

## Rehabilitation of metropolitan beaches by local administrations in Catalonia: new trends in sustainable coastal management

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**Abstract.** The planning and management of coastal sites in Catalonia has been mainly concerned with rendering beaches functional for mass frequentation. This has caused serious problems for the beaches, including the alteration of dune formation processes and the destruction of beach vegetation and habitats. Municipal capacity to plan and manage beaches is theoretically very limited and relegated to the design of plans related to the maintenance of facilities for beach users. Nonetheless, a singular experience, led by a local council in the metropolitan area of Barcelona demonstrates the crucial role that a local administration can play in achieving a balance between habitat preservation and social use based on sustainable coastal management objectives, in spite of a restrictive legislation.

**Keywords:** Beach management; Coastal resource; Habitat; Llobregat Delta; Sand dune.

### Introduction

Since the 1960s, beaches in Catalonia have been administered essentially to favour tourism, the most important industry in the country. Consequently, beaches turned into consumer's goods. This has led to an intensive occupation of the coastline –59% of the length of the Catalan coast was occupied by urban settlements in 1983 (Anon. 1983); this, together with growing speculation, has resulted in poor construction quality and bad infrastructures and commodities, especially lack of sewage treatment, which affected the state of the beaches in many ways (sand and water pollution, occurrence of rubbish, etc). Moreover, the construction of many marinas has had an important impact on the deterioration of beaches. Likewise, the construction of new maritime promenades and large car parks on the upper parts of the beaches has caused building impacts adjacent and parallel to the coastline. These impacts include the alteration of dune formation processes and the destruction of beach vegetation and habitats, with the consequent reduction of diversity and the degradation of beaches as natural systems (Nordstrom 1994).

The metropolitan beaches have suffered specific

problems. During the 1950s the implantation of industry along the metropolitan coast occupied large areas to the detriment of recreation. Long stretches of beaches were used as industrial dumps and for other marginal purposes. During the 1960s and the 1970s, recreational uses gradually became more important and metropolitan beaches are increasingly used by people from Barcelona and its metropolitan area.

The situation improved during the 1980s, in all Catalonia and especially in the metropolitan area beaches, with the establishment of new democratic administrative bodies. At the metropolitan scale, an urban planning document especially oriented towards the metropolitan coast was issued in 1982 by the Metropolitan Authority. This document foresaw future development along the coast in order to open the way to urban uses and tourism. The Metropolitan Area is an administrative body, set up by the metropolitan municipalities including Barcelona, to co-ordinate and give support to the tasks undertaken by local councils. Hygienic standards became the main worry of the local authorities, which resulted in the widespread use of beach cleaning machines and, more recently, surface sea water cleaning boats. These hygienic standards associated with the presence of facilities for beach users (showers, toilets, playgrounds, boat areas, vehicle access facilities, security, etc.), have become the main criteria for beach management. Therefore, it can be stressed that the administrative bodies have been mainly concerned with rendering beaches functional for mass frequentation (see Breton et al. 1994).

Beaches became a main issue with the release of the Spanish Coastal Act of 1988. The Spanish Coastal Act was not implemented in Catalonia until 1990 because the Autonomous Government disagreed. It claimed for authority on its coastal area more than the Central State. According to the Coastal Act, responsibility for beach planning and management in Catalonia is shared by a number of administrative bodies ranging from state to local levels. The Spanish Ministry of the Environment is essentially responsible for beach management -beaches

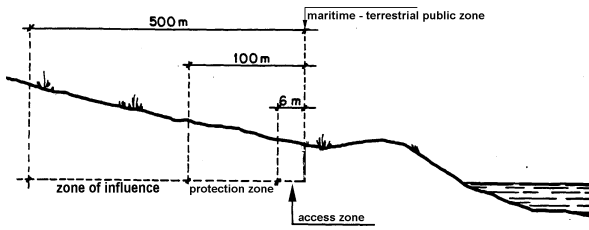


Fig. 1. Coastal zones protected by the Coastal Act of 1988.

are included in the so-called maritime-terrestrial public zone (MTPZ) which includes the zone between low tide level and major storm waves limits. It includes salt marshes, lagoons, areas flooded periodically, beaches and dunes. The State has full authority over this stretch of MTPZ. Following the Coastal Act, the first 100 m above the upper limit of the MTPZ are considered as 'Protected Zone' and can be enlarged to 200m (Fig. 1). Protection regulations are strict in this zone. This 'Protected Zone' is under the jurisdiction of the Catalan Government authority. The Generalitat – the Autonomous Government – also exercises authority over territorial planning at a entire Catalan level. Local councils assume, with an important level of autonomy, the task of town planning including land use allocation (zoning) and regulatory measures. However municipal plans have to be finally approved by the Urbanism Commission of the Generalitat. With respect to beaches, the municipalities draw-up beach use plans related to beach cleaning and the maintenance of seasonal infrastructures and commodities for beach users, under the State control of the MTPZ. Municipal capacity to plan and manage beaches is theoretically limited to the design of plans related to the maintenance of facilities for beach users.

The nomination of Barcelona to organize the 1992 Olympic Games gave the opportunity to carry out part of the coastal planning designed by the metropolitan authority 10 yr before, recovering the northeast beaches

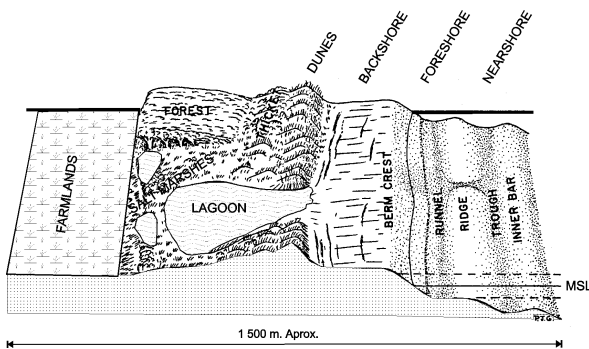


Fig. 2. Cross-section of beach and adjacent coastal landforms (adapted from Platt et. al. 1987).

in front of the city. The rehabilitation programme on Barcelona's coastal front and the urban development related to the Olympic village between 1990 and 1992 are examples of these macro-interventions. This plan included the renewal of the sewage system, the removal of physical structures which functioned as a barrier between the city and the sea (i.e. railroad tracks along the coast), the construction of a (partly underground) ring motorway, the opening of coastal parks and a maritime promenade, the construction of a new marina, with commercial and recreational interests, and finally, the restoration of degraded beaches through waste cleaning and artificial beach reconstruction. This urban waterfront, mainly oriented towards recreational uses, represented the opening of the city to the sea.

Nevertheless, there is still a lack of basic infrastructures, like sewage treatment, especially on the southwest of the capital where an important load of sewage – 40% of the Barcelona metropolitan area production – is currently dumped directly into the Llobregat river, close to its mouth. Even though the building of a giant sewage treatment plant is planned to be constructed in the near future, sea water contamination is affecting the beaches at the Llobregat delta.

These beaches have important natural characteristics which make them very special in the metropolitan context. There are 19 km of beaches with different levels of urbanization along the delta coastline, a half of them are practically unspoiled as it is the case for the beaches in the municipalities of Viladecans and El Prat de Llobregat. Historical reasons have kept these beaches free from mass use, in spite of their close proximity to Barcelona: basically the location of the Barcelona International Airport and the contamination of sea water from the river. In addition, several barriers to access to the sea exist: the occurrence of large enclosed properties of the Barcelona bourgeoisie – which have been used for hunting in the coastal wetlands backing the beaches, the presence of a golf camp, several military facilities and different camp sites adjacent to the coast. As a result, a long stretch of beaches preserves its complete natural structure with its adjacent coastal land forms like dune systems, salt marshes and lagoons, in a variety of ecological changes (Figs. 2 and 3).

The purpose of this paper is to analyse how a local council has been able to take advantage of the value of its coastal resources in this metropolitan context and make an early strategy to preserve them. Although the implementation of a local beach rehabilitation programme launched in 1988 has already been presented in a previous paper (Breton & Esteban 1995), it is important to evaluate today the El Prat del Llobregat beach management programme as a substantial effort over the years. It is also important to analyse how and why a

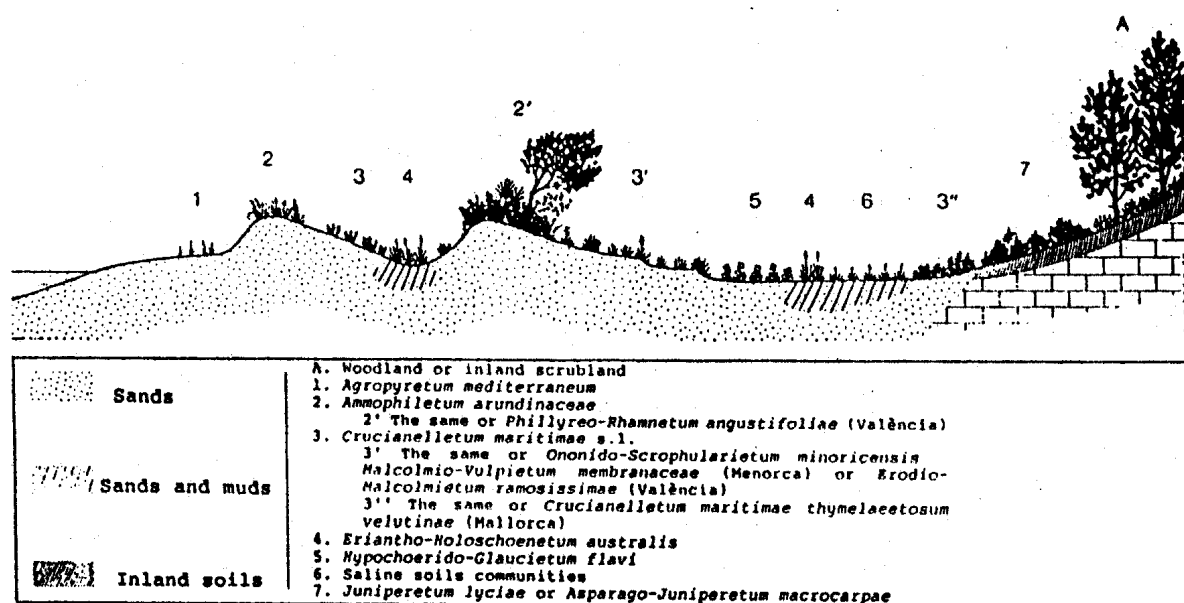


Fig. 3. Plant communities of the Mediterranean Spanish coastline (from Folch 1986). The profile is not at scale.

local council has been able to develop and strengthen an environmentally sound strategy of beach management.

It should be noted that this is not an isolated example. On the one hand, there are local and regional initiatives in other countries which demonstrate the increasing importance of the local role in the conservation of coastal resources (Brindell 1990; Fischer et al. 1995; Meur-Ferec 1995) and on the other hand, other municipalities in Catalonia, especially in the same Llobregat delta, are launching plans for recovering the natural systems of their beaches (Breton et al. 1999). Nevertheless, in the Catalan context, El Prat has been the first council concerned with the restoration of its natural beaches and implementing an ecological management programme before the Coastal Act release.

As the Llobregat Delta beaches have some specific characteristics in the Metropolitan Area, we will (1) present the problematic situation of the El Prat beaches in the Delta context; (2) analyse the response to this issue by the El Prat Council; (3) explain and evaluate the management program developed for the municipal beaches since 1988, while keeping in mind that it has been carried out during 10 years; (4) asses strategies developed by local council in front of a State project affecting its coastal zone, as well as the actual impact these may represent on beaches. The final goal is a critical analysis on the capability and limitations of local administrators to achieve sustainable coastal management.

### The Llobregat delta context

The Llobregat river flows into the sea through a delta. To the north of the river the delta area is occupied by the expanding urban municipalities near Barcelona. The southern part has kept large open spaces in spite of the continuous pressure exerted by agriculture, industrial activity, tourist resorts and infrastructures (i.e. the presence of the Barcelona harbour and airport) (Fig. 4).

The history of the delta is a continuous transformation process related to human activities (Breton & Esteban 1995). The delta was originally a vast area of continuous marshes, several kilometres in width along the coast. Several lagoons, linked to ancient mouths of the Llobregat river, could be found along with beaches and dune systems.

The first human occupation in this area was based on agriculture and was located near the river, exploiting wetlands and riparian forests, which explains the origin of the settlement El Prat del Llobregat. In the second half of the 19th century the construction of irrigation channels stemming from the Llobregat River and the perforation of the first wells which permit the exploitation of the aquifer led to the transformation of traditional agriculture into a more intensive form of land use, including market gardening, and it expanded over the whole delta. Only coastal areas with highly saline soils were not affected by this expansion. Towards the end of the 19th century, farmers planted pine woods (mainly *Pinus pinea*) along the coastline, in order to protect the fields from mobile dunes. Recent historical documents

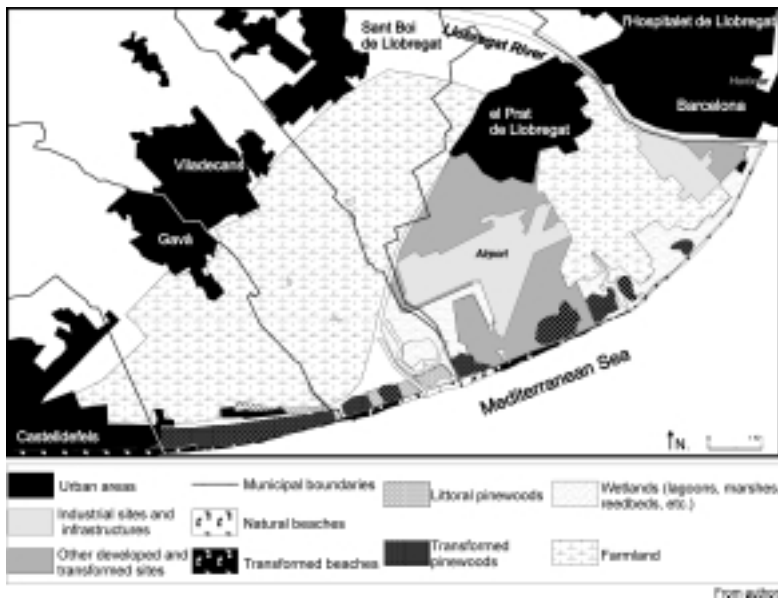


Fig. 4. The Llobregat Delta.

prove that some pine trees formations are far more ancient (16th century) and that they were planted to obtain wood for construction or for energy (Valverde 1998). By the early decades of the 20th century, the original landscape of the delta had been greatly transformed. In the 1940s, the delta landscape was an important agricultural area, serving the Barcelona market with fresh vegetables.

Since the 1950s, changes have occurred increasingly quickly. The construction of infrastructures, notably the Barcelona International Airport (the first runway was constructed in 1948 and its expansion took place between 1965 and 1991), and the extension of Barcelona Harbour (it has undergone continuous changes since 1950) together with the construction of a dual carriageway from Barcelona to Castelldefels, and the growth of industrial and urban areas in the delta and its surroundings, which received important waves of immigrants from the south, transformed the landscape once again.

The development of tourism began in the 1960s, and hotels, camp sites and apartment buildings occupied most of the pine woods, along the dual carriageway, especially in the southwest of the delta. In fact, the southern beaches of the delta supported massive summer frequentation from the Barcelona area, that implied the construction of maritime promenades for vehicle traffic and parking areas on the upper part of the beaches, causing the disappearance of the vegetation (especially pine woods and psammophilic communities) in some areas, and the alteration of topographical features. This affected mainly the municipalities of Castelldefels and Gavà. Castelldefels became (and remains until today) the main resort for Barcelona weekenders (Breton et al.

1992). By contrast, the beaches of the municipalities of El Prat and Viladecans, nearest the Llobregat river mouth, have preserved large extensions of pine woods and some areas of beach vegetation and dunes, due to the above-mentioned facts.

Nowadays there are important problems affecting the delta beaches, two of which are of particular importance. The first one is sea-water pollution as it has already been mentioned, and the second one is the erosion and regression of the northern beaches of the delta.

Coastal regression is of considerable importance. Barcelona Harbour is an important obstacle for the long-shore current, which flows from NE to SW in this zone, getting diverted from the river mouth. It is empirically known that the sediment discharge by the Llobregat River has decreased for different reasons (construction of dams in the upper basin, sand extraction, etc.) during the last 50 yr. Due to the lack of data on sediment loads from the river, it has been calculated indirectly that the river brings ca. 60 000 tons of sediments per year (Breton & Miralles 1998). No historical data are available to make a comparison. Nonetheless, the area located nearest the mouth of the river shows a regression trend of about 6 m/yr. This trend diminishes gradually towards the south where an inflexion of the process is observed, resulting in a gradual increase of sedimentation in the southern half of the delta coastline. This is principally due to the role of the marina called Port Ginesta, located in the south of the Castelldefels beach, which acts as a barrier for coastal sediments.

### **The response of the council of El Prat de Llobregat**

Different important outcomes help to understand why the local council of El Prat de Llobregat made the move towards a programme of beach management in 1988. Since the 1970s, social and ecological movements have arisen in El Prat. They were especially concerned with the project of diversion of the Llobregat River, foreseen in the Metropolitan Territorial Plan of 1974 to enlarge the Barcelona Harbour. This plan considered the El Prat municipality mainly as an industrial area between the harbour and the airport. A huge demonstration took place during this period to protest against the river diversion. Environmental awareness grew from these early dates in El Prat in favour of the conservation of wetlands, lagoons and beaches in front of the town. When the first democratic election took place, El Prat Council was led by a local communist government—during some time allied with the socialist party. Although the local government had many social problems to solve (massive working class immigration, poor housing, marginality and job problems, industrial contamination, airport noise, etc.), it developed a growing sensitivity for environmental matters. Certainly, beaches were considered by the municipality as important natural resources in the context of the Llobregat delta.

This was firstly because the El Prat beaches are located in the centre of a metropolitan area and remain to a large extent unspoiled or, at least, free from urban sprawl, especially in the area used as municipal beach and frequented mainly by people from El Prat. Since the 1980s some development proposals affecting pine tree areas adjacent to the beach have been systematically stopped by the municipality, leading to different legal disputes with the Autonomous Government which has the territory planning authority.

Secondly, along this stretch of beach, beginning ca. 3 km away from the river mouth and extending towards the south, no net regression or progression of the beach has been observed. Local administrators had no quantitative data on this process, but they empirically knew that beaches were in a situation of relative balance. On the contrary, the local Council has had to protect the area nearest to the river, as the access road to the beach has been repeatedly cut by water during heavy storms. As the beaches of El Prat del Llobregat were not a priority in the State coastal defence programme, the local Council has had to defend this northern part. On the one hand, this needed much money, which comes from the annual local budgets, and on the other hand it has caused repeated legal disputes with the Central Authority as coastal defence is not a local matter.

Thirdly, because of its sedimentary balance characteristics and the presence of unspoiled adjacent dunes, pine

trees and wetlands formations, the beach of El Prat offered considerable potential for regeneration without important investments. At the same time, the local Council El Prat exerted pressure on the supra-local, auto-nomic and central government to get a sewage treatment plant constructed. This meant a better quality of seawater which would permit bathing recreation, prohibited at present. The same Council was aware though, that once water would be cleaned, intense urbanization pressure would be exerted.

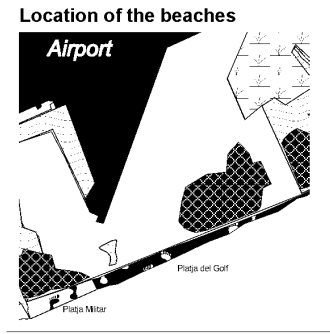
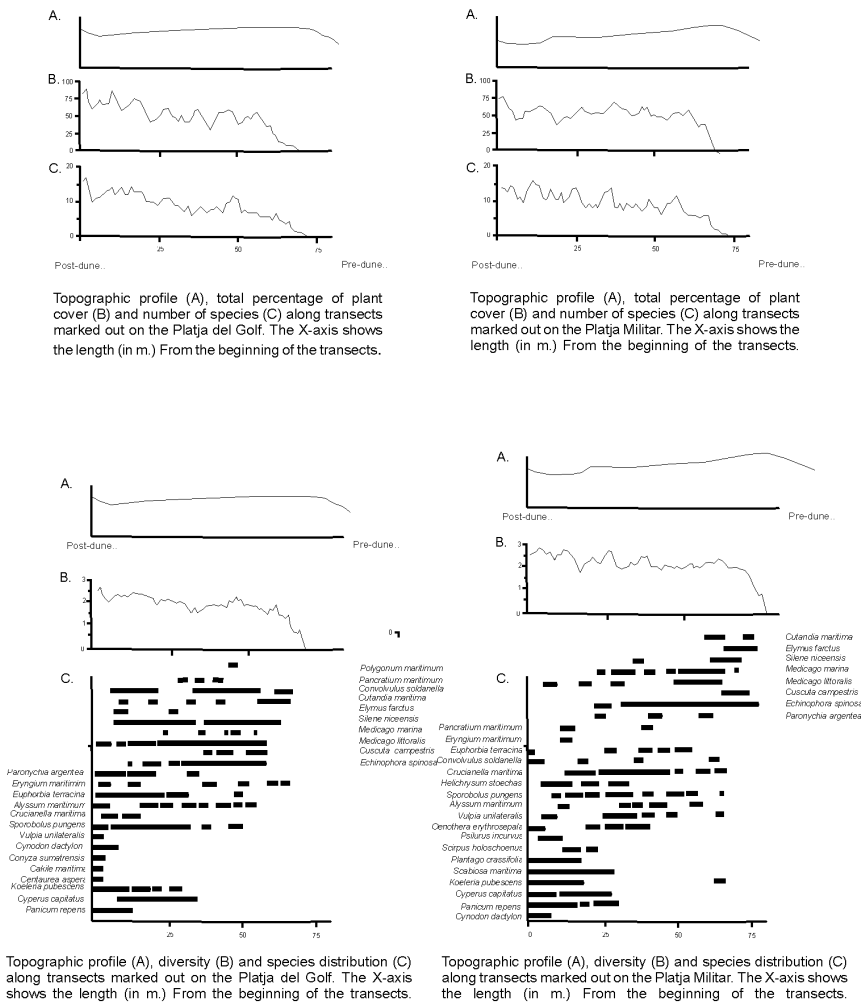
Fourthly, because these beaches represent the second largest breeding population (ca. 100 pairs) of the Kentish Plover (*Charadrius alexandrinus*) in Catalonia (the first one is in the Ebre delta), concentrated in the municipalities of El Prat and Viladecans. The Kentish Plover is one of the key bird species that confers international importance to the Llobregat delta. It is the most threatened limicolous bird in Europe (Tucker & Heath 1994). Its recession is mainly due to the increase in the use of beaches for tourism, which implies high levels of frequentation and mechanical beach cleaning, resulting in the destruction of their natural habitat. Nowadays, an important part of the European population nests in the Iberian Peninsula (Hagemeyer & Blair 1997), and the Catalan population is the largest (Figuerola & Cerdà 1998).

Fifthly, the Local Council was aware that these unspoiled beaches and their value as habitat would have considerable potential as a tool for environmental education and could be used in education programmes to show the importance of coastal ecosystems as natural resources.

Finally, the El Prat Council has always considered the landscape of its beaches separately in the metropolitan context. The beaches also represented an open space of high quality for its own local population. Thus, they could absorb recreational uses compatible with the conservation of its natural value, with appropriate management. This function is extremely important because of the numerous local populations which are not fully aware of the natural importance of the area. Moreover, the beach area is 15 minutes by train or car from the centre of Barcelona. Therefore the coastal area of the Llobregat Delta is crucial for the quality of life of both the metropolitan and local population. It could also be very attractive for bird watchers or other forms of eco-tourism.

### **The role of the local administration in beach management: the El Prat case-study**

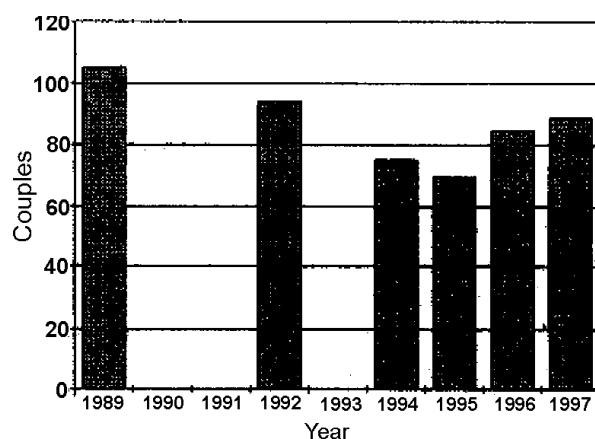
In 1988, El Prat local council designed a beach management programme aimed at making public use of these beaches compatible with the preservation of their



**Fig. 5.** Species composition and structure of the vegetation of the El Prat de Llobregat beaches (from Pino & De Roa 1998).

botanical and zoological value. Firstly the council developed an experimental information programme for their beaches. Simultaneously, a 1.5 km stretch of ca. 60 m width was qualified as a ‘preserved area’. As the municipality has jurisdiction over the cleaning of the beaches, mechanical cleaning of the protected beach zone was terminated and since 1988 this task is carried out selectively by hand. This is important for the native plant communities, which are now establishing themselves without periodical disturbances. In 10 years, the vegetation cover of the beach has increased dramatically. In 1988 the vegetation had almost disappeared from the area as a result of mechanical cleaning. The termination of this practice and the establishment of ropes delimitating the protected parts of the beach together with the later introduction of a network of signposted paths have led to a progressive increase in plant cover and extension. Nowadays vegetation covers an area of 135m ×1500m on the El Prat beach (Pino & De Roa 1998). At

the same time, the initial stages characterized by a complete mixture of different communities are now being replaced by naturally distributed plant populations in relation to the coastline (Fig. 3). Until now, there were no detailed data of species composition and distribution, total and specific plant cover, species number and diversity. However a recent study provided data on this topic (Pino & De Roa 1998). The most relevant results of the study are shown in Fig. 5. The increasing density of vegetation has produced some direct effects, such as the beginning of the natural regeneration of the foredune system. Wind force combined with the trapping of sand by the strong roots of beach plants allowed dunes to reach a height of 1.5 - 2 m. Moreover, the selective cleaning of the beach is effective in encouraging community participation, as it is usually carried out by volunteers. Actually, groups of volunteers from the municipality perform this task every year, before and after the Kentish Plover breeding period. They are



**Fig. 6.** Breeding numbers of the Kentish Plover (*Charadrius alexandrinus*) in the Llobregat Delta. No censuses are available for the years 1990, 1991 and 1993 (from Figuerola & Cerdà 1998).

generally people involved in recreative and educative associations, scout or ecologist groups and members of the red cross, co-ordinated and supported by the El Prat Council.

A programme of environmental education was implemented in 1989 by the local Museum of El Prat (supported by the Council). This programme is joined by a growing number of people from the Metropolitan Area of Barcelona (ca. 14 500 in 1997). It includes information on natural beaches, wetlands, pine woods, agricultural land and the river itself. The adaptations of the dune plants to the lack of water, high temperatures, mobile ground and poor soils are of particular interest. Management measures used on this beach are also an important topic of this programme.

In 1991, a network of signposted paths was established with the support of the Metropolitan Authority of Barcelona. This allowed access to the seashore without affecting plant communities and animals, particularly the colony of breeding Kentish Plover (Santaeufemia et al. 1990; Gutiérrez 1994). Some sensitive areas were excluded from public access.

Since 1992, a service of control and an information campaign has been operating on the beach during the breeding season of the Kentish Plover (April to July). A patrol of guards, in contact with the local police, inform beach users by giving them pamphlets and explanations in an attempt to ensure the enforcement of the access regulations.

Nevertheless, a problem arose unexpectedly. The breeding population of the Kentish Plover, chosen as a symbol of the whole project, decreased constantly between 1990 and 1995, from 105 pairs to 69 (Figuerola & Cerdà 1998). The decrease seemed to be caused by the increase in vegetation density in the area. It would

appear that the Kentish Plover prefers the initial stages of the succession rather than the more mature ones, when dense vegetation has been established. Since the Kentish Plover is one of the key bird species that confers international importance to the Llobregat delta, this proved to be a serious problem. To solve this problem, new areas of restricted access to the beach were created in 1996 allowing the occupation of the pre-dune area (with a less dense plant cover than the post-dune area) by the Kentish Plover. Detailed monitoring of the population trends and breeding behaviour of the birds has been carried out recently, and it demonstrates slow recovery trends (Figuerola & Cerdà 1998) (Fig. 6).

The use of this site as an educational resource caused some conflicts between conservation and environmental education due to the continuous frequentation of groups on the beach and dunes (200 visitors/day in spring (De Roa 1998)). The solution lies in concentrating visitors in a 'sector' specifically designed to receive the public. This sector, called the 'pedagogical plot' (900 m<sup>2</sup>), was created in 1993, and has been covered entirely with new vegetation. It includes two artificial dunes, the closer one to the coast is 130 cm high and the second one is 1 m high. Their plant distribution matches the distribution of natural dune plants (De Roa 1993, 1998): pre-dune (*Agropyretum mediterraneum*), dune (*Ammophiletum arundinaceae*) and post-dune (*Crucianelletum maritimae*) communities in strips parallel to the coastline. A wooden walk way allows easy access. Signposts describe the main species in the plot. The monitoring of the evolution of the area has permitted to obtain data about the most effective method of planting available: vegetative fragments, transplanting or sowing. The information collected during the course of this project (i.e. species adaptation, better methods of planting etc.) will be useful in future projects of rehabilitation of beaches and reintroduction of dune plants (De Roa 1998).

The future condition of the beaches in the Llobregat Delta is linked to the development of the Llobregat Delta Infrastructure Plan (LDIP). This operation is expected to have regional, national, and international importance (Marshall 1994; Breton 1995; Breton & Esteban 1995). The coastal area of the delta is threatened by different projects in the framework of the LDIP: the extension of the existing harbour and airport, the construction of new highways, high speed railway tracks and the diversion of the Llobregat River. The decisions related to the LDIP will affect the situation of the coastal ecosystems.

### The coastal management strategy El Prat

The El Prat Council takes its own initiatives to plan the coastal zone, and despite its limited authority, it is an important agent in the decision process about the future of the coastal front. When the Central Administration launched an important sectorial plan in the area in agreement with the autonomous Government, the so-called Llobregat Delta Infrastructure Plan (LDIP), the El Prat Council had no choice: it had to reach an agreement with the higher levels of administration to negotiate the different infrastructures and to control the projects and their environmental impacts. Especially important were those affecting the coastal zone and the beaches. It should be kept in mind that the airport and most of the foreseen associated development were located inside the municipal boundaries of El Prat de Llobregat. An LDIP agreement was signed between local, autonomous and central bodies in 1994. The local council accepted the Llobregat River diversion (which was a socially sensible point), with a view to negotiating measures for designing an efficient ecological project of river diversion and a coastal protection plan. This course of action was associated with a complete package of other measures aimed at restoring and preserving the delta's main coastal resources (wetlands, pine trees, dunes and beaches) and at reducing the expected impacts of developments foreseen in the LDIP in the delta in general.

Since 1994, the El Prat Council has worked directly on the ecological design of every project. On the one hand, the LDIP has taken in account old claims as the construction of a sewage treatment plant and the defence of the coast. On the other hand, some of the most important impacts on coastal ecosystems cannot be completely avoided. In this sense, the most controversial project at the moment is the construction of a new airport runway parallel to the coastline which will have far-reaching impacts on the El Prat and Viladecans beaches. Thus the adjacent pine forest and the upper part of the beaches will suffer an impact due to the expansion of the airport and its area of influence, which will also be affected by the noise. To counterbalance these negative effects, El Prat demands the insertion in the LDIP of a special project to protect its entire natural coastal fringe and states a claim for the public acquisition of private property. Thus, this would make possible the creation of a huge natural coastal area (Coastal Natural Park) from the mouth of the river (once diverted), which would include the whole length of unspoiled beaches with their adjacent coastal land forms. The quality of the sea water will improve once the giant sewage treatment plant included in the LDIP starts operating in 2003. Thus, an increasing pressure from beach users is expected, and stringent measures have to be implemented to protect

the coastal resources in order to preserve their biological diversity. This would mean a concentration of public use in specially designed and properly equipped areas. A change in the access regulations to the beaches is foreseen, based on restrictions for private vehicles and on the provision of a network of bicycle and footpaths.

This coastal natural park project would also contemplate sound environmental measures to reduce erosive processes, and recreate wetland areas especially in the zone adjacent to the new river mouth.

### Conclusions

In the framework of a restrictive legislative system which limits the capacity of action of local councils to the level of the beach use plan, the El Prat experience is, therefore, a successful local initiative in beach management. It began making a different beach use plan that modified the cleaning methods of the beach and established protected zones with the objective of achieving a balance between habitat preservation and social use. The El Prat municipality demonstrates that it is possible to implement measures at the local level. These go beyond the scope of the beach use plans which are restricted, by and large, to the maintenance of facilities for beach users.

The El Prat Council has been able to manage its beaches in a different way. The El Prat programme constitutes the first conservation experience of natural beaches in the metropolitan area of Barcelona. Beaches are usually planned and managed for mass use leading to a resultant uniform urban coastal landscape. On the contrary, the El Prat beach management programme aims to achieve the preservation of ecological values in the beach areas making it compatible with sound social uses. At present, the preservation of botanical and zoological values has been accomplished through vegetation consolidation (there are few psammophilic communities established on Catalan beaches and even fewer on the metropolitan ones) and through the protection of the population of Kentish Plover (*Charadrius alexandrinus*).

Even though social use is limited at the moment, participants in the educational programme are increasing year by year (from 1658 visitors in 1992, to 14487 in 1997 registered in the El Prat Museum). In the signposted zone, users can get access to the beach on wooden paths without damaging the vegetation even if the number of visitors increases. Moreover, the Kentish Plover habitats are especially protected during the breeding season.

Therefore, the beach management of El Prat has been successful and relatively inexpensive. The fact that this management program has included a whole coastal management strategy at long term from its very



beginning has to be highlighted. When early disputes arose because the local council wanted to keep beaches and their land forms free of developments and when it decided to defend parts of its own coast against erosion, the council demonstrated that it was willing to implement a coastal conservation programme that went beyond the initial beach use plan. The same strategy obliged the municipality to negotiate with higher level administrative bodies about the LDIP project and to assume an important role in it, taking into account every initiative and exerting pressure in order to guarantee the incorporation of environmental counterparts in the various LDIP projects. Negotiations and the direct involvement of the local council in the ecological design of every single project has implied a tremendous effort. Therefore, it has been possible for the local council to obtain some of its strategic demands, lowering further negative impacts on the coast. By doing so, the sectorial plan was converted in a means to implement a general protection strategy and the enhancement of the coastal front, in which natural beaches play an important role.

The launching of a special protection plan for the coastal area could be a result of these negotiations. This coastal natural park would permit the recovery of public ownership of old dunes with pine tree cover, wetlands and lagoons. The integrity of these coastal resources would be restored and managed by the local authorities.

This initiative is also contributing to the diversity of the coastal landscape on a generally homogeneous metropolitan coast where beaches are seen as no more than sand piles only valued as recreational spaces. Even so, the problem of achieving an integrated beach management in the entire delta coastal system still remains.

However, this singular experience has revealed new ways of looking at beaches and has implied a demonstration role in the Llobregat Delta. New projects have arisen through local initiatives on other beaches of the delta with the aim of restoring and conserving natural coastal systems while promoting their social use for recreation (Gavà in 1992, and Castledelfells and Viladecans in 1998-1999). The supra-local administration, the Diputació de Barcelona, through its Environmental Service, is undertaking important initiatives in supporting and coordinating all these different experiences, even if such measures are not free of difficulties.

Moreover, in most of the municipalities where these experiences have taken place, a process of public participation linked to local Agenda 21 has been recently launched promoted by the Diputació de Barcelona, in which, between other items, beach management has to be evaluated.

Thus the El Prat example can be an important reference in the future beach management practices. Even if cooperation between administrations is sometimes

difficult, the El Prat experience proves that it is possible. Moreover, this experience shows that biodiversity and high quality in coastal ecosystems can be achieved in dense urban areas. This would be associated with new forms of tourism and leisure based on coastal ecosystems knowledge in an integrated perspective of coastal planning and management.

**Acknowledgements.** This paper has been possible thanks to the collaboration of the local council of El Prat de Llobregat and the Universitat Autònoma de Barcelona (UAB) and it has been granted by the UAB-CIRIT in the framework of the project 'Methodology for open space planning and management in coastal areas' and by DGSIC in the framework of the project PB97.0197 'Análisis y gestión del territorio, usos del suelo, paisajes y desarrollo sostenible en espacios naturales protegidos'.

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Received 4 September 1997;  
Revision received 7 April 1999;  
Accepted 5 June 1999.