood the reasons for the occupation and consolidation of these settlements, classify has high risk areas. This way, it was important to get the answers to the following questions: These places offer ideal conditions for permanent occupation? The coastline was located at a considerable distance, at beginning, not offering any risk occupation? There was lack of knowledge about coastal erosion problems? The instruments of territorial management acted in accordance with his nature and places characteristics?

In an area already weakened by their genesis, where worsening coastal erosion problems and increase frequency of overtopping sea will be a trend, it is important to understand the existing urban dynamics in this sector of the Portuguese coast.

On the shoreline two informal settlements appeared linked with the villages of Esmoriz and Cortegaça used as a support to the fishing activities. These settlements stayed basic till the fifties of the 20th century with contribute of several factors to that: difficult access to the shoreline by vehicles on a sandy coast, strong winds, high waves and fog, and the perception that those places have a very low liveability.

Is faced with a zone of recent formation, in geological terms, which over hundreds of years has enjoyed a rich littoral drift sediments from Douro river. This is a very fragile area and is exposed to ocean agitation formed in the North Atlantic and strong coastal dynamics. So at these local, maritime overtopping, historically, are not new. However, at beginning of appearance of first houses on informal settlements, the level of exposure of human elements in these situations was lower and the destructive consequences had less impact.

After the Portuguese revolution of 1974, the settlements grew with masonry houses owned by holidaymakers. By the eighties of the XX century, urban and coastal management planning was introduced in Portugal. When the city master plan was made in 1994, with the legal recommendation for the coastal areas, existed many buildings along the coastline in general illegals. Although instead the plan tries to correct that situation, they classify the involving area as urban land, allowing construction. So in
place to put some order on the informality of the place, was opened the door to development in places at risk of coastal erosion. The illegal construction, which has been growing since 1960, is at present defended by an expensive system of groins and seawalls.

As a final conclusion and lessons learned by the present case study, coastal planning can have a perverse effect by allowing settlement in places at risk of erosion and with very low liveability. The problem is that the liveability of the area is only perceived by locals, which have been living nearby for many years. The decision for all the others to settle is based mainly on the building permission they can get from the authorities, which can be quite misleading.

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