

Land Use Tourism Models in Spanish Coastal Areas. A Case Study of the Valencia Region

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ABSTRACT

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The “sun and beach” tourist product is of major economic importance in Spain and particularly in the region of Valencia. Beaches are natural fragile resources that contribute greatly to a country’s economic productivity. In this paper, intensive and extensive tourism models are analyzed, concluding that from the economic as well as the environmental perspective, intensive tourism models are more efficient than extensive ones. The generalized erosion problem of the Valencia coastline is described and three fundamental causes are examined: damming, port breakwaters and urban development. “Beach sand” and “littoral space” are identified as critical natural resources limiting future economic development of the coastal areas. Restoration of the natural fluvial coarse sediment drift together with reservoir dredging and sediment bypassing in dams are considered essential for the sustainability of beaches. After restoring natural coastal sediments, it will be necessary to install sand bypasses in ports along the coast. Beach nourishment projects based on marine and fluvial deposits may contribute to solving local, specific erosion problems in the short-term.

ADDITIONAL INDEX WORDS: *Tourism, beach nourishment, damming, urban planning, sustainability.*

INTRODUCTION

Tourism in Spain is of vital economic and social importance. This economic activity is based on the country’s mild climate and inviting beaches and has transformed Spain into a mature and sound destination. The Spanish coastal area, with 6,584 km of coastline (28% beaches), constitutes a scarce and fragile resource of great environmental and economic value. As such, it must be managed so that economic activities, environmental assets as well as tourist demands are sustained in the long-term.

Spain constitutes one of the most popular international tourism destinations. In fact, according to the WORLD TOURISM ORGANIZATION (2004), Spain vies for first place in world tourism, rivaling only the United States of America and France. The WORLD TOURISM ORGANIZATION estimated that Spain received 7.5% of the 691 million international tourists in 2003. Tourism in Spain is characterized by the volume of demand from tourism markets involving both residents from foreign countries coming to Spain and Spaniards themselves. In 2004 Spain received 85.7 million foreign visitors, 62.5% of whom stayed at least one night. That same year Spanish inbound travel registered 132.9 million trips.

Recent statistical data from the Spanish INSTITUTO NACIONAL DE ESTADÍSTICA (2005) show that income from tourism in 2004 totaled 37,250 million euros, which made up 55% of the Spanish commercial deficit. Tourism in Spain generated 11.4% of the Gross National Product and maintained almost 11.2% of the direct employment.

From the point of view of supply, the highly fragmented and atomized sector is composed of a large number of companies and establishments that carry out a wide range of activities. Some interesting representative data on the main subsectors are the

following: 17,000 hotels with accommodation for approximately 1.4 million guests; 1,200 camp grounds with some 770,000 sites; 127,000 regulated apartments, with 400,000 beds, although there are an estimated 5.5 million dwellings for potential tourist use (INSTITUTO NACIONAL DE ESTADÍSTICA, 2005).

Tourism in Spain is based on a “leisure and holiday” product type given the importance of mass coastal tourism, labeled as a “sun and beach” product. Thus, there is a high geographic concentration in tourist destinations on the Mediterranean coast.

In 2004, 89.6% of the foreign tourists and 62.5% of the Spanish ones chose the Spain coastal regions as their holiday destination. Moreover, “leisure and holiday” constituted the main reasons to visit Spain for 81.8% of the foreign tourists and 67.9% of the Spanish tourists (INSTITUTO DE ESTUDIOS TURÍSTICOS, 2005).

In Spain, coastal tourism has been noteworthy since the beginning of mass tourism. Beaches, as rare and fragile natural resources, are a limiting factor in the development of the Spanish tourism industry (YEPES, 1995), and accordingly, they are of a fundamental social and economic value. The economic importance of beaches is a matter of great concern in Spain as it is in other countries (HOUSTON, 1996).

Coastal tourism is one of the fastest growing types within the world’s largest industry. The development of seaside resorts has been the focus of a number of papers (AGARWAL, 2002; COOPER, 1990; KING, 1994; SMITH, 1992). Sustainable principles should be taken into consideration in the management of tourist destinations (VERA and IVARS, 2003), as well as in the identification of a legal and economic framework that can harmonize natural environmental resources, beach use, opportunity costs and compensation in order to preserve priceless coastal areas for future generations. Shoreline and coastal zone management and tourism

development can be integrated so that the quality of the environment may be improved at any stage of the resort cycle (JENNINGS, 2004). HALL (2001) provided a review of the literature on coastal tourism, focusing on its environmental impact.

In this paper, intensive and extensive tourism models are examined, and research indicates that intensive tourism models are more efficient than extensive models both from the economic as well as the environmental points of view. The generalized erosion problem of the Valencia coastline is described and three fundamental causes are examined: damming, port breakwaters and urban development. "Littoral space" and "beach sand" are identified as critical natural resources limiting future economic development of the coastal areas.

STUDY AREA

With its 23,255 km², the Valencia Region is located on the eastern coast of the Iberian Peninsula (Figure 1). This autonomous community is home to 4 million inhabitants; 53% of the population in the region lives in coastal municipalities, the average density being 650 inhabitants/km² in winter and twice that figure in summer (INSTITUTO NACIONAL DE ESTADÍSTICA, 2005).

Tourism in the Valencia Region began in the early 1960s and has grown rapidly ever since. This is one of the Region's primary industries, mostly due to the sunny conditions and excellent beaches. In fact, there are some 3,000 hours of sunshine per year, and seawater temperatures range from a minimum of 13°C in winter to a maximum of 29°C in summer. The Mediterranean climate of the Valencia Region is characterized by a considerable number of bathing days (between 140 and 190 days/year), as well as the 454 km of coastline with 265 km of beaches (MINISTERIO DE OBRAS PÚBLICAS Y URBANISMO, 1970). Throughout 2004, 4.9 million foreign tourists visited the Valencia Region, generating 67.6 million overnight stays. Spaniards made 15.9 million trips and generated 83.9 million overnight stays (INSTITUTO NACIONAL DE ESTADÍSTICA, 2005). Table 1 summarizes the basic data regarding the tourist offer according to the AGENCIA VALENCIANA DEL TURISMO (2005).

METHODOLOGY

Firstly, the economic productivity of beaches in the Valencia Region is defined as the ratio between the Gross Regional Product and land surface. Secondly, two different tourism models in the study area are analyzed in economic and environmental terms. Thirdly, the main beach erosion problems affecting the study area are described, related to the anthropic causes and quantified as based on beach surveys taken throughout the last six decades. Finally, urban planning, tourism models and beach nourishment strategies developed during the last twenty years are evaluated to identify the critical natural elements for sustainable development: littoral space and beach sand.

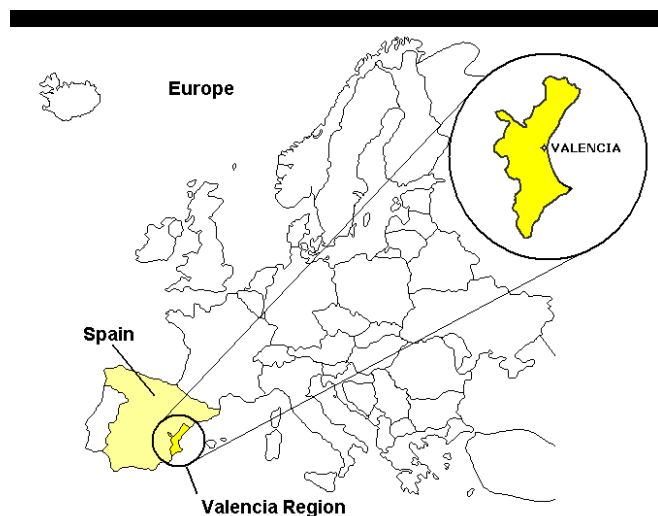


Figure 1. Location of the Valencia Region.

Economic Productivity of Beaches

The favorable climate is but one reason why tourism is so popular in the Valencia Region. Table 2 describes the usable beach surface depending on types (from urban to virgin). Considering the results of the spatial distribution of beach users on Spanish and Portuguese beaches (YEPES, 2002a; PEREIRA, 2002), it is assumed that any beach wider than 45-50 meters is not usable because of the excessive temperature of the sand in summer. Furthermore, the use of beaches is highly unbalanced as urban and semi-urban beaches sustain the bulk of tourism while rural and virgin beaches receive only a small percentage of the total visitors to the littoral (GENERALITAT VALENCIANA, 2002).

The aforementioned data allows for a simple evaluation, such as that provided by YEPES (2002b), of the relative importance of beaches in the areas within the Valencia Region. Defining land productivity as the ratio between Gross Regional Product (in euros) and land surface (m²), the global land productivity of the Valencia Region is 3 euros/m² while the land productivity of the beaches of the Valencia Region is 700 euros/m². In the case of Benidorm, land productivity totals 12,000 euros/m². These data of the Valencia Region are in accordance with the economic data for the whole of Spain, comprising the urban beaches 0.001% of the total surface of Spain while generating 10% of the Gross National Product (IRIBAS, 2002).

Intensive and Extensive Tourism Models

It is evident that beaches and littoral areas are key resources for the short- and long-term development of tourism in the Valencia Region. However, the occupation of littoral areas has been driven by local, short-term, high economic profits and not by

Table 1. Hotel beds in the Valencia Region in 2004 (Agencia Valenciana del Turismo, 2005).

	Alicante	Castellón	Valencia	Valencia Region
Hotels	59,930	19,522	24,426	103,878
Hostels	2,886	1,653	1,856	6,395
Apartments	73,378	39,735	25,007	138,120
Camping sites	26,260	24,849	20,063	71,172
Rural sites	1,160	2,294	1,423	4,877
Youth hostels	581	661	1,124	2,366
TOTAL	164,195	88,714	73,899	326,808

Table 2. Usable beach surface (km²) in the Valencia Region (GENERALITAT VALENCIANA, 2002).

	Alicante	Castellón	Valencia	Valencia Region
Urban	1.513	0.866	1.294	3.673
Semi-urban	0.726	0.779	1.387	2.892
Rural	0.867	0.242	0.546	1.655
Virgin	0.034	0.199	0.000	0.233
TOTAL	3.140	2.086	3.227	8.453

global, long-term benefits. In March 2002, only 23.98% of the Valencia coastline was classified urbanistically as non-urban (GENERALITAT VALENCIANA, 2002). There is significant pressure from urban planning and construction on the littoral areas of Valencia, both stemming from tourism and residential demands which are modifying the coastal landscape, threatening the essential tourist appeal of the littoral.

The Valencia littoral areas have been massively occupied by second-home Valencian, Spanish and also European residents and vacationers who use their second-home near the sea only for seasonal holidays. Table 3 describes the main characteristics of demand (FUNDACIÓN CAVANILLES DE ALTOS ESTUDIOS TURÍSTICOS, 1995). According to the AGENCIA VALENCIANA DEL TURISMO (1998), the Valencia Region has 1.8 million beds that are potentially useful for tourism.

The development of littoral areas used for tourism may follow two different models: intensive and extensive (FUNDACIÓN CAVANILLES DE ALTOS ESTUDIOS TURÍSTICOS, 1995). The intensive model is characterized by short tourist visits (several days), stays in hotels or rented apartments, high daily spending and high urban density; a typical example of the intensive model is Benidorm (VALERO, 1999). By contrast, the extensive model is characterized by long tourist visits (weeks), stays in owned houses, low daily spending and low urban density; a typical example of the extensive model is Torre Vieja (CASADO-DÍAZ, 1999). Contrary to what is commonly assumed by Spanish public media, the most intensive tourism models are more land productive and seem to be more environmentally and economically sustainable in the long-term.

There are 200,000 beds in Benidorm, 67% of which are potentially useful for tourism. 37.7% of the hotel beds of the Valencia Region are found in Benidorm. This city has only 5 km of beaches, yet it generates 65% of the overnight stays of Spanish tourists and 94% of the overnight stays of foreign tourists in hotels of the Valencia Region. Benidorm is one of the few tourist destinations in the world that operates all year round, disregarding the seasonality imposed by winters and summers (CURTIS, 1997). On the contrary, there are 225,000 beds in Torre Vieja, but only

2.3% are registered as tourist beds. Most are second-home residences with an annual occupation rate rarely above 30%. The environmental impact caused by these second-home properties was analyzed by GARTNER (1987).

Previous studies (GENERALITAT VALENCIANA, 2002) conclude that a hotel tourist in an intensive tourism model uses on average approximately 7% of the land surface required by a tourist in an extensive model. Further, the demand of water per tourist is four times higher in the extensive model; the water distribution systems are less efficient, and the amount of purified and re-cycled water is significantly lower in the extensive model. The intensive model requires less energy per person in addition to less paved surface per person (GENERALITAT VALENCIANA, 2002).

Not only does the intensive model consume fewer resources per person in terms of land, water and energy, but it is also more efficient from the economic point of view. The average daily spending of the tourist increases with his or her personal income but decreases with the duration of stay at the destination. Additionally, the savings from the industrialization of the basic tourist processes in intensive models (transport, beds, meals, etc.) generate additional spending and complementary services. The daily spending of a tourist in the intensive model is on average 60% higher than the daily spending of a vacationer in the extensive model.

The information presented so far indicates that intensive tourism models are more efficient than extensive ones both from the economic as well as the environmental point of view as long as the maximum capacity is not exceeded. In fact, if the intensive model of Benidorm were reproduced and the present situation reversed, the intensive occupation of less than 10% of the beaches of the Valencia Region could nearly generate the current economic income from tourism, and more than 90% of the beaches would remain virgin for future generations.

Beach Erosion Problems

Both intensive and extensive models of tourist development of littoral areas are dependent on the stability of the beaches. However, severe erosion problems have affected half of the

Table 3. Main characteristics of demand (FUNDACIÓN CAVANILLES DE ALTOS ESTUDIOS TURÍSTICOS, 1995).

Concept	Tourists	Vacationers	Residents
Average length of stay	15 days or less	Less than 2 months	More than 2 months
Type of accommodation	Hotels, camping sites or tourist apartments	Tourist apartments and dwellings, owned by tourists in most cases and rarely rented	Owned dwellings
Trends in tourist expenditure	High	Medium	Low
Urban structure	Urban destinations with high concentration and density	High density rural areas and some residential development	Residential development and some rural areas
Seasonally	Low	High	Non existing
Population	Young and increasing in numbers	Established in numbers and rather aged	Quite aged
Business dynamism	High	Low	Non existing

Valencia coastline since the 1950s. The loss of sand from the eroded areas of the Valencia Region during this period has been estimated at 3 million m³/year, which amounts to approximately 200,000 m²/year. Since beaches are a critical factor in the productivity of the tourist sector in many littoral areas (YEPES, 1995), these erosion processes are generating considerable short-term economic damage and are threatening environmental stability and the future economic value of the coastal area. The current erosion processes affect not only specific points along the coastline, but also wider areas near the coast where potential tourist appeal is reduced.

There are two infrastructure problems responsible for the major erosion processes along the Valencia coastline and one additional urban planning problem increasing the short-term and long-term economic and environmental damage. The first infrastructure problem is the construction of dams (damming), which interrupts the natural fluvial coarse sediment transport to the beach; the lack of the natural fluvial deposit of sand and gravel on the coastline causes the direct erosion of deltas and affects the balance of sediments on the coastline. The second infrastructure problem is the construction of littoral barriers for long shore transport; groins and breakwaters for shore protection as well as harbors are modifying or interrupting long shore transport, changing the balance of sediments and creating erosion and accretion areas in the coastline. An additional problem that increases the economic damage of beach erosion is urban planning, which favors the construction of buildings near the coastline. This simplified description of the main causes of erosion problems along the Valencia coast is in agreement with the European review given by EUCC (2003), which indicates that damming, gravel mining, port breakwaters and urban development are the principal causes of erosion along the Mediterranean coast. Specifically, in the early 1900s the Ebro River, located at the northern extreme of the Valencia coastline, discharged about 15 million m³/year of deposited sediments, 10% being coarse grains; nowadays, the coarse sediments are almost completely trapped in the 187 reservoirs regulating the Ebro River. Dams on rivers like the Millars, Palancia, Turia, Xúquer, Serpis and others rivers discharging water and sediments to the central and northern coasts of the Valencia Region total about 31,125 km². Considering the yearly ratio of sediment deposits in reservoirs of 200 m³/km², 10% being coarse sediments, the flux of gravel and coarse sand trapped by dams affecting the central and northern Valencia coast may be estimated in 600,000 m³/year, in addition to the Ebro river trappings in the northern extreme of the Valencia beach system.

Dams, coastal structures and inadequate urban planning have caused severe economic damage to specific locations along the coast; furthermore, there is no clear strategy to solve the multiple erosion-induced problems along the Valencia coastline in the short or the long-term. Dams have been considered essential infrastructure elements to regulate rivers for water supply, but no attempt has been made to establish sediment bypasses to maintain the natural flux of sediments to the coast. It is well known by hydraulic engineers that large amounts of sediments are trapped every year in the reservoirs, thus reducing their capacity of regulation, but the costs of dredging have prevented the bypass solution, ignoring the long-term environmental impact that the interruption of coarse sediments by dams causes to beaches. The challenge for coastal engineers is to convince hydraulic engineers and society that the flux of coarse sediments in rivers is as important for the coastal environment as the flux of water is for the fluvial environment; therefore, bypasses for coarse sediments must be installed in each fluvial barrier to limit the environmental impact on beaches. Moreover, as fluvial barriers have long been

interrupting fluvial coarse sediment, there are tens of millions of m³ of sand and gravel that could be transported and used to neutralize the current massive deficit of sediments in the coastline.

The central and northern coastlines of the Valencia Region have formed, over time, a chain of about one hundred highly interconnected beaches (178 km) with intense long shore transport north to south ranging from 100,000 to 400,000 m³/year (SERRA and MEDINA, 1996). This very active sedimentary coastline naturally fed with fluvial sediments (more than 90% of the sand in beaches) has no natural port; moreover, artificial ports were not feasible until the last century because of the intense long shore sediment transport. Nowadays, the breakwaters of a number of marinas and commercial ports (Valencia, Castellón, Sagunt, Gandia, Burriana, etc.) interrupt long shore transport at several points, generating significant advances of the shoreline along the northern beaches and damaging erosive retreats in the southern beaches. The littoral barriers to long shore sediment transport have the same theoretical corrective solution as fluvial barriers: the bypass of sediments. Although the theoretical solution is well known and has been widely accepted by the Spanish coastal engineering community for more than two decades, no operational, permanent bypass has been established in Spain. In addition to the economic costs of sand bypassing, environmental allegations and social disputes between highly valued northern beaches and poorly considered southern beaches have prevented the earnest application of sediment bypassing in littoral barriers. Further, most of the wide northern beaches, artificially supported by the littoral barriers, have become increasingly dependent on the barrier as the beaches have been subject to urban development or have been intensively occupied, reaching the beach carrying capacity. Therefore, bypasses could cause intense short-term economic damage to northern beaches without any reasonable economic or social compensation for southern beaches. In order to justify the permanent installation of sand bypasses on every littoral barrier, it would be necessary first to guarantee the natural sand feeding of northern beaches, a condition reached only with massive beach nourishments by re-activating the fluvial discharges of coarse sediments to beaches (installing sediment bypasses in dams). At present, neither massive beach nourishment projects nor fluvial sediment bypasses are considered as viable alternatives for the Valencia Region.

Beach Nourishment and Urban Planning

Beach nourishment with sediments taken from marine deposits has been considered for over twenty years as one of the best techniques to neutralize erosion processes (DIRECCIÓN GENERAL DE COSTAS, 1995). Groins, detached breakwaters and other shore protection elements have been considered only as last resorts to combat erosion problems. However, Spanish environmental activism has recently opposed beach nourishment projects (MEDINA *et al.*, 2001), increasing the difficulties in applying this shore protection technique, frequently recommended by coastal engineers. Furthermore, the available marine deposits on the coast of the Valencia Region, which can be used for large-scale beach nourishment projects, have been reduced to just one deposit near Benidorm. The 20 million m³ of sand that still remain in the marine deposit of Benidorm is not enough to cover the more than 150 million m³ of sand lost over the last five decades; only the beach nourishment demand of the southern coast of the Valencia Region near Benidorm can be fulfilled in a sustainable way. Beach nourishment with sand and gravel taken from fluvial deposits is a reasonable alternative, but this technique has received limited attention due to economic and environmental concerns; however, fluvial sediment deposits near the northern coastline of the

Valencia Region are reserved for possible future shore protection and beach nourishment projects.

Urban planning is usually not a direct cause of beach erosion, but it is indirectly responsible for damage from erosion. Firstly, urban planning is responsible for the construction of buildings and transportation infrastructure on dune fields and beaches, thus eliminating natural sediment reservoirs that could be mobilized in the case of coastal erosion. Secondly, urban planning is responsible for constructing reflective structures near the shoreline; these constructions may reduce the natural beach width to a critical point at which severe storms along with the reflective structures cause irreversible erosion. Finally, urban planning affects the global environment of the littoral area, the landscape and the carrying capacity of beaches and infrastructure. Urban planning in the Valencia Region is driven by short-term economic profits and considerable local demand for residential homes. The approved urban plans of the coastal municipalities of the Valencia Region could accommodate three times more population than the present 4 million inhabitants of the region. The environmental and social impact of such urban plans has not been globally assessed and the substantial influx of foreign capital, residents and vacationers has been so intense in recent years that both landscape and environmental treasures as well as social and cultural structures are now at risk.

DISCUSSION

Upon examining the economic productivity of the Valencia Region and the erosion problems of its beaches along with the urban planning and development of the coastal area, two natural resources are found to be crucial for long-term economic and environmental sustainability: littoral space and beach sand.

After five decades of progressive occupation of the littoral areas of the Valencia Region, it is obvious that both medium and coarse sand for beaches (diameter > 0.25 mm) and littoral space are becoming critical environmental factors that will limit the economic development of significant areas of the Valencia coast. From the economic and environmental points of view, the intensive tourism model of occupation of the territory is more efficient than the extensive model. However, extensive tourism models dominate the Valencia coast, contributing to a rapid decline of the extension of virgin and rural areas. Additionally, beaches retreat at a rate of 3 million m³/year and there is no clear strategy to reverse the present situation. Environmental activists oppose both intensive and extensive tourism models as well as beach nourishment projects with marine sand while the real estate and construction sector along the coast is undergoing the fastest growth rate in history. This is a clear picture of unsustainable development because two key natural resources are limited: littoral space and beach sand. In the long-term, other natural resources, such as fresh water, may also hinder economic growth; however, in the short-term it is essential to limit urban development and to establish a reasonable strategy to reverse the generalized erosion processes affecting the Valencia coastline. If future generations have the right to live in our territory in a reasonably natural and stable environment, the present generation must limit the consumption of critical natural resources such as littoral space and beach sediments. Furthermore, the present generation must reverse degenerative processes like coastal erosion to recover part of the natural and economic value of the coast that has been lost by the human activity of past generations.

Urban development produces an almost irreversible impact, usually consuming littoral space for more than a century. Therefore, urban growth must be limited to a much lower and more sustainable rate, establishing much stricter protection

mechanisms for remaining virgin and rural areas. Dredging and establishing sediment bypass systems in dams affecting the Valencia coast could reverse the generalized erosion problems. Beach nourishment projects based on marine or fluvial deposits may contribute to solving specific local erosion problems in the short-term. Finally, coastal sand bypasses must be established in the ports and barriers along the coast once the natural sediment drift to the coast is recovered.

If urban development is not limited, and protection plans of rural and virgin areas and natural resources remain easy to change, the economic and social pressure to consume littoral space will be irresistible, and virgin and rural areas will disappear within decades. If the fluvial coarse sediment drift is not recovered, and beach nourishments using marine and fluvial sediments are applied only on a reduced scale to solve a few specific erosion problems, current erosion problems will propagate, favoring the construction of hard-shore protection structures along the coast.

CONCLUSIONS

Tourism is a fundamental sector of the Spanish economy. The "sun and beach" tourist product, the most important product for the economy of the Valencia Region, is based on a fragile natural resource: beaches.

Economic income from beaches is estimated at 700 euros/m² on average, but land productivity depends on the tourism model of the littoral area, totaling as much as 12,000 euros/m² in the case of Benidorm.

As long as the maximum capacity is not exceeded, intensive tourism models are more efficient than extensive ones both in economic and environmental terms.

Damming, port breakwaters and urban development are the principal causes of the erosion processes of 3 million m³/year. Erosion reduces beach land by approximately 200,000 m²/year, affecting 58% of the 178 km of sandy shoreline of the central and northern Valencia Region.

The restoration of fluvial coarse sediment drift is essential to solve the generalized erosion problem, including reservoir dredging and sediment bypasses in dams. After restoring the river nourishment of beaches, sand bypasses should be installed in the ports along the coast.

For sustainable development, urban growth must be greatly limited to a much lower rate and far stricter protection mechanisms must be established for remaining virgin and rustic areas.

Beach nourishment projects based on marine and fluvial deposits may contribute to solve specific local erosion problems in the short-term.

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