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WHY ARE BEACHES DISAPPEARING?

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Probably you have heard that our beaches are disappearing. Why do beaches disappear during storms? Why do beaches not regenerate naturally? There are several causes that explain the regression of line coast, having all of them a human origin. In this article, I want to explain which the reasons of the regression of beaches are and which the possible solutions to this problem are.

INTRODUCTION

Beaches are zones placed between land and sea where sediments accumulates. Not only are they a place where people can enjoy, but also a habitat for many animal and plant species and with a defensive function.

FUNCTIONING OF A BEACH

On beaches, there is a sediment accumulation from fluvial flows. Swell, on the one hand, causes a displacement of these sediments through the coast (with more or less intensity), what is known as longitudinal littoral transport. To maintain a beach, the amount of sediments that disappear from a beach have to be the same that those that are added. On the contrary, the beach reduces (prevails the erosion) or increase. It has to be added the transversal littoral transport, which consists on the swell moving sediments from emerged beach to underwater beach, or backwards. Wind, at the same time, can produce an accumulation of sediments in the more interior part of the beach, creating dunes.

Dinamic functioning of coast (Picture: Directrices sobre Actuaciones en Playas)

So, a beach is working correctly if:

- There is a stable source that contribute with the necessary sediments to make a beach.
- There is a free movement of the sediments through the coast and in the transversal way.

Therefore, the main problems of regression of beaches are due to a modification of one or both factors.

WHY ARE BEACHES DISAPPEARING?

Now, it's time to talk about the reasons why beaches in our littoral are being reduced or in regression. As mentioned above, these can be classified in two types: causes that reduce the source of sediments and causes that impede their movement.

WHICH ARE THE CAUSES OF THE REDUCTION IN THE CONTRIBUTION OF SEDIMENTS?

Construction of dams, with the aim of regulating the flow of rivers, is one of the main causes of the regression of beaches. The construction of dams produce a retention of sediments in the reservoir of water, what impedes their movement river downhill and, for this reason, their arrival in coast. It is this accumulation that explain that the useful life of dams is just 55-60 years. To give an example, in the Ebro Delta (Catalonia) arrives every year 200,000 tonnes of sediments, 10 times less than what is necessary to maintain the delta constant and 100 times less than what arrived in 20th Century.

Dams produce an accumulation of sediments and, for this reason, the regression of beaches (Picture from Adasa).

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The **urbanization of littoral zone** close to beaches impedes the mobilization of sediments. Without going any further, due to the increase of the interest in the last decades of the population to coast, there have been a massive construction of promenades behind beaches, followed by important flat blocks. This has supposed the destruction of dunes and their plants mostly in all the littoral. Dunes are important zones of accumulation of sediments, so they constitute a sediment reservoir, it is that after a storm, wind can sweep along sand form this ecosystem and, thus, it can naturally regenerate the beach. Moreover, dune's vegetation give stability to the beach since it affixes the sand and impede its erosion.

Construction of promenades is usually accompanied by the destruction of dunes, that has a negative effect on beaches (Picture from Ayuntamiento.org)

There are other explanations, like the occupation of the surface of rivers by urbanizations or the removal of sand and gravel, among others.

As we have seen with dunes, these could be a source of natural regeneration of beaches. We have to had also in consideration that the **destruction of seagrasses (like *Posidonia)*** due to the urban development, bottom trawling, construction of harbours, piping and sewage pipes and the increase of anchors helps that the transported sand during a storm isn't retained in the zone close to the beach, so this sand don't naturally return by swell to the original position.

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Destruction of Posidonia contributes to the erosion of coast (Picture from Periodico de Ibiza).

WHY CANNOT SEDIMENTS BE SPREAD THROUGH COAST?

Again, the occupation of beaches by buildings and other infrastructures explains why sediments can't be spread through coast with freedom. Anyway, it is important to mention the **construction of maritime structures**. Effectively, we are referring to the construction of dikes, breakwaters and harbors, that constitute a barrier that produce the accumulation of sediments in the opposite side of the current direction, while it produce erosion downhill.

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Maritime constructions modify the dynamics of sediment transportation (Picture from Cyes).

To all this causes, we have to add the global change that, due to the rise in the sea level, is producing the disappearance of the littoral because it is sinking.

WHICH ARE THE SOLUTIONS?

There are several possible solutions to face beach regression, but all of them have their problems:

- Artificial regeneration of beaches with marine or terrestrial sediments. The dredging of sea floor has a negative impact on plants and animals of the zone, especially if these areas have sea grasses like *Posidonia*. When the origin is terrestrial, it usually come from quarries (with the posterior crushing), so its touch is not pleasant and it produces the destruction of mountains.
- Construction of maritime structures like dikes and walls. These are not free from problems because they produce the erosion downhill.
- Elimination of obstacles that stop the sediments or the free circulation.

Sometimes, the most prudent solution, in the case of not being any interest for population, is to leave the beach to its luck. It means to leave the natural evolution of the beach happen.

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*The only thing necessary for the triumph of evil is that good men do nothing"….**Edmund Burke***