CHAPTER 98

STUDIES FOR VILLAJOYOSA'S BEACH REGENERATION (SPAIN)

José L. Campello Chorro *
Vicent J. de Esteban Chapapría **
José Aguilar Herrando ***
J. Javier Díez González **

ABSTRACT

In the last two years a whole of studies was realized in order to determine precise solutions to the regeneration of Villajoyosa's beach, in the spanish mediterranean coast. Investigations were carried out to the surrounding coastal areas based in field investigations and laboratory analyses of the beaches materials.

INTRODUCTION

In the last years, the spanish mediterranean coast has been subjected to a great deal of tourists. This supposed an increase in the population seasonal and permanent, wich has been solved with a lot of urban development and an intensification in uses of all types, wich have produced, and will continue producing, negative results on the coast. In many cases, these are superior than some produced in portual works. In must cases, the human activity developed in the coastal area goes well beyond geomorphologic processes. Alicante province is one of the coastal area in wich this demand has been present because its special climatologic and landscape conditions.

SITUATION AND CHARACTERISTICS

Villajoyosa village is placed between Alicante and Benidorm (fig. 1), finding a position around Amadorio river's mouth. The existence of a locked delta with a certain disymmetry is checked in this mouth. This river, with a tipical mediterranean regime, is today regulated by Amadorio dam, placed about four kilometers upstream from the mouth. Between this and the port, esentially fishing and sporting, takes place the Villajoyosa's

*Ingeniero Director Grupo de Ptos. Sur. ALICANTE (SPAIN).
**Profs. Dto. Ocean. e Ing. Costas. Un. Pol. MADRID (SPAIN).
*** Prof. Dto. Puertos. Univ. Pol. Valencia (Spain).

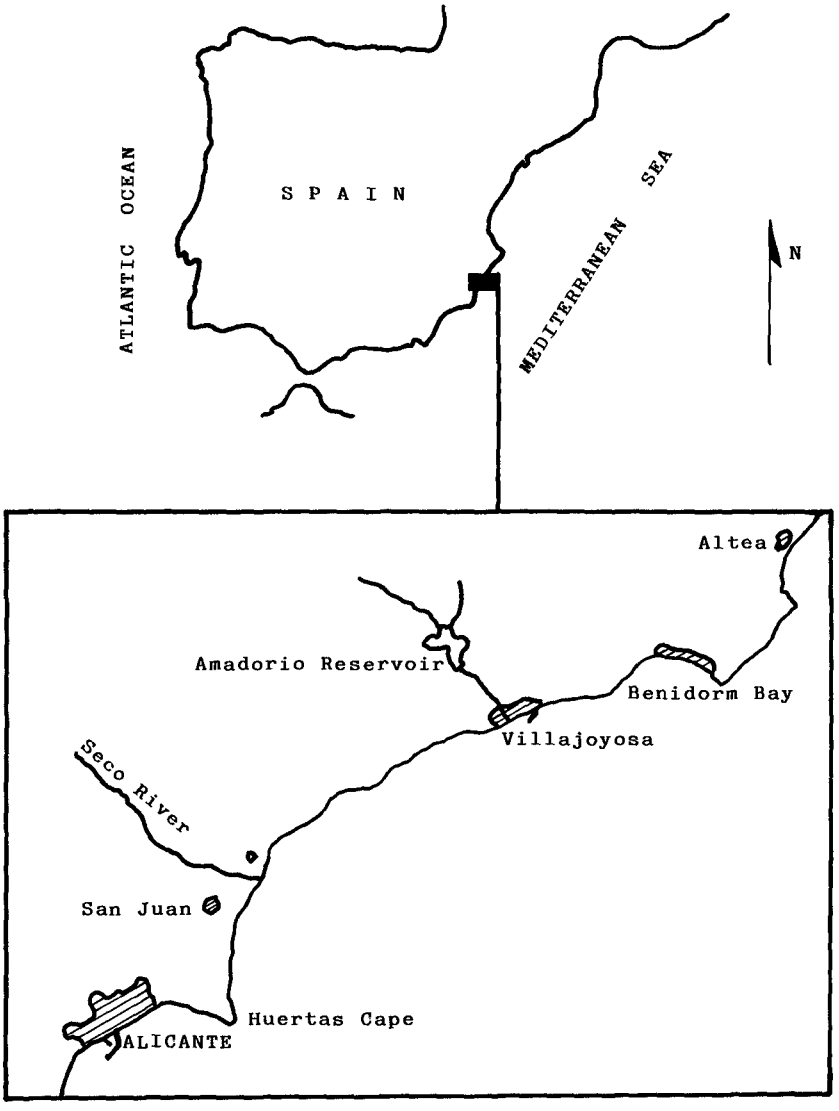

FIG. 1

beach integrated by hard grainsgravel, crashed stone and coble in most cases calcareus and ofitic. Its longitude is about 1400 m., and it was used to strand ships in old ages, according to a picture pated in the first years of the 19th Century, and wich is today found in the Naval Museum (Madrid), being used Alcocó Cala to search.

The line of this beach is not rectilinean, since, as well as its general curvature shoped like a big cave, the existence of reef and rocky outcroops have induced small hemitombol.

The beach has suffered a continous erosion in the last years, getting important damages in several works which have been done recently, specially in a seaside promenade with wich an important part of beach was occupied and in the way that merger the old maritime neighbourhood, in the old inner part of Villajoyosa with the port.

GEOMORPHOLOGIC FRAME

Separating Altea and Benidorm Bays we find Helada Mountain Range. It is a classic barrier of NE-SW direction formed in many cases by materials wich belong to Cretaceous period, with a submerged extension appearing in the small Benidorm Island. In the South there are Quaternary sandy sediments, especially the beaches of "levante" and "poniente" of Benidorm. Further away the change to limestone along the length of the coast which is developed to the South. Around Villajoyosa there is a whole, with more than 500 m. in power, of flischoid type, composed by clayly marls, levels of clay loams, bio-sandy and fosilifers limestones. All this are completed by a length of a rocky coast which gives way further away to the South to alow, backer coast, which have produced the presence of some deltas, such as Amadorio's, as we mentioned before, or gully Torre's one. Along the area there are small caves in which hard materials are found.

VILLAJOYOSA HARBOUR

The port was built in the place pointed in the mentioned picture of 1800. Villajoyosa harbour has been investigated because it can mean some disturbances to the surrounding area. The harbour was planned in 1917, June. Works, consisting in the breakwater construction starting at the Punta de L'Alcocó, began in 1923, March. After many paralysations and vicissitudes, works were nor finished to 1940 refering to the basic part. Beach has been gradually eroded after the breakwater construction, going materials into the harbour. Therefore a counter-dike was constructed.

In 1944 was planned a breakwater extension, and another one in 1952. The first one was disapproved, but the second was carried out, finishing the works in 1963 : 183 m. of new breakwater was constructed. Several storms (1943, February and December, 1947,January, 1965, January) pushed to make maintenance works. In 1984, January was planned a new extension of the harbour (Fig. 2) still not approved. Therefore predictions show negative influences to the near shoreline.

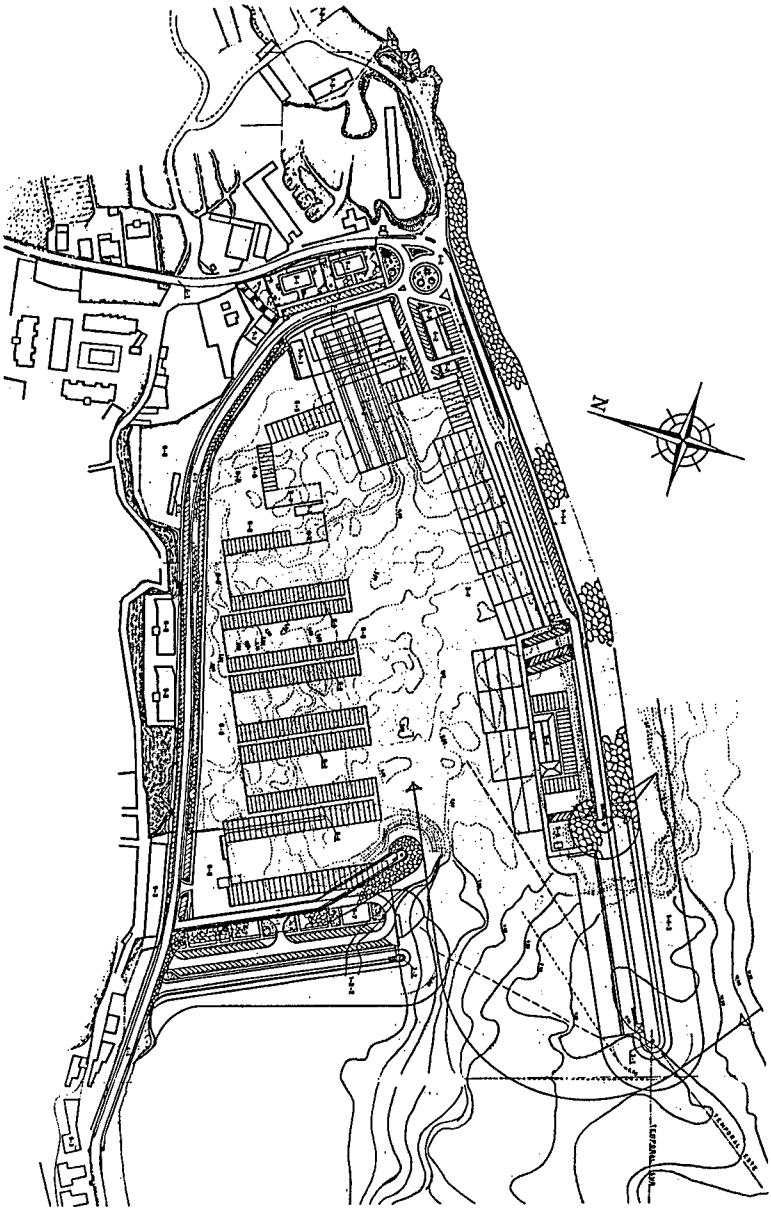

FIG. 2

STUDIES DONE AND CONCLUSIONS

With views to determine precise solutions to the regeneration of Villajoyosa's beach a whole of studies was realized referied to the determination of the coastal movement in our days, as well as in sedimentologic and batimetric analyses (Fig. 2, 3). On the other hand, we tried to study materials retained in Amadorio's Dam, but it was not possible get a quantification. It was investigated the influency in the beach erosion of the works realized that have been mentioned above. At last the possible sourcer of the precise materials to the beach regeneration were located, studying in this way the registered and enviromental impact in different means for the different alternatives.

Some of the studies developed were included in a general one of the Alicante coast. Studies show the independence of the coastal Villajoyosa area from near, especially with the north area. Works has investigated the clasification of the coastal zone in different "Morphodinamic coast units" of several orders, as a function considerating littoral dynamics, materials and geomorphologic frame.

In this case all that shows the Benidorm Bay connected to the Altea one as a result of the granulometric and mineralogic analyses. Nevertheless Villajoyosa area shows very different mineralogic compositions in the beach materials. That clearly mean another "Morphodinamic coast unit".It was been possible to demostrate have the materials of Villajoyosa's beach are inmerged with the contributions of Amadorio's River and also with streams which ran into this area which belongs to the second order "Morphodinamic coast unit" "Punta Plana Punta dels Banyets".

Coastal dynamic, with a clear tendency to the N-S, presents important partial components to the other direction, although they are inferior also the materials like autochtonous. Presence of high contents of anfibols and piroxen, and the longitudinal variation of the roundness grade in white quartz let confirm existence of real means of littoral transport towards the South around Amadorio's River mouth. However influence of its materials is losen quickly and this coastal area shows very clearly an important and general isolation as it has been studied widely considering different methods to determine littoral transport rates.

FRACCION RETENIDA TAMIZ ASTM Nº 50			
TAMANO DE PARTICULA(mm): 0,30-0,42		%RETENIDO: 49,4	
FRACCION CARBONATADA : 97,1			
COMPOSICION MINERALOGICA EN % DE LA FRACCION NO CARBONATADA			
CUARZO BLANCO	63	TURMALINA	
CUARZO ROJO	9	EPIDOTA	
CUARZO AZUL		CIRCON	
CUARZO NEGRO		ANFIBOLES	8
MIXTOS CUARZO		PIROXENOS	
MOSCOVITA		OXIDOS	3
BIOTITA		OPACOS	
		RESTOS BIOLOG	17
MORFOLOGIA CUARZO BLANCO EN %		GRADO DE REDONDEO	
REDOND. 3	POCO ROD. 48	49	
MUY ROD. 46	NO ROD. 3		

FRACCION RETENIDA TAMIZ ASTM Nº 80			
TAMANO DE PARTICULA(mm): 0,18-0,30		%RETENIDO: 19,2	
FRACCION CARBONATADA : 95,1			
COMPOSICION MINERALOGICA EN % DE LA FRACCION NO CARBONATADA			
CUARZO BLANCO	50	TURMALINA	
CUARZO ROJO	10	EPIDOTA	
CUARZO AZUL		CIRCON	
CUARZO NEGRO		ANFIBOLES	12
MIXTOS CUARZO		PIROXENOS	
MOSCOVITA		OXIDOS	4
BIOTITA		OPACOS	1
		MAGNETITA	*
REST.BIOLOG.	23	ILMENITA	*
MORFOLOGIA CUARZO BLANCO EN %		GRADO DE REDONDEO	
REDOND. 6	POCO ROD. 32	48	
MUY ROD. 48	NO ROD. 14		

FIG. 2 MINERALOGIC ANALYSES

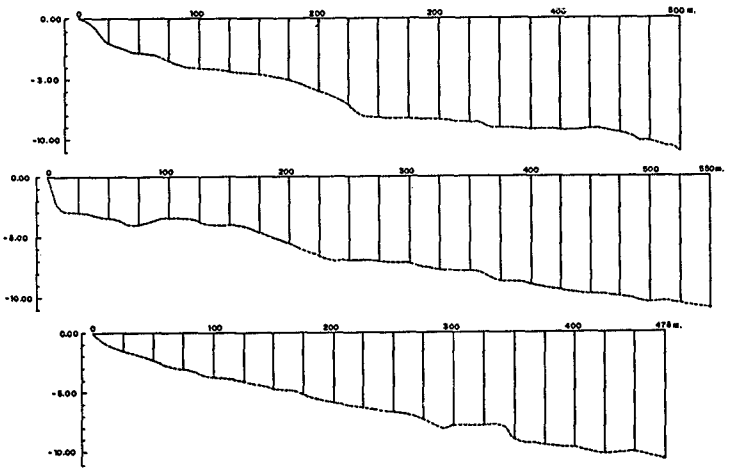

FIG. 3 VILLAJOYOSA'S BEACH PROFILES

REFERENCES

* ASENSIO AMOR,I. et al. (1973) : "Aspectos sedimentológicos del litoral de Alicante". Estudios Geológicos, Vol.XXIX, nº 3, pp. 253-264.

* DIEZ GONZALEZ, J.J. (1982) : "Bases para una aproximación a la dinámica litoral del País Valenciano". R.O.P. (Madrid).

* ESTEBAN CHAPAPRIA, V. (1987) : "Procesos litorales en las costas valencianas al Sur del Cabo de San Antonio". Tesis Doctoral. Univ. Politécnica de Valencia.

*LLORCA BAUS, C. et al. (1985) : "La vila del mar i el mar de la Vila". Exmo. Ayto. de Villajoyosa.