

## New Planning for Cala Panizo rocky beach (Almería, Spain)

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### ABSTRACT

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New planning in Cala Panizo Rocky beach in Almería, south Mediterranean Spanish coast, is presented. This rocky area is the result of an erosion process over a volcanic area on the coast of Almería in the west Mediterranean sea where the erosive inland process due to a semi-arid region has generated a fine and coarse material from upstream basins, that combined with successive up and down sea level movements has conferred a particular beauty to this coast. In particular, the rocky sea area where Cala Panizo is confined has preserved this area from a more recent inappropriate development. A new project to save and enjoy the beauty of this area has been proposed for the municipality who is in charge and responsible for the future of Cala Panizo. The main proposal of this study is to make the area accessible to public use by building paths on the rock platforms and provide a station which will help visitors understand the evolution of the rocky system and interact with nature without the help of sophisticated equipment. Supplying this plan to Cala Panizo will manifest that development of the area for a tourist purpose can be done in a sustainable manner, enjoyable for tourists, while at the same time generating profit for the local community and creating a new alternative use for the coast. Hopefully this will be an incentive to create similar actions in the surrounding coastal areas.

**ADDITIONAL INDEX WORDS:** *Rocky sea area, sustainable planning, coast creative action.*

### INTRODUCTION

Cala Panizo beach, Figure 1, is located in the Almerian coast, South East Iberian Peninsula, in Cuevas de Almanzora County, with a population of 12,000 inhabitants. The area, of 293 square kilometres, receives very little rainfall with an average of 200 mm per year. In this area, the annual precipitation is very unpredictable with periodic extreme flood events occurring approximately every 11 years. Flood events generate a massive transportation of soil to the coast through its Mediterranean type gully of waterless rivers, called "ramblas". Cala Panizo is surrounded by several outstanding geological features such as the Tabernas desert, the Caves of Sorbas and the volcanic outcrops of the Gata Mountain, with Cabo de Gata-Níjar Marine Nature Park located just a few kilometres west from the area of study.

The arid conditions of the Almerian coast and its isolation from economical and social epicentres (such as Andalusia and the rest of Spain) have slowed its development rate, in comparison to other coastal areas, in the last 30 years. In the last ten years these features have become appealing for tourists, attracted to the number of sunny days a year and the untouched landscape.

Some littoral areas, like Vera to the west and San Juan de los Terreros to the east of Cala Panizo have suffered a quick and non sustainable growth with the ratio of sandy beach square metre/building cubic metre decreasing year by year. Consequently only rocky areas have survived the change.

Cala Panizo is a very special littoral place where the need of tourist development is integrated with the amazing natural

geology, typical of the area. The recent tectonic history of Almería, SE Spain, has produced some varied and interesting geology, the key reason for the planning proposed. The region lies within the Cordillera Bética, a mountain range produced as Africa collided with Europe in the Alpine orogeny.

The thrust sheets, or nappes, generated by this collision form the high Sierras. The study area is located in the vicinity of Carboneras, which is rich in dark metamorphic rocks, Figure 2. These formed when the sediments were deeply buried, causing the growth of new minerals at higher temperatures and pressures, and then they were brought back to the surface by the thrusting. Following formation of the Béticos, the tectonic regime changed about 10 million years ago, with the initiation of left lateral strike-slip faults (like the San Andreas Fault, with the opposite sense of movement). Historical records of Almería and other nearby cities being flattened show that some are still active today – the last recorded big earthquake was in 1865.

The Grantilla River cuts across the Carboneras Fault. Large faults rarely consist of a single narrow fissure in the earth; instead motion occurs along a number of interlinked faults across a broader fault zone. Within these zones fault-bounded 'slices' of rocks of different ages and types are all randomly mixed together, Figure 3. This process is perfectly illustrated in this area because all the different rocks have distinctive colors. This new tectonic activity also included the formation of sedimentary basins, possibly pull-apart basins at bends in the strike-slip faults. The



Figure 1. Cala Panizo, South East Spain. Photo M<sup>o</sup> Medio Amb.

sequence of rocks deposited in these basins records a sequence of increasingly shallow marine environments.

This shallowing-up sequence is not only due to sedimentation but also because the Africa-Europe collision has continued to uplift the region, as it is obvious from the fact that all of these marine deposits are now above sea level. The very oldest sediments record very deep water environments punctuated with periodic debris flows, where landslides at the edge of the continental shelf have transferred material into deeper waters. Some of these must have been massive like in 'El Gordo', a truly stupendous chunk or megaclast of deformed sediments within one of these debris flows. A few million years later, the water depths became shallow enough for coral reefs to grow. In most places the coral hasn't preserved too well, it has dissolved away leaving holes marking where it once was. The youngest sediments in these basins preserve a mud-flat environment, complete with preserved raindrop marks.

## METHODS

The clear idea is to draw a preliminary plan in order to improve and preserve the 5 kilometre pocket beach centred in the Cala Panizo littoral area, without establishing a maritime or natural protected area like the one in Cabo de Gata which would hinder the economic growth of the Cuevas de Almanzora.

The first step was to take note of the changes that have occurred in the surrounding area, especially the nearby beach called "Serena" in the San Juan de los Terreros, less than 4 kilometres to the east of Cala Panizo, Figure 4. In Figure 4 we can appreciate the high level of tourism density and very close second houses that will extend some kilometres inland in the next years, compared with the level and type of occupation in the same day, August, 2005 in Cala Panizo, Figure 5. The first data was recorded from local owners in Pozo del Esparto Village, 500 metres from Cala Panizo. People from Cala Panizo and Pozo del Esparto are mainly residents in the same area but they normally reside not further away than 30 km inland and in summer time they usually move to their family houses around the old fishing town.

The second step was a field trip along the coastline from San Juan de los Terreros to Vera, for about 40 km. We appreciated a type of growth in the purchase and sale of apartments for tourists which always offer a sandy beach view. The rocky area has not

yet been developed in the same way only because there is still space available in the neighbourhood beaches although it has the same potential development due to the same sand that is around the rocky bottom. In fact, it is the same sediment that moves between the Rambla de Terreros, in the east, to river Almanzora in the west. The erosion expected coming from upstream of the coast area is estimated about 27,06 tons per hectare per year, according to ESTEBAN et al (2003). A sample sand test was taken from three beaches: Serena, Pozo del Esparto and Cala Panizo, with the same type of fine sand in all three places. This indicates that adopting beach nourishment techniques will transform those areas into a sandy beach tourist model with the negative consequences experienced in San Juan de los Terreros and in Vera villages with the loss of the natural volcanic sediment.

## RESULTS

It seems clear that all the studies made until now show that the area is in danger, Figure 5, and it could be totally transformed in the next few years unless emphasis is put on the special characteristics of this littoral zone. Often, the typical image of a sandy beach has been imposed as the only attractive possibility for tourism; voices need to be raised to defend other qualities and



Figure 2. Cala Panizo, Sierra Almagrera. Photo P. Fernández.



Figure 3. Near shore material. Photo P. Fernández.



Figure 4. Serena beach, San Juan de los Terreros. Photo P. Fernández.

attractive interests of the coast.



Figure 5. Cala Panizo beach. Photo P. Fernández.

### ANALYSIS

The studies made until now show that the area is in danger and needs to be preserved. We will need to evaluate and preserve the natural Rocky platform, Figure 6, with the least possible changes while making it more accessible to public use.

For this project it is necessary to build a path to connect the rocky areas and to establish areas for recreation activities such as swimming, diving, sailing, walking or other activities, harmonious with the environment. It is essential to have informative panels strategically located, showing the geological, maritime and landscape characteristics of the place. This would inform every visitor of the relevance and the importance of the place that she or he is enjoying.

To reach the optimum solutions we consider of vital importance to research and to compare similar case scenarios from other parts of the world. We have achieved this by cooperating with colleagues from as far away as Australia, in this case, that can give



Figure 6. Rocky area. Photo P. Fernández.



Figure 7. Almanzor rock. Photo P. Fernández.

a parallel view of some other cases and show solutions that could help.

### DISCUSSION

Currently, a big issue about how we want to see our littoral is under discussion in Spain. We consider that studies related with the sociological perception of the places, like IRIBAS (2002) suggests and the importance to inform and ask the users of a beach about a future initiative, like VILLARES et al. (2004) developed in Sitges littoral, can avoid many environmental disasters and waste of resources. Another question of vital importance is to introduce new criteria to the classical beach classification to support Integral Coast Management, see for example YEPES (2004), where the main objective is to get sandy beaches. This criteria is clearly not applicable to many places, Cala Panizo being one of them, Figure 7.

### CONCLUSION

It is not easy to appreciate the current importance and beauty of some natural systems. Our previous concept of what is more

relevant or our limited knowledge of many varied aspects of a territory does not let us view this beauty in its real dimension. In the case of a littoral zone, like Cala Panizo, where to appreciate one of its most relevant aspects is necessary the knowledge of at least some basic aspects of geology, it is mandatory to let these characteristics arise in the plans of the decision board especially in an area that is proposed to suffer quick real estate development to supply a growing demand for the enjoyment of the littoral by locals and foreigners.

The past development of the surrounding littoral areas, Playazo de Vera beach to the West and Serena beach to the East, has followed the classical patron in the Spanish Mediterranean coast during the last decades. The main base for the growth was based in the nice sandy beaches that both areas have. The objectives in both, Vera and Serena, was to respect and protect the sandy areas and forget about the surrounding zone that form part of the system. In the case of Serena beach, a wonderful and ancient Salinas system was destroyed to be transformed in a parking lot a few metres from the sand.

Cala Panizo has survived this type of development due to its consideration of area of very low interest because of its apparent lack of sand in its beaches and its perception of an uncomfortable rocky area. But the growing number of resort and holiday apartments and houses, even in the surrounding mountains, will demand new swimming areas due to the collapse of the San Juan de los Terreros, Serena and Rabiosa beaches and will turn towards the, until now, quiet and calmer beaches as Pozo del Esparto that can easily be transformed to a sandy beach, due to the fact it is in the same sediment cycle budget of the Almanzora river and previously mentioned ramblas system.

This preliminary study has put emphasis on the relevant geological aspects. The clear objective is to introduce, in the agenda of the local development driven forces, new criteria to improve a littoral area without losing their main characteristics, and give the user of the littoral enough information for them to know that they are in an especial and unique beach. It is not necessary to repeat developments based on tourist advertisement pictures from other littoral zones that have brought only a negative impact to the natural system and has destroyed the natural beauty of the place.

Even if this work is still in process and will be in 2007 part of the research from the group of the Medio Marítimo, Costero y Portuario from the Universidad Politécnica de Madrid, we consider a very good example to show in the 9th International Coastal Symposium. It can help understand how to develop the coast in a sustainable way that can change many ideas of how we can enjoy the beauty of a coast.

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