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MARITIME SPATIAL PLANNING AS A TOOL FOR BEACH MANAGEMENT: CASE STUDY PLAYA GRANDE BEACH, SANTA MARTA, COLOMBIA

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By

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To God who gave the opportunity to meet wonderful people

To my parents and brother who always trust in me

To my professors and classmates who made me love even more the seas

And to my friends that never let me down

Contents

ABSTRACT

Maritime Spatial Planning (MSP) has been used in recent years to accomplish the objectives of Integrated Coastal Zone Management (ICZM). Thus it has been ocean areas where MSP is most applied, achieving positive results in most of the cases. Colombia with the advantage of it geographic localization has the privilege of own coasts not only in the Caribbean Sea but also in the Pacific Ocean. Nevertheless, its IZCM applications has been limited due to the lack of intervention of both national and local authorities that have allowed the factors that contribute to degradation of beaches in the country, such as disorganized urbanization, and human uses prevailing over environmental control and protection activities.

In this work are presented two methods for achieve one of the most important steps of MSP, the *Definition and Analysis the Existing Conditions* on a particular study case of a beach located in the northern part of Colombia. Which is visited by both locals and foreigners during all year, with the aim of promote these tools for being applied by the responsible of sea management. One of these methods was made by having in account the concepts of different authors in order to create an original application for characterizing the main features, uses, activities, pollution and management problems, safety and security, information and education and existing planning activities. This application allows to have a wide view of a particular beach, with the aim to become a useful tool for any beach and therefore for MSP. The other method used was an interaction matrix, which was built with the information of the beach collected in the previous method and that permitted the identification of the main conflicts either positive or negative between the uses and activities of the studied beach.

Obtained results confirmed that MSP can be also applied in beaches according to the methodology used and that management measures proposed can have in account not only economic benefits but also environmental problems.

1. INTRODUCTION

The regions on the Caribbean Sea that Colombia have greatly varies along its coastline. Among them are differences in climate, geomorphological, hydrological, biological, ethnic, economic, linguistic, etc. (Parra, 2009).

It also presents a rich ecosystem that as Alonso et al (2003) established, in the coastal zone of the Colombian Caribbean there are coral reefs, mangrove ecosystems and transitional forests, beaches and cliffs systems, estuaries, deltas and coastal lagoons, or seagrass beds and sedimentary soft bottoms of the continental shelf.

The impacts on the Colombian coastal areas are mainly due to uncontrolled tourism, urban and industrial growth, though perhaps economic development inevitably brings problems of an environmental nature.

Parra (2009) said that another possible cause of environmental degradation on these areas in the Colombian Caribbean the absence of specific studies on territorial planning in the country's coast.

That is why without controlling the development of human activities on the Colombian coastal areas as also state Avella et al (2009) have caused problems such as inadequate management of fishery resources, marine pollution, deforestation of mangrove forests, coastal erosion caused by the construction of infrastructure without adequate information about the dynamic coastal shoreline, the suitability of land as coastal lagoons, estuaries and mangrove areas for urbanization and inadequate management of coastal resources in general .

Thus, the integrated coastal zone management appears, promoting sustainable coastal development incorporating policies, sectors and interests into one. Allowing management of impacts on coastal areas and at the same time improving the relationship between population, economy and biodiversity.

In this context, and according with Dengbol & Wilson (2008), MSP appears as a tool for coastal planning that involves not only environmental protection but also the management of the different uses and activities in the marine area with a more comprehensive and coordinated approach to the multiple and increasingly conflicts expandable uses of the sea.

Besides, and due to the complex environmental problems of the beaches, its recognition and resolution exceeds the residents and the municipality and, in this sense, the aim of lasting solutions requires comprehensive planning and management, and therefore, interdisciplinary studies and multi-sector activities, and consequently, requires significant investments (SECTUR, 2005).

That's why integrating both concepts of coastal zone management and MSP as a derivation, is analyzed a tourist beach in order to propose measures for proper management that also include activities and uses that exist on maritime space.

The analyzed beach was chosen taking into account not only because of its location (Caribbean Sea region) but also due to the increase of urban development on same which together with increased activities and tourism uses have impacted on their environment, especially in its maritime area.

Using tools of characterization and identification of conflicts previously applied on beaches, is intended to analyze how the activities and applications interact with each other in order to establish which conflicts are arising and need to be managed.

As Douvere et al (2007) stated, a spatial plan on land is never developed without thorough knowledge of the environment and the existing situation of infrastructure and uses.

This is way is proposed a Quick Characterization Sheet for Beaches, in order to establish the more relevant and specific characteristics of the analyzed beach. This Sheet was built with concepts and subjects related to beaches, proposed and used for many authors, world organizations and government authorities (Barragán, 2003; Evrim, 2004; UNESCO, 2005; Botero, 2008; Pranzini 2008; SNET, 2009; Williams & Micaleff,

2009; IDEAM, 2010; Pranzini et al, 2010; Pranzini & Vitale, 2011; DIMAR, 2012; Noguera, 2012; CoastWatch Europe, 2013; Fonseca, 2013; EPA, 2014).

Furthermore, an Interaction Matrix (UNESCO, 2006 & Botero, 2013) is proposed in order to explain how the different actual uses respond each other. This second method aims to analyze what is stated by Douvere et al (2007), that individual uses in marine areas face spatial restrictions when trying to occupy a particular area to which other uses have already been allocated. And this response varies according to complete exclusion or possible management in time, space, overlap, or a combination. The degree of interaction therefore can be negative, positive or neutral.

An analysis of the results obtained in both methods is described as well as possible management solutions for the conflictive uses and activities determined by interaction matrix. These uses and activities would not be identified if an exercise like the Quick Characterization Sheet was not done.

Finally, is pointed if a Coastal Zones Integrated Management tool like Maritime Spatial Planning can be applied or not in smaller marine spaces like touristic beaches.

2. CONCEPTS FRAMEWORK

2.1 IMPORTANCE OF INTEGRATED COASTAL ZONE MANAGEMENT (ICZM)

Coastal zones are the most densely populated areas on Earth, where 23% of the world's population lives both within 100 km distance of the coast and <100 m above sea level (Small and Nicholls, 2003; Nicholls et al, 2007; Balk, 2010).

Management of these coastal zones needs to consider the multiple functions of many coastal areas, which is increasingly occurring through ICZM (EEA, 2012). ICZM is a unitary program that has to both manage development and conserve natural resources and while doing so, it has to integrate the concerns of all relevant sectors of society and of the economy (Clark, 1996)

However, in its beginning sea management was approached through methodologies in which the law played a leading role. Managing the sea consisted in claiming or agreeing jurisdictional zones, thus the research on the environment and the setting up of scenarios of the relationships between resource development and environmental management have been regarded as a subsequent tasks (Vallega, 1992; Cicin-Sain & Belfiore, 2005).

Coined during the 1992 Earth Summit in Rio de Janeiro, ICZM describes an adaptive, integrated approach for achieving sustainable resource management in coastal areas (UNCED, 1993). The European Commission (EC) describes ICZM as a ''dynamic, multi-disciplinary and iterative process that seeks to balance economic development and use of the coastal region, protection and preservation of coastal areas, minimization of loss of human life and property, and public access to the coastal zone.'' (Recommendation 413/2002/EC of the European Parliament and Council).

As a consequence, the need to overcome this approach and to set up appropriate multidisciplinary – based methodologies is one of the primary tasks of the present time (Vallega, 1992). Many common elements regarding ICZM represent challenges/themes

such as financial sustainability, inadequate capacities, weak law enforcement and a lack of integrated and collaborative efforts.

Vallejo (1991) has pointed out that the ICZM marine dimension may be divided between coastal and ocean areas. The former was defined by Ketchum (1972: 4) as, *"the band of dry land and adjacent ocean space (water and submerged land) in which land ecology and use directly affect ocean space ecology and vice versa"*.

ICZM is an approach that integrates coastal management and planning, taking into account all policies, sectors and interests to achieve a sustainable coastal development (Wilson and Piper, 2010). Its distinctive feature is the fact that is multi-sectorial and that it seeks to integrated or coordinate activities of existing users (Clark, 1996). In this context, ICZM can be considered mainly as a spatial planning instrument to manage negative impacts and an effort of organized intervention in coastal zones (Barragán, 2003; Daschkeit, 2007), which can significantly affect populations, economies and biodiversity (Nicholls and Tol, 2006; ESF, 2007; JonesWalters and Nieto, 2007; EEA, 2008). The main functions of ICZM are named in *Figure 1*.

Figure 1. Integrated Coastal Zone Management Functions. Adapted from Cicin-Sain & Belfiore (2005)

Ideally, an ICZM program should operate within a closely integrated, coherent management framework within a defined geographical limit. Beaches are an example of this, which require an adaptive management approach that can be adjusted to changing human and environmental needs (Williams & Micallef, 2009).

And is due to the importance of integrated management that it's justified the need of an organized intervention in this geographic areas which are affected by the magnitude of the problems they have (Barragán, 2003). In this way, a range of adaptation options is available for fulfilling coastal management, including the planning for rising sea-levels by the building or strengthening of coastal and river flood defenses; protecting and strengthening natural defenses such as dunes and other green infrastructures; and the land-use management and moving back from the coast (Klein et al., 2001).

2.2 COLOMBIA INTEGRATED COASTAL ZONE MANAGEMENT HISTORY

Colombia has a diverse, rich and productive types of coastal marine ecosystems along its 3.000 km of coast on Caribbean Sea and Pacific Ocean plus its insular systems (IDEAM, 2014). These have a great capacity to provide goods and services that sustain the growing economic activities, as well as the diverse traditional uses of local communities (MMA, 1998).

As a result, is observed a disorganized growing of tourism, a poor planning of coastline, pollution through the most dense populated and exploited strongly, coastal erosion, habitats loss and degradation, etc. The bad planning of land use in Colombian coasts, wrong procedures for development control, excessive and/or harmful use of marine resources, low control and monitoring from public sector, among others, are the main causes of this accumulation of problems.

Because of this, surged the necessity of the country in promote policies for management to the sustainability of the coastal territory, an environmental policy for its

Integrated Coastal Management (ICM). This policy was called N*ational Environmental Policy for Sustainable Development of Oceanic Areas and Coastal and Insular Zones of Colombia* (PNAOCI), and also a unified policy for its management and sustainable development called *National Policy of the Ocean and the Coastal Areas* (PNOEC).

The main objective of PNAOCI is to tend for the sustainable development of the ocean and coastal areas, allowing by its integrated management to contribute to improving the quality of life of the Colombian population, to the harmonic development of productive activities and to the conservation and preservation of ecosystems and marine and coastal resources (MMA, 1998).

The *National Policy of the Ocean and the Coastal Areas* (PNOEC) was approved on July 1st of 2007 by members of the Colombian Ocean Commission - CCO. Since that time, Colombia had a long-term tool that responded to the need to assume the ocean from a comprehensive vision to recognize its character of organized totality and united in the diversity (CCO, 2010).

The main objective of PNOEC, as is cited in the original document by CCO, (2007: 13) is "*to promote the sustainable development of ocean and coastal areas and maritime interests of the nation, through the concerted structuring and implementation of strategies to ensure the full administration, economic exploitation, public benefit, environmental conservation, sociocultural development, monitoring and control of such jurisdictional spaces*".

In the same context, ICZM is defined in the *National Environmental Policy for Sustainable Development of Oceanic Areas and Coastal and Insular Zones of Colombia* (PNAOCI), as a special planning process led to a complex and dynamic area that focuses on the sea - land interface and considers the following: certain fixed and other flexible concepts that demarcate a conservation ethic ecosystems, socio-economic goals, a style of active management and participatory problem solving and a strong scientific base (CCO, 2010).

Also, in PNAOCI were defined twelve Coastal Environmental Units (UAC), defined as "*Area from coastal zone geographic defined for its planning and management, which*

has ecosystems with their own and distinctive characteristics, with similar and connectivity conditions according to its functional and structural aspects."

These integral units are continuous environmental and geographical units with clearly defined ecosystems that require visualization and systematic management, integrating local and sub-regional entities, Regional Environmental Corporations (CARs), the maritime authority, public and private productive sectors, the academy, the NGOs, communities and inhabitants of the same area, around common problems, common goals and joint and sustainable development solutions (Avella et al, 2009). For example, the study area chosen for this research, is framed within the Coastal Environmental Unit named the North Shed of Sierra Nevada de Santa Marta.

Is also important to mention that thanks to the experiences from a pilot, a methodology was built for addressing common ICZM in different management units (UAC-UMI) en Colombia, called COL-ICZM Methodology. This method can be fulfilled by achieving the different phases of Preparation, Characterization and Environmental Diagnosis, Formulation and Adoption, Implementation and Assessment.

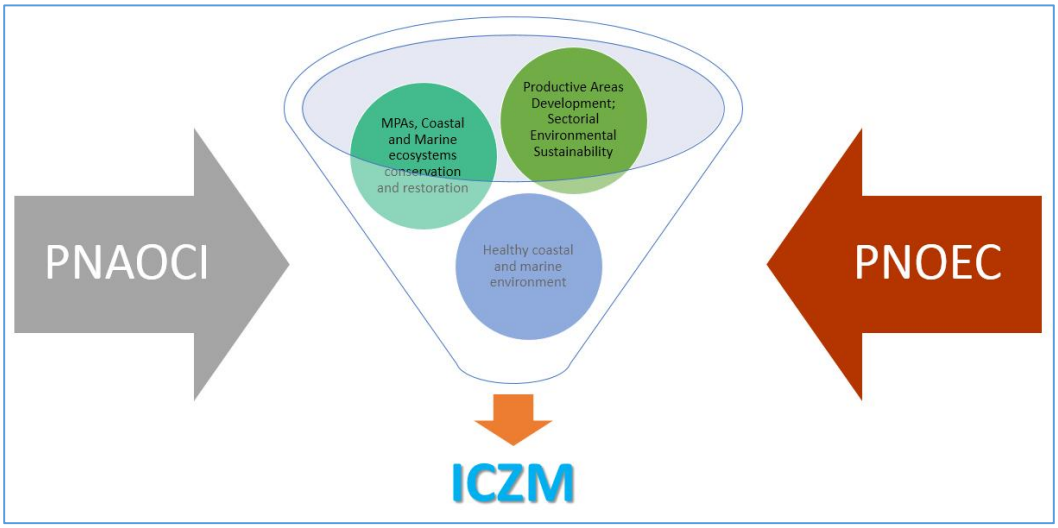


Figure 2. Integrated Coastal Zone Management relation subjects between PNAOCI and PNOEC as Colombian coastal policies. Source: own elaboration.

Anyway, both national policies have in common a thematic approach that includes mainly the Marine Ecosystems Conservation and Restoration, Socioeconomic Goals, Strong scientific basis, Coastal and Marine Protected Areas and Natural Disaster

Prevention and Attention just for mention some of them (Figure 2). Thus, since their implementation have been achieved positive results (Table 1) for the ICZM in Colombia.

Table 1. Some of the results of implementing Colombian coastal policies

Some of the results from implementation in Colombia of the National Policies for ICZM (PNOEC and PNAOCI)
• Creation of education programs in both bachelor and postgraduate related with coastal subjects and integrated coastal management (CCO, 2009)
Guidelines for ICZM in Colombia were created by the Institute for Coastal and Marine Research (INVEMAR), in order for being applied in any part of the country, specifically in the Coastal Environmental Units (UACs): • Part I: Preparation, Characterization and Diagnosis (Alonso et al, 2003), • Part II: Planning (Rojas et al, 2010)
• Decree 1120 of 2013, where (UACs) are regulated, establishing procedure rules and criteria to restricted activities on seagrass and other activities (MADS, 2013)
• Implementation of planning tools for one of the UACs, 7 UACs are in their guidelines phase, 2 are just in characterization phase and only 1 is lacking of implementation phases (INVEMAR, 2012)
• 28 Marine Protected Areas (MPAs) are established in Colombia. 71% of them have their own Management Plan, but the most recent that were created don't have approval of their Management Plan (INVEMAR, 2012)
• The presence of marine ecosystems (Coral reefs, seagrass, beaches and deep sea corals) in MPAs, named as percentage of representativity, is maintained constant (INVEMAR, 2012)
• Today in Colombia zoned mangrove areas or under approval by resolution by the MADS are in total 264,375 ha, of which 69,549.6 ha are in the Caribbean and 194 825 ha in the Pacific. Of all mangrove areas zoned 44.5% are conservation areas, 23.6% to recovery areas and 31.8% are areas of sustainable use (INVEMAR, 2012).

- Coastal erosion studies include characterization of critical areas affected by coastal erosion, shoreline variation analysis, marine waters quality assessment and monitoring of coastal ecosystems (Coral reefs, mangroves and seagrass)

2.3 MARITIME SPATIAL PLANNING

Since its inception, ICZM has focused primarily on a process-oriented approach, emphasizing integration across agencies and sectors. It has rarely addressed allocation of coastal space to achieve its goals (Douvere, 2010).

The idea of managing coastal and marine areas in a more integrated, holistic way has been around for decades, couched in a variety of terms, each with a different beginning and distinction. In recent years, the concept of marine spatial planning has been widely promoted, although its precise definition is not always agreed upon (Gopnik et al, 2012).

However, management in the marine environment has taken a different approach through the use of Maritime Spatial Planning (MSP). The UNESCO guide to Maritime Spatial Planning (Ehler & Douvere, 2009; Page 18) defines it as: ‘‘*a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process*”.

Coastal and Marine Spatial Planning, as it has been adopted in U.S. (Executive Order 13547, 2010), identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives .

MSP not only considers environmental protection but aims to manage multi-sectorial uses of marine space, encompassing the increasingly wide range of human activities

and interests that seek to benefit from ecosystem goods and services (Kidd & McGowan, 2013).

Marine Spatial Planning (MSP) has been promoted as a tool for the sustainable management of the marine environment and as a means of reducing conflict between marine resource users (Crowder et al, 2006; Ehler & Douvere, 2007; Young et al, 2007; Flannery & Cinnéide, 2008; Douvere, 2008). It is defined as the ''*rational organization of the use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way*'' (Douvere, 2008; 766).

In this context, and by focusing on the spatial and temporal aspects of management, MSP has more advantages by using the principles of ICZM for multiple uses (Figure 3).

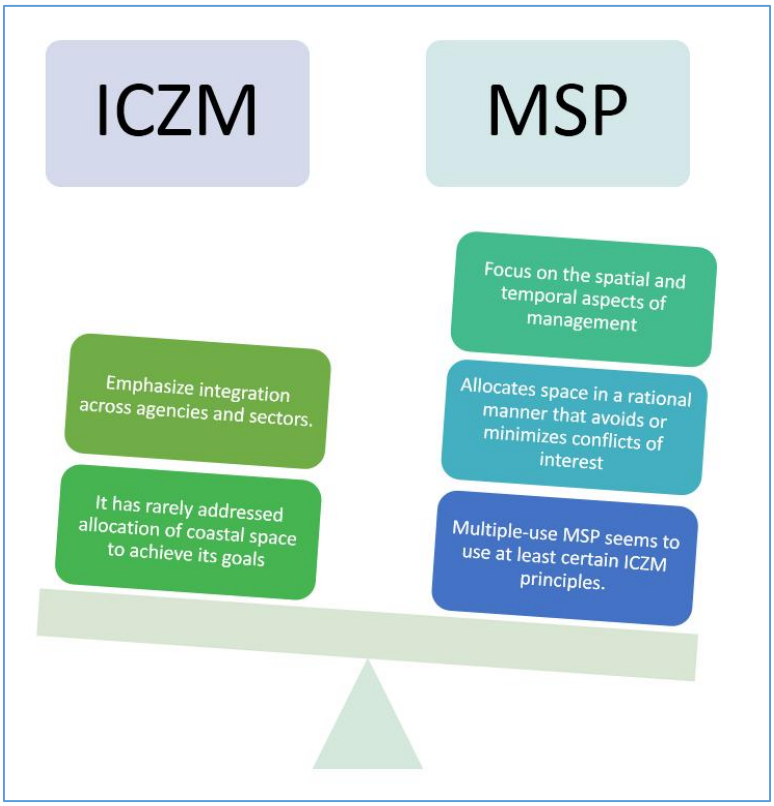


Figure 3. Differences between ICZM and MSP. Based in Douvere (2010)

Besides, the application of spatial planning in the marine environment would provide a wide range of benefits (Table 2).

Table 2. Benefits of applying MSP (Based on UK-MSP Working Group, 2005)

Benefits of applying MSP
Applying an ecosystem approach to the regulation and management of development and human activities in the marine environment by safeguarding ecological processes and overall resilience to ensure the environment has the capacity to support social and economic benefits
Providing a strategic, integrated and forward-looking framework for all uses of the sea to help achieve sustainable development, taking account of environmental as well as social and economic objectives;
Identifying, conserving and restoring important components of coastal and marine ecosystems; and
Allocating space in a rational manner that avoids or minimizes conflicts of interest and, where possible, maximizes synergy across sectors.

ICZM could take MSP approach in order to make its principles more tangible and operational by better defining what they imply in space and time (Douvere, 2010).

2.4 MARITIME SPATIAL PLANNING WORLDWIDE

While initially the idea of marine spatial planning was stimulated by international and national interests in developing marine protected areas, e.g., the Great Barrier Reef Marine Park (Australian Government, 2008) or the Florida Keys National Marine Sanctuary (US Department of Commerce, NOAA & NMSP, 2007), more recent attention has been placed on managing the multiple use of marine space, particularly in areas where use conflicts are already clear, for example in the North Sea (IDCC, 2005).

Today, various countries have begun to recognize that the time has come for a strategic and integrated plan-based approach for the management of entire marine spaces, instead of the 'piecemeal view', so that commitments made in a number of important international and national marine policy declarations, including

commitments regarding biodiversity and habitat protection, can be fulfilled (Douvere, 2008).

During the past decades, international environmental law and policy, especially with regard to the marine environment, has expanded significantly. Some of these international and regional legal and policy documents provide a substantive framework regarding the allocation of marine space. Among the most important are the United Nations Convention on the Law of the Sea (UNCLOS), the CBD, Agenda 21, and the World Summit on Sustainable Development Plan of Implementation.

The allocation of marine space has further been specified in international agreements for particular sectors, such as some Conventions and Protocols adopted in the International Maritime Organization, the FAO Code of Conduct for Responsible Fisheries, and the World Heritage Convention among others.

2.4.1. Marine Spatial Planning in Europe

Most marine spatial planning initiatives in Europe are driven by international and European legislation that is, in turn, a reflection of the discussion and controversy regarding new uses of the sea and the seabed and the increasing need to meet commitments on biodiversity conservation. Especially these new uses (i.e. wind farms, marine protected areas, aquaculture) have triggered a pragmatic approach to the development of marine spatial planning (Douvere & Ehler, 2009).

The Netherlands for example, has developed an 'Integrated Management Plan for the North Sea 2015', that includes a 'Spatial Planning Policy Framework' directed toward economically efficient use of their marine space (IMPNS2015, 2005). The coastal Länder in Germany recently extended their spatial planning competencies to the territorial sea, while the Federal Spatial Planning Act has been amended to allow the development of spatial plans for the entire German exclusive economic zone (Gee et al., 2004).

The need for a more comprehensive approach toward spatial planning for the Belgian Part of the North Sea (BPNS) became particularly urgent in light of new national

objectives and associated targets such as the need for offshore energy production (i.e., wind farms) and the development of the European network of protected areas (Natura 2000) (Douvere et al., 2007). So it was developed a 'Master Plan' for its part of the North Sea and is among the first countries that has begun to implement its marine spatial plan.

On the other hand, while the United Kingdom has not yet made marine spatial planning operational, it is considering a Marine Bill with the purpose of introducing a new framework for the management of its seas, based on marine spatial planning, that balances conservation, energy and resource needs (DEFRA, 2007).

2.4.2. Other applications of Maritime Spatial Planning worldwide

Innovative and successful initiatives toward the development and implementation of ecosystem-based marine spatial management have been also taken in both highly-used marine areas such as the coastal area around China (Fang et al, 2011)., and in large ocean areas such as Canada, Australia and New Zealand (UNESCO, 2013). Figure 4 summarizes the quantity of MSP initiatives worldwide, being Europe where has been more applied.

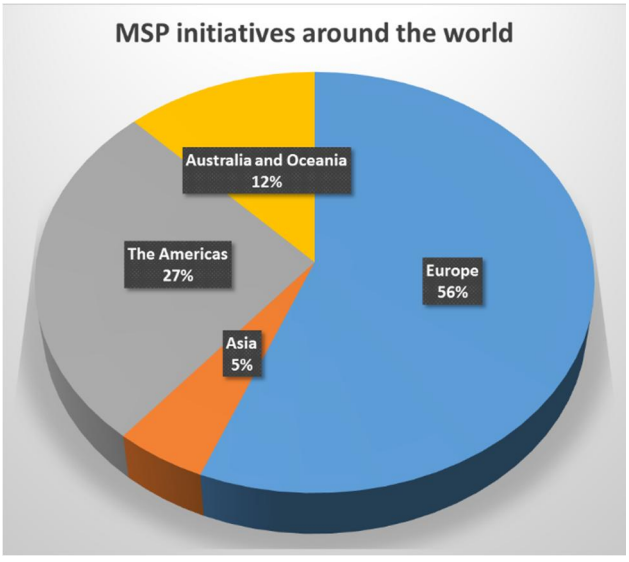


Figure 4. MSP initiatives worldwide. Source: UNESCO, 2013

A key characteristic of these marine spatial management initiatives is their ability to provide integration across multiple uses and sectors, to minimize conflicts, to maximize sustainable economic development, and to protect important habitat and biodiversity areas (Douvere 2008).

2.4.3. Colombian approach

Although there is a specific legal framework related to the Colombian coastal areas, it lacks a desired integration for Maritime Spatial Planning. Maritime activities, harbors, fishing and tourism are regulated, among others, but in general, limiting their articulation due to the diversity legal standards that may conflict (MMA, 2000).

Planning is one of the principles that guides and demarcates the development of activities, policies and strategies of Colombia. It's established in the National Constitution (Art. 80) together with sustainable development that State will plan the management and correct use of natural resources in order to guarantee its conservation, restoration or substitution (Steer et al., 1997).

Despite existing a specific legal framework related to Colombian coastal zones, this lacks of a desired integration for maritime spatial planning. Maritime, port, fishing, tourism and other activities are regulated but in a general way, limiting their articulation due to diversity of laws that could have conflict between each other (Yanes, 2013).

A specific example can be the Law 388 of 1997th about Land Planning, which in mostly from the 47 coastal municipalities of Colombia do not have a planning that considers the singularity of its coastal space (Parra, 2009).

However, an approach to the MSP was made in the Bay of Cartagena, one of the most touristic cities of Colombia, where a Sea Management Plan (POM) was formulated, which zoned the adjacent maritime territory to the District of Cartagena according to its current use, proposed by Land Use Plan (POT) (Torres, 2004). The aim of this POM was to provide a tool for the management and administration of the Coastal Zone to be

used by the Port Authority and local maritime authority and that ensures the orderly development and coordination of maritime territory with different economic sectors along the environment and district development plans.

There it was also a similar case in Playa Blanca, Santa Marta, where the problem was the absence of a single responsible of the beaches that support its management, existing extensive subcontracting, weak management control, lack of specific annual budget for investments and maintenance, and only had an ordering during high seasons (Herrera, 2010).

This work proposed functional management actions like e.g. the incorporation of concepts to promote the use, the laminar time distribution, creating alternatives at peak time and increasing the use of bathing zone. In this case it was shown that cooperation between institutions and communities to implement models of coastal management at local level, it is beneficial not only to the parties but also in increasing the quality and provision of tourist services on a beach.

3. METHODOLOGY

3.1. DEFINING AND ANALYZING EXISTING CONDITIONS OF THE AREA

Most of the experts in ICZM agree that the characterization of the coastal zone is one of the initial activities for its integrated management, since it is required to have a minimum of information on the land before initiating actions for its conservation or modification (Clark, 1995; Post & Lundin, 1996; Rojas et al, 2010; Botero et al, 2013). Initially the characterization is used to gather information, providing the background information required for MSP (Ehler and Douvere, 2009).

In order to achieve the definition and analysis of the existing conditions in the beach, is necessary to collect all possible information from it. This initial evaluation of the beach conditions and characteristics is useful not only for sea management authorities but also for coastal science researchers.

As was mentioned before, coastal zones are particularly specials due to the many features they have and the many uses and activities that can be developed on them. Also coastal ecosystems are the main source of natural resources as well as a habitat for other species.

The importance of realizing a characterization is mainly the identification of problems and critics situations needing urgent solutions. The specific actions for the management of these problems can be proposed if it is well known the current situation of a beach in this case.

This characterization phase was done using two methods, a Quick Characterization Sheet for Beaches and an Interaction Matrix.

3.1.1. Description of the study area

Playa Grande is located in the city of Santa Marta, capital of Magdalena Department, in the north part of Colombia (Figure 5).

Figure 5. Study Area Location. Source: Google Earth, IGAC (2014).

The area comprising Santa Marta territory covers an area of 239 335 hectares of the Colombian Caribbean Coast, bordered on the north and west by the Caribbean Sea, on the east by the department of La Guajira, and the South with the municipalities of Cienaga and Aracataca, is located between 11°14'50" North Latitude and 74°12'06" West Longitude. The main rivers of the city are Gaira, Manzanares, Piedras, Mendihuaca, Guachaca, Buritaca, Don Diego and Palomino (CORPAMAG, 2000).

At the city all climates of the Tropical Zone are present, by having reliefs from flat to mountainous, with maximum elevation of 5775 m on the summits of the Sierra Nevada. The rains follow a bimodal pattern, with rainfall concentrated in the months of June-July and September-October, and a dry season from December to April, with variations due to local phenomena (INVEMAR, 2012).

Santa Marta is located within the Coastal Environmental Unit of the North Shed of Sierra Nevada de Santa Marta, composed of a mosaic of marine and terrestrial ecosystems with varying degrees of intensity and exchange of matter and energy,

namely funds continental shelf formations reefs, seagrass beds, beaches and cliffs system, ecosystem mangrove and transition forests, estuaries, deltas and coastal lagoons (Alonso et al, 2003).

The natural condition of the territory explains the existence of two national natural parks which extension cover 53% of the total area of the city, they are: Tayrona Natural Park, with 12,000 hectares (ha) land and 3,000 ha marine, and the Sierra Nevada de Santa Marta, subregional, with an area of 113,396 ha., Parks also determine the spatial arrangement of the city (Corso, n.d.).

Is important to point that Playa Grande beach, chosen for this work, has not specific data or research related to it. This information gap was also one of the motivations for choosing the method for its characterization.

3.1.2. Quick Characterization Sheet for Beaches

This step was realized by filling out a **Quick Characterization Sheet for Beaches** made especially for this project in order not to only know the characteristics of the beach studied but also if it can be applied on any touristic beach.

Structure of the sheet was based on CoastWatch Survey (CoastWatch Europe, 2013). In this survey, there are several questions with yes/no answers in most of the cases and requires a longer time and high level of understanding to be completed. So the structure was completely changed and built it like a new one sheet but without losing the considerations and information asked in CoastWatch one.

Along with the sheet was improved a guide for filling it. The guide was used before as a support for a characterization survey applied in a project (Botero et al, 2013) for promoting the river and beach tourism in another region of Colombia. And the new guide includes sections more related with beaches.

The main objective of this sheet is to collect all possible data on the studied beach by just observing the features of it, such as activities and uses of the beach, natural characteristics, maritime uses and activities specified before by Barragán (2003).

The Quick Characterization Sheet is supported with many experts like Pranzini (2008), with concepts like coastal erosion or the importance of the sand color and why should be a requirement in characterization of beaches (Pranzini et al, 2010; Pranzini & Vitale, 2011).

Another more specific concepts depending on the region where is applied and in this case for Colombia, information provided for local authorities is helpful for knowing unique features like geomorphology (IDEAM, 2010) and how is the maritime areas zoning (DIMAR, 2012).

Other important intention of the sheet is to assess aspects of compliance for minimum beach requirements in services, information and education, risks and safety, and so on. These can refer to the infrastructure and equipment and their condition, as well as the economic activities developed on the beach by people, public institutions and/or private companies, in order to meet the needs of tourists and visitors (Noguera, 2012).

Subjects related with the management of beaches, which facilitate or require a better organization and seek for the sustainable development of the beaches, through environmental, participatory and/or integrated beach management (Botero, 2008; Williams & Micaleff, 2009)

Another important concepts are also considered, such as beach width (UNESCO, 2005), wave type (SNET, 2009); color scales for both sand and water and coast land shape (Fonseca, 2013); water quality (EPA, 2014) and vegetation in the coast (Evrim, 2004). The different sheet categories are completely explained in the guide for its application (Appendix II).

The sheet can be filled just by professionals with experience in coastal subjects. It has multiple options of answers in most of the subcategories. Also the sheet is evolving constantly in order to become a tool for collecting information of beaches and coastal areas in a quick and reliable way. The complete sheet is on the appendix section.

The sheet was applied in Playa Grande, a small beach but with many uses and activities on it that needed to be analyzed and that fulfilled the requirements for a

coastal area asking for an urgent implementation of coastal management tools like MSP.

The sheet was filled out during a visit to the beach along with members of the Research Group in Coastal Systems (GiSisco), who also have been helpful with this project, more specifically with getting information of the beach on local authorities and also helped in the improvement of the sheet subcategories.

Thus, is important to point that with the visit made for filling the sheet, there were taken photographs and written observations of particular situations, activities and/or development in the beach.

The sheet was filled out on Sunday, February the 2nd, perhaps a low season date, but even so the beach was completely occupied by tourists and locals, so it were possible to observe the activities developing on it. Is relevant to mention that even in low seasons the beach is visited especially on weekends.

Anyway, the sheet was filled by four Environmental Engineers, two graduated and with further studies, and two undergraduates but with experience in coastal topics. Because of the importance level of a characterization in a beach is necessary that sheet has to be filled not only with one or two persons but with three and maximum four. These because when the data is digitalized allows to compare different points of view but without producing a margin error too wide.

Finished the sheet, the group in charge can discuss a while (one hour or more) about particular situations, answers options that maybe were not considered before, possible solutions to problems found, etc.

The data collected of the four sheets (each per person) was organized in an excel worksheet in order to identify the subcategories applied for the analyzed beach.

3.1.2. Interaction Matrix

After being identified the main activities and uses of the beach due to the previous method, the next step is to analyze how these activities and uses interacts with each other.

For achieving this, it can be used an interaction matrix, based in the adaptation by Botero (2013) of a conflict matrix cited in a study done by the Russian State Hydrometeorological University (UNESCO, 2006) in which the interaction is shown between different coastal uses by a twin-cross matrix (Appendix II). The advantage of using this tool is the determination of types of interactions, both beneficial and harmful, which widely facilitate coastal zoning.

Uses and activities for the matrix were selected according to the results obtained in the characterization sheet.

First, the matrix is filled for which each cell including the effect that the use or activity that is in each row (A) on the use or activity that is in each column (B). For them, the following classification of interactions that depend on its type and Nature (Figure 6) is used:

- Mutually beneficial interaction for both uses or activities, qualify with a score of plus two (+2);
- Mutually detrimental interaction for both uses or activities, qualify with a score of minus two (-2);
- The interaction of the use or activity on the row (A) positively affect the use or activity in column (B), but not the other, qualify with a score of plus one (+1);
- The interaction of the usage or activity on the row (A) adversely affect the use or activity in column (B), but not the other, qualify with a score of minus one (-1);
- No effects on either uses, qualify with a zero score (0)

For example, in order to evaluate Fishing activity interaction with other uses/activities, like bathing, both have place on the maritime area but in the case for Playa Grande they don't have conflict between them for space. In this case punctuation is 0 for both

the file and the column of the two uses/activities. However, score is different if fishing may have conflict with aquatic sports so it should be -2.

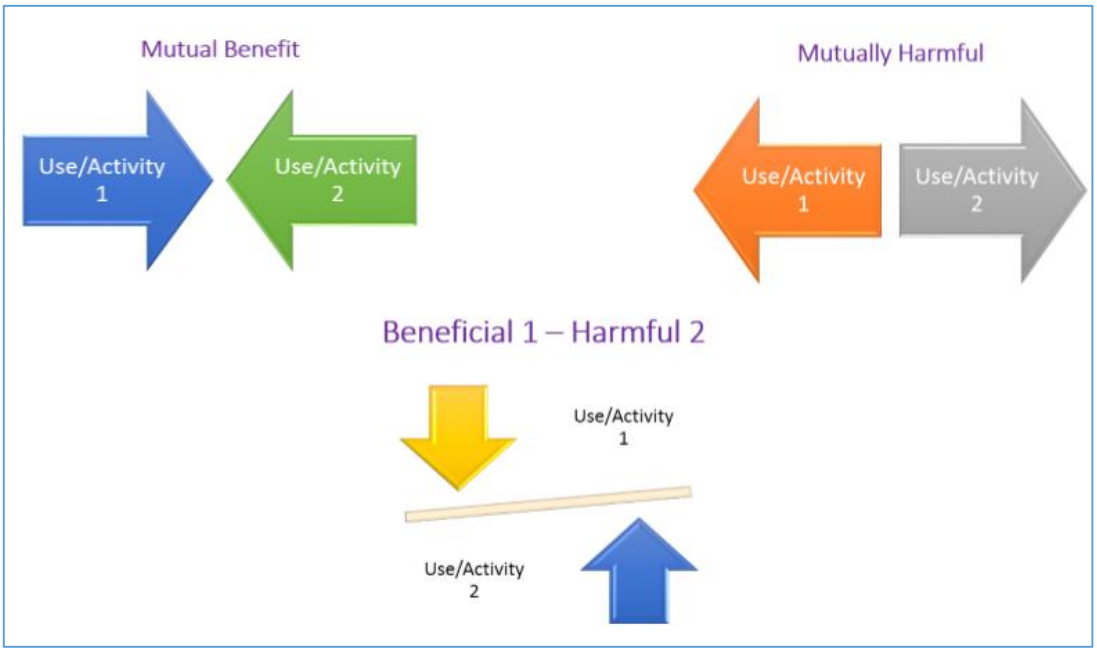


Figure 6. Assessment of origin of coastal interactions (Botero et al, 2013)

Once filled out the matrix, it automatically computes the influence that each has on the overall structure of coastal uses and activities (Botero et al, 2013). To accomplish this, matrix by UNESCO (2006) proposes the following equation:

$$I_n = \Sigma_{fa} - \Sigma_{ca}$$

Where

I_n= Influence of the use or activity *n* on the structure of coastal uses and activities

Σ_{fa}= Sumatoria of the nature of the interactions of use or activity of row A

Σ_{ca}= Sumatoria of the nature of the interactions on the use or activity of the A column

Regarding I_n , this is determined as the 'strength parameter' a use or activity throughout the coastal system, the greater I_n, the greater its influence on the system.

Calculating this strength parameter can predict how strong will be the performances on a use or activity, so that they focus on those uses or activities that have greater influence on the coastal system, which are usually related to the called, from the sciences of complexity, *critical pressure points* (Botero et al, 2013).

As Botero et al (2013) established, once calculated the strength parameter I_n for all uses, results should be compared with a key of interpretation (Table 3) in which the type of interaction each use or coastal activity related to the type of coastal management that is going to be performed. It should be noted that in the case that $I_n$and Σ_{fa} have zero (0) value is considered that the use or coastal activity is balanced, because it is neutrally synchronized with the complexity of the system and will provide an integrated coastal management (UNESCO, 2006).

As a last step, all uses or activities must be grouped by type of interaction, in order to guide the proposal of actions integrated coastal management, being one of them the maritime spatial planning.

Table 3. Interpretation key of coastal interactions model (Adapted from Botero, 2013)

I_n Influence in all coastal system / Σ_{fa} Effect on the use/activities structure	Positive	Negative
Positive	**Type A. Use or Activity to maintain.** Use with strong influence on coastal system and positive effect for uses and activities structures	**Type B. Use or Activity for promoting.** Use with weak influence on coastal system and positive effect for the structure or uses and activities
Negative	**Type C. Use or Activity for Regulating** Use with strong influence on coastal system and negative effect for structure of uses and activities	**Type D. Use or Activity to discourage.** Use with weak influence on coastal system and negative effect for structure of uses and activities.

This group of activities was filled into an excel worksheet and a matrix was built with the equations explained in methods section. The matrix filled and with calculated equations is on Appendix II.

The worksheet was configured to highlight both punctuations values (green for +2, yellow for +1, orange for 0, dark orange for -1 and red for -2) and for establish by itself in case of change or edited the values the type of relationship depending on the obtained condition (Type A, B, C, D or Zero)

4. RESULTS

4.1. Beach information

The **Quick Characterization Sheet for Beaches** allowed to identify main characteristics of the beach studied and analyze some of its present conditions.

As was mentioned before, the beach studied was Playa Grande, located in Santa Marta city. The beach can only be reached by both sea and by walk, the difficulty for this last one is not recommended for elder and children.

The most predominant ecosystem that was observed is sandy seabed littoral. However, there is also rocky seabed type and presence of coral reefs.

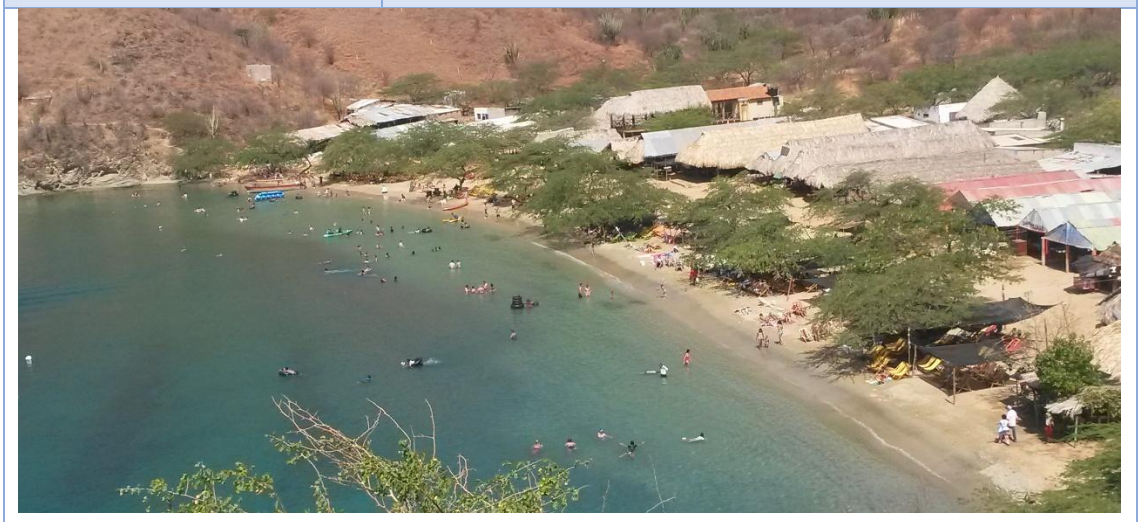
On the other hand, main commerce services along the beach includes restaurants, peddlers' presence and equipment rental for diving, snorkeling or inflatable boats. There is also cleaning service by each owner of restaurants on its own area.

In the case of environmental aspects, sea water quality does not seem affected for any source, but it cannot be said the same for sand quality. The main sign of pollution is mainly the solid waste disposal dispersed by zones, probably because of the lacks of cans along the beach. Also during the exercise it were detected odors behind the restaurants.

Erosion signs as the defined on the sheet there are not but it can be observed the retreat of the shoreline because of trees next to it. The beach waves are small, even during strong winds seasons of the year there are not formed high sized waves.

There is also urbanization on the hills surrounding the beach but is still not that high. However, they can cause landslide risk because of these buildings. **Table 4** summarizes the results of the characterization.

Table 4. Summary of the Quick Characterization Sheet applied in Playa Grande beach.

QUICK CHARACTERIZATION SHEET FOR BEACHES	
Beach name	Playa Grande
	
City, Region, Country	Santa Marta, Magdalena, Colombia
Geographic Position	11°16'04.52" and 11°16'13.25" N 74°11'50.22" and 74°12'05.72" W
Special denomination	None, beach is public
Primary Activities	Commerce influenced by tourism; fishing nearby
Touristic Activities	Bathing; Diving; Snorkeling; Aquatic Sports; Equipment and Facilities Rental
Beach width	<30 meters
Environmental control	None
Sediment type	Mostly sand but also pebbles
Sand color	Yellow
Tributaries	None
Seawater color	Turquoise
Vegetation	Grass and big trees
Land shape	Very undulating
Noise level	None
Emissions sources	Restaurants
Services	Commerce; Facilities; Lodgings
Handicap facilities	None
Leisure activities area	None

Lighting	None
Safety services	Police
Natural risks	Landslides
Risks situations	Boats on bathing area
Risk prevention	None
Social Risk	Insecurity
Signalization/Information	None
Maritime area activities	Passenger transportation by small boats; Diving; Snorkeling; Aquatic Sports;
Type of small/medium boats	Yachts; jet ski; motor boats; kayaks; inflatable boats

The aim of this method was to compile, integrate and prioritize information in order to identify the main actors and its interests on the studied area. Considering this, even if the exercise was to made for MSP purposes it never lost its ICZM background.

Is also important to point that even if satellite images and GIS systems are the more used method to characterize coastal areas for MSP initiatives, this sheet is easier and can collect information more quickly. So it can be also a supportive tool for mostly used methods.

However, and according to the obtained results, is always possible to use this tool along with other information sources for identifying the uses and activities on beaches for their further analysis of present conditions.

Another advantage of the sheet is that allows the integration of environmental, social, economic, maritime and planning concepts in order to have updated version of current conditions on any beach.

Is true that complementing studies in a characterization phase would allow specific results, like monitoring, carrying capacity, meetings with locals, social interaction with actors in the beach and so on. But as was mentioned before, one of the principal objectives of analyzing the sheet is to determine main activities and uses for their further analysis in the next step of characterization.

The design and modification of the Quick Characterization Sheet for Beaches are based on many authors that provide ICZM, beach management, and scientific concepts, as well as guidelines from national and local institutes of coastal conservation, monitoring and control. The sheet is also always evolving by the experience on field and direct contact with users, becoming and useful tool for coastal researchers and managers.

4.2. Identified conflicts between beach uses and activities

The method for determining the main activities and uses in the beach is a new one. It was used before in Pacific coast of Colombia (Botero et al, 2013), and for rivers tourism purposes in department of Meta. However, this was the first time that was implemented on Colombia caribbean coast and more specific in a beach of sun, sand and sea tourism.

The uses and activities present on the beach and determined thanks to the characterization sheet are specified on Table 5.

Table 5. Uses and activities of Playa Grande

Uses and Activities present on Playa Grande
Urbanization
Stationary Commerce
Peddlers
Facilities (decks, chairs, shade services and so)
Fishing
Diving
Bathing
Snorkeling
Aquatic Sports
Solid Waste Receptor
Playground areas
Lodging

Passengers transportation by sea
Maritime signaling
Local cabotage
Equipment Rental

On the following paragraphs, there will be described these activities into the coastal aspects.

The phenomenon of the use of coastal areas for human settlements has shown directly impact on land use and the disappearance of natural habitats and landscapes. Also indirectly favors the construction of all types of infrastructure and equipment, generating problems of dumping, solid waste, noise, etc. In Mediterranean coast for example, the anarchic and uncontrolled urbanization caused by second homes and tourist installations have blighted the coastal zone with serious negative and, in some cases, irreversible alterations (Beriatos & Papageorgiou, 2010).

One of the most striking effect is caused by the construction of houses on the edge of the coastal zone. This would increase of both coastal erosion and the loss of species (Barragán, 2003). Although in Playa Grande urbanization is low, later on buildings may have stability risks (Image 1)

Image 1. Infrastructures built in edge of the coast. Source: SisCo Group (2013)

Urbanization perhaps is one of the activities that due to its location (land), can be the less related to MSP. However, marine water quality and marine ecosystems can be affected by the presence of the buildings in the edge of the coast, due to both waste water disposal and solid waste dumping on the beach. Private houses lack in sewage systems.

In the same way, there are restaurants as the main service of stationary commerce and there is also presence of peddlers. However, this last one seems to be accepted by tourists, who does not complain about them.

MSP relation with these activities is not that strong, but the idea is to incorporate touristic beaches in MSP context, so not only the maritime activities and uses should be improved or managed, but also the ones that have an important role for economic development (in this case for example).

Beach facilities, such as shade services, decks and chairs just for mention some, do not affect directly maritime uses or activities, but are a service required for bathers, which play an important role in the maritime space of the beach.

In most of MSP initiatives worldwide, management of fishing is at least one of the most important goals. Not only because of the area used for its development, but because is a relevant economic income for locals and as well can have conflicts with other activities or uses that share the maritime area. However, this is not the case for Playa Grande, where Fishing area is well located and does not affect others activities or uses.

But this is not the case for bathing, diving, snorkeling and aquatic sports, which just by observing it can be seen the conflicts between them for their “fight” for marine space (Image 2). Although there is zoning for the beach uses, this is not implemented due to the absence of maritime authorities.

These uses and activities would be the main concern for implementing MSP management measures, due to the difficulty in organize the area already designed for each activity and use.

Image 2. Mixed uses and activities of marine area in Playa Grande

The main pollution source is the solid waste. This was observed distributed by zones along the beach. MSP should have in account this problem for its further management because this waste will end in the sea due to wind and waving.

Playground areas and lodging are also located in land. However, its correct spatial planning will interact positively with activities on the sea. For the case of lodging, if the maritime space is organized correctly, it will increase tourist stay in the beach because they can arrive to the beach more comfortable by boat.

As was mentioned before, one of the main ways to reach the beach is by sea. However the disposal of boats along the beach shows the disorganization for them and consequently interacts negatively with the other activities present on marine area. After is prioritized by MSP management it would stop being a problem and will relate positively with the other uses and activities.

Maritime signaling is present on the marine area but not in the optimal conditions. Buoys are not used, but plastic tanks. However, fishing activity is properly delimited.

In any case this use should be improved if is aimed to implement the existing marine zoning, Just for being in maritime area, it would automatically become a priority for MSP initiatives.

Local Cabotage even if is not that high is still present.

On the other hand, equipment rental even if is still not a problem, should be properly organized and distributed on the beach. It occupies an important land space.

Having in mind the described activities and uses, these are put in the matrix and consequently evaluated in order to know each interaction.

According to matrix calculations, these activities (Figure 7) are balanced and neutrally synchronized with the complexity of the system providing an ICZM (Type 0):

Figure 7. Uses and activities neutrally synchronized and balanced.

These activities do not affect others neither they are affected by others. Activities and uses such as equipment rental and playground areas, although are neutrally synchronized need to have their own space in order to improve beach landscape and reduce conflicts with peddlers for example.

Is important to point out that solid waste receptor probably entered in this category because as was mentioned before, there are cleaning activities by each owner of restaurant/kiosk.

Uses and activities that need to be maintained (Type A) and promoted because are benefic to others are showed on (Figure 8)

Figure 8. Uses and activities needed to maintain

According to matrix calculations all of these activities have a positive relationship with the others, however they should be observed and controlled properly such as urbanization, that even if interacts positively with stationary commerce (Type B), it can start growing without control and as consequence, could become conflictive with the beach environment due to its strong influence on coastal system.

The only activity with relationship "Type B" is Stationary Commerce (Figure 9). It doesn´t have strong influence on the coastal system but affects positively the others. This activity, which is present in the beach mainly as restaurants, needs to be promoted because of its positive effects on other uses and activities. Local groups like restaurants owners committee, are well organized and this can be confirmed with the way they manage the cleaning of its frontal area.

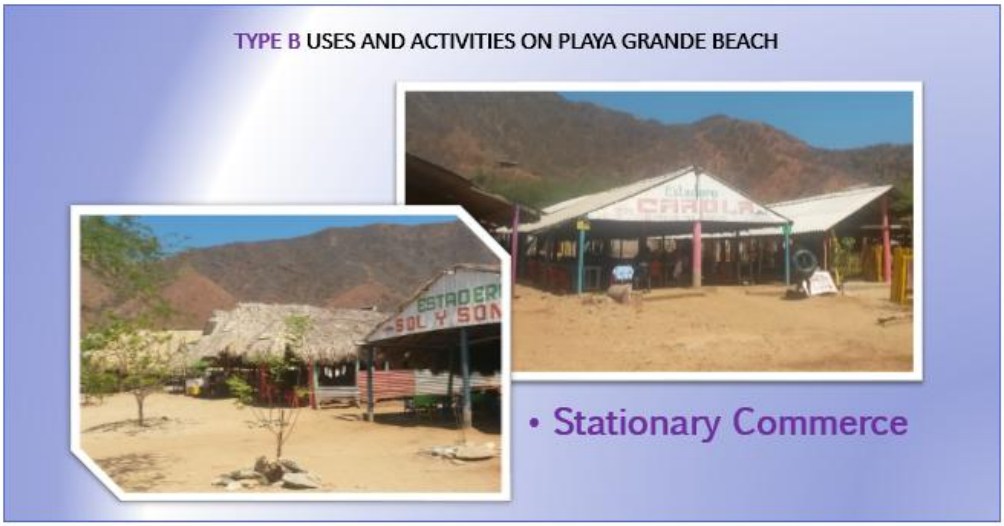


Figure 9. Activity needed to be promoted (Type B)

Type D uses and activities (Figure 10) requires urgent measures for their management, specifically on the beach is needed a zoning for these use and/or activities not being discouraged as the classification suggests.

Figure 10. Uses and activities that need to be discouraged or managed

Is necessary to discourage the wrong disposal of solid waste (Type 0) by putting cans along the beach.

Maritime uses and activities are not only the most conflicting between each other (most of them are Type D) but also have negative effects on others activities like bathing (Type 0) confirming the need of an urgent implementation of management measures, like a maritime spatial zoning.

Is important to point out that DIMAR, as the national authority for maritime affairs in Colombia, has established a zoning and regulations on hours for bathing and for the traffic of boats in the area, however, these aren't being accomplished by users. Is necessary to strengthen the presence of the authority in the beach, which showed interest in the realization of this research.

5. CONCLUSIONS

Maritime Spatial Planning (MSP) is an innovating tool for Integrated Coastal Zone Management (ICZM) used mostly in oceans and seas. With this particular study case, a touristic beach is analyzed by finding out basic information of it and evaluating the interactions and conflicts between the uses and activities with the aim to establish if MSP can be applied on beaches.

In Colombia, despite existing a complete framework of laws and policies, these cannot be implemented properly due to the conflicts between local, regional and national authorities that have a particular interest on the coastal area for manage it or for control it. They cannot be complemented between each other and in the end they mutually affect negatively. In this way, MSP allows integration of each part involved and includes also the communities for manage the coastal area.

In this context, analysis of current conditions is one of the first steps for succeeding in any MSP initiative. And this was realized successfully in a local beach of Santa Marta, a city where one of its more important economic activity is the tourism.

Quick Characterization Sheet is an innovating tool only applied in two specific cases in Colombia but never in Caribbean region. And one of the aims of this work that was achieved was precisely the application of this sheet.

Guidelines supporting the sheet can be improved for being used in any beach, it would depend on the country legal framework for maritime space for example, or add subcategories if it is necessary. However, the basis for its application is easily understood by professionals on coastal subjects.

The importance of this sheet is not only for defining the existing conditions of a beach, but also allows to determine the activities and uses in both land and maritime area of the analyzed area.

This can be confirmed in the interaction matrix, the second method used in this work, which was based on the information collected on the sheet. The conflicts that were

identified and studied allow the involved authorities and beach users be ready for defining strategies for a MSP implementation and propose management measures.

The objective of the MSP is to provide a mechanism-based approach to strategic planning and integrated maritime management, which makes it possible to take into account "the full context" turn and manage conflicts of current and potential use in reduce the cumulative effects of human activities, and likewise provide marine protection.

This can be achieved by realizing the interaction matrix, which allows to identify the main conflicts and also positive interactions between uses and activities in the beach.

Categories for both the sheet and in matrix the specific activities, even if on the beginning could not seem related to MSP they have functions and are as well as important as the other activities.

Maritime Spatial Planning can be a tool that integrates ICZM principles in the management of the maritime areas and can complement strategies of integrated coastal management without losing its emphasis of spatial and temporal distribution of it.

Is important to also mention that this work is only focused in the initial phase of an MSP initiative. Further analysis for future conditions if the current conditions are maintained or if the beach is managed, it would be done in the future.

6. REFERENCES

Alonso D., Sierra-Correa P., Arias-Isaza, F. & M. Fontalvo. (2003). Conceptos y Guía Metodológica para el Manejo Integrado de Zonas Costeras en Colombia, manual 1: preparación, caracterización y diagnóstico. Serie de Documentos Generales de INVEMAR No.12, 94p. ISBN: 958-97301-7-5

Australian Government (2008) Great Barrier Reef Marine Park Authority. Available online at: http://www.gbrmpa.gov.au

Balk, D. (2010). The Rising Tide? Urban Population and Climate Change. CUNY Institute for Demographic Research & School of Public Affairs, Baruch College

Barragán, J. M. (2003). Medio ambiente y desarrollo en áreas litorales. Introducción a la planificación y gestión integradas. Servicio de publicaciones Universidad de Cádiz. 306 p.

Botero, C., Tosic, M., Prüssmann, J., Lugo, J., Acosta, O. & Fonseca, S. (2013). Guía metodología de zonificación costera. Estudio Técnico del contrato INRED1-014-2013 PlayasCorp para la Dirección General Marítima. Santa Marta, Colombia. 42p. + Anexos.

Botero, C. (2008). Proposal of Management Framework for Tourist Beaches based on ICM. Tesis for obtaining Master Degree in Water and Coastal Management, Universidade do Algarve, Faro, Portugal.

Botero, C. (2013). Evaluación de los esquemas de certificación de playas en América Latina y propuesta de un mecanismo para su homologación. Tesis doctoral para obtener el Doctorado en Gestión del Agua y de la Costa. Departamento de Geografía, Historia y Filosofía. Universidad de Cádiz, 2013.

Bravo, L., I. Espejel, J. Fermán, B. Ahumada, C. Leyva, G. Bocco & R. Rojas (2007). Evaluación ambiental estratégica, propuesta para fortalecer la aplicación del ordenamiento ecológico: Caso de estudio "La región Mar de Cortés". Gestión y Política Pública. VOLUMEN XVI - NÚMERO I - I SEMESTRE DE 2007 - PP. 147-170

CCO (2010). Lineamientos Para La Formulación del Plan Nacional de Manejo Integrado de Zonas Costeras PNMIZC. Comite Tecnico de Manejo Integrado de Zonas Costeras, Comisión Colombiana del Oceano. ISBN 978-958-44-7705-7. 162 pp

Cicin-Sain, B & S. Belfiore (2005). Linking marine protected areas to integrated coastal and ocean management: A review of theory and practice. Ocean & Coastal Management 48 (2005) 847–868

Clark, J. (1996). Coastal Zone Management Handbook. CRC Press, 720 pp.

CoastWatch Europe, (2013). On line *www.coastwatch.org*, last access on January of 2014

Corporación Autónoma Regional del Magdalena-CORPAMAG. (2000). Diagnóstico General del Distrito de Santa Marta. Capítulo 1. 36 pp

Corso, A. (n.d.) Relatora del Taller ¿Cómo es Santa Marta al final del siglo XX?. 36 p

Crowder L.B., Osherenko, G., Young, O.R., Airame, S., Norse E.A., Baron N, et al. (2006). Resolving mismatches in US ocean governance. Science 2006; 313:617–8.

Daschkeit, A., (2007). Integrated Coastal Zone Management (ICZM) as instrument of spatial planning for the assessment of climate changes in the coastal areas. Berichte zur Deutschen Landeskunde 81, 177–187.

Dengbol D and Wilson D. (2008). Spatial planning on the North Sea: a case of cross-scale linkages. Marine Policy 32:189-200.

Department for Environment Food and Rural Affairs (DEFRA). (2007). A Sea Change. A Marine Bill White Paper, United Kingdom

Dirección General Marítima de Colombia (DIMAR), (2012). Sectorización para el Uso y Goce de las Zonas de Aguas y Playas Marítimas. Dirección General Marítima. 10 pp. Circular N° 110720121200-MD-DIMAR-CP04-Litorales-021

Douvere F. (2008). The importance of marine spatial planning in advancing ecosystem-based sea use management. Marine Policy 2008;32:762–71.

Douvere, F. (2010). Marine spatial planning: Concepts, current practice and linkages to other management approaches. Ghent University, Belgium.

Douvere, F. & C.N. Ehler (2009). New perspectives on sea use management: Initial findings from European experience with marine spatial planning. Journal of Environmental Management 90 (2009) 77–88

Douvere, F. (2008). The importance of marine spatial planning in advancing ecosystem-based sea use management. Marine Policy 32, 762–771.

Douvere, F., Maes, F., Vanhulle, A. & Schrijvers, J., (2007). The role of spatial planning in sea use management: the Belgian case. Marine Policy 31, 182–191

E. Beriatos and M. Papageorgiou (2010). Towards Sustainable Urbanization and Spatial Planning of the Coastal Zone in Greece and the Mediterranean Basin. Sustainable planning of the coastal zone in Mediterranean 46th ISOCARP Congress 2010

EEA (European Environmental Agency), (2012). Climate change, impacts and vulnerability in Europe 2012: an indicator-based report. European Environment Agency, Report 12, Copenhagen, Denmark, 304 pp

EEA (European Environment Agency), (2008). Impacts of Europe's changing climate: 2008 indicator-based assessment. European Environment Agency, Report 4, Copenhagen, Denmark, 246 p.

Ehler, C. & Douvere F. (2007) Visions for a sea change: report of the first international workshop on marine spatial planning.Paris: UNESCO;2007.

Ehler, C. & Douvere, F. (2009). Marine spatial planning: a step-by-step approach toward ecosystem-based management. Intergovernmental Oceanographic Commission (IOC) Manual and Guides 2009; No. 53, ICAM Dossier No. 6.

ESF (European Science Foundation), (2007). Impacts of climate change on the European marine and coastal environment: ecosystems approach. Marine Board – European Science Foundation (ESF), Marine Board Position Paper 9, Philippart. C.J.M. (Ed.), 84 p.

Evrim, G. (2004). Coastal scenic evaluation, a pilot study for Çirali. In partial fulfillment of the requirements for the degreeof master of science in civil engineering , 79.

FANG, Q., R. ZHANG, L. ZHANG & H. HONG (2011). Marine Functional Zoning in China: Experience and Prospects. Coastal Management, 39:656–667, 2011

Fermán, J. (2000), Propuesta de ordenamiento marino del golfo de California,informe técnico final, México, Semarnat. In Bravo et al, 2007

Flannery W,O & Cinneide M. (2008). Marine spatial planning from the perspective of a small seaside community in Ireland. Marine Policy 2008;32:980–7.

FONATUR (2003), "Manifestación de impacto ambiental en su modalidad regional para el plan maestro de las Escalas Náuticas Singlar" (documento para revisión), Centro de Planeación.

Fonseca, S (2014). Calibración del Parámetro Paisaje para las Playas del Caribe Norte Colombiano como parte del Indicador Calidad Ambiental Recreativa del Modelo ICAPTU. Informe Pasantía de Investigación para optar al Título de Ingeniera Ambiental y Sanitaria. Universidad del Magdalena, 2013.

Gee, K., Kannen, A., Glaeser, B. & Sterr, H., (2004). National ICZM strategies in Germany: a spatial planning approach. In: Schernewski, G., Lo¨ser, N. (Eds.), Managing the Baltic Sea. Coastline Reports 2, pp. 23–33

Gopnik, M., C. Fieseler, L. Cantral, K. McClellan, L. Pendleton & L. Crowder (2012). Coming to the table: Early stakeholder engagement in marine spatial planning. Marine Policy 36 (2012) 1139–1149

Herrera, J. (2010). Modelo de Gestión Costera para playas turísticas del Caribe Colombiano. Aplicación Playa Blanca, Magdalena, Colombia. 174 p.

Holloway J. & N. Taylor (2006). The business of tourism. Pearson Education. p. 29. ISBN 0-273-70161-4.

IDEAM (2014). Pronóstico de Pleamares y Bajamares Costa Caribe Colombiana. Instituto de Hidrología, Meteorología y Estudios Ambientales. 169 pp.

Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM), (2010). Sistemas Morfogénicos del Territorio Colombiano. Instituto de Hidrología, Meteorología y Estudios Ambientales. Bogotá, D. C., 252 p., 2 anexos, 26 planchas en DVD

Integrated Management Plan for the North Sea 2015 (IMPNS2015), (2005). Interdepartmental Directors Consultative Committee. The Netherlands.

Jones-Walters, L. & Nieto, A., (2007). Climate Change and Biodiversity—The Role of the European Regions. European Centre for Nature Conservation (ECNC), Tilburg, The Netherlands.

Ketchum, B. H. (1972). The Waters Edge, Woodhole, MA, MIT Press. In (Williams & Micallef, 2009)

Kidd, S. & McGowan, L. (2013). Constructing a ladder of transnational partnership working in support of marine spatial planning: Thoughts from the Irish Sea. Journal of Environmental Management 126 (2013) 63e71

Klein, R.J.T., Nicholls, R.J., Ragoonaden, S., Capobianco, M., Aston, J. & Buckley, E.N., (2001). Technological options for adaptation to climate change in coastal zones. Journal of Coastal Research 17, 531–543

Klein, M. (2012). The Ocean as a new frontier. Rhode´s Island Ocean and Coastal Magazine. Pages 2-5 Vol 7

MMA (1998). Política Nacional de Ordenamiento Integrado y Desarrollo Sostenible de las Zonas Costeras. Documento preliminar para discusión. Grupo de zonas costeras y humedales, 9 de junio de 1998.

MMA (2000). Política Nacional Ambiental para el desarrollo sostenible de los espacios oceánicos y las zonas costeras e insulares de Colombia. Ministerio de Medio Ambiente. Bogotá D.C., 99 p

Montes-Lira, P. (2001), El Ordenamiento Territorial como opción de políticas urbanas y regionales en América Latina y el Caribe, Serie Medio Ambiente y Desarrollo, núm. 45, Chile, CEPAL. In Bravo et al, 2007

Nicholls, R.J. & Tol, R.S.J., (2006). Impacts and responses to sea level rise: a global analysis of the SRES scenarios over the twenty-first century. Philosophical Transactions of the Royal Society A 364, 1073–1095

Noguera, L. (2012). Evaluación de los aspectos de conformidad ambientales de las certificaciones de playas de América Latina. Informe Pasantía de Investigación para optar el título de Ingeniera Ambiental y Sanitaria. Universidad del Magdalena, 2012.

Parra, E. (2009). Ordenamiento Territorial Costero en el Caribe Colombiano. Las directrices del Estado en los casos de estudio de Coveñas y San Andrés. Universidad Nacional de Colombia. 142 pp

Pidwirny, M. (2006). Fundamentals of Physical Geography, 2nd Edition.

Pranzini, E & G. Vitale. (2011). Beach Sand Colour: the Need for a Standardised Assessment Procedure. In: Micallef, A. (ed.), MCRR3-2010 Conference Proceedings, Journal of Coastal Research, Special Issue, No. 61, pp. 66-69. Grosseto, Tuscany, Italy, ISSN 0749-0208.

Pranzini, E. (2008). Beach variability and shoreline evolution monitoring. In: Pranzini, E & Wetzel, L. Beach Erosion Monitoring: Results from BEACHMED-e/OpTIMAL Project. Printed by Nuova Grafica Fiorentina. May of 2008.

Pranzini, E., D. Simonetti & G. Vitale. (2010). Sand Colour Rating and Chromatic Compatibility of Borrow Sediments. Journal of Coastal Research, Vol. 26, No. 5, 2010, 798–808

Red Interinstitucional de Manejo Integrado de Recursos Costeros y Marinos (RIMIRCOM) e Instituto Nacional de Ecología (INE) (2000), "Ordenamiento ecológico de la región del golfo de California y Pacífico Norte", informe técnico final.

Rivas, J. (2012). Antecedentes y Marco Teórico del Ordenamiento Ecológico Territorial Marítimo y Costero. In Prezi http://prezi.com/6cdlae6rblne/ordenamiento-ecologico-territorial-maritimo-y-costero/

Rojas Giraldo, X., Sierra-Correa P.C., Lozano-Rivera P. & López Rodríguez A. (2010). Guía metodológica para el manejo integrado de las zonas costeras en Colombia, manual 2: planificación de la zona costera. Serie de Documentos Generales INVEMAR No.44, 74 p.

Salinas-Chávez, E. & J. Middleton (1998), La ecología del paisaje como base para el desarrollo sustentable de América Latina, http://brocku.ca/epi/lebk/ lebkhtml. In Bravo et al, 2007.

Sanjaume, E. (2005). Geomorfología litoral I quaternari. Valencia: Universidad de Valencia.

Secretaría de Turismo de Argentina (SECTUR), (2005). Gestión Turística y Ambiental: Directrices y Guía de Evaluación. Una publicación de la Secretaría de Turismo de la Nación y la Secretaria de Ambiente y Desarrollo Sustentable de la Nación. 65 pp

Small, C. & Nicholls, R.J., (2003). A global analysis of human settlement in coastal zones. Journal of Coastal Research 19, 584–599

SNET - Sistema Nacional de Estudios Territoriales. (2009). Introducción a los procesos costeros. Salvador: Ministerio del Medio Ambiente y recursos Naturales.+

Steer, R., Arias, F., Ramos, A., Sierra, P.C., Alonso, D. & Ocampo, P. (1997). Documento base para la elaboración de la Política Nacional de Ordenamiento Integrado de las Zonas Costeras Colombianas. Documento de Consultoría del Ministerio de Medio Ambiente, Bogotá. 390 p

Torres, R. (2004). Plan de Ordenamiento Marítimo de la Zona Costera adyacente al Distrito de Cartagena de Indias. 38 p.

UK-MSP Working Group, (2005). Added value of marine spatial planning. County Agencies. Interagency MSP Working Group, United Kingdom. In Douvere & Ehler, 2009

UNESCO (2013). Marine Spatial Planning Initiative. Available on http://www.unesco-ioc-marinesp.be/, last update December of 2013

UNESCO, (2005). Introduction to Sandwatch: An education tool for sustainable development. Coastal region and small island papers 19, UNESCO, Paris, 91 pp.

UNESCO, (2006). Exit from the labyrinth. Integrated coastal management in the Kandalaksha District, Murmansk Region of the Russian Federation. Coastal region and small island papers 21, UNESCO, Paris, 75 pp

United States Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service and National Marine Sanctuary Program (2007) Florida Keys National Marine Sanctuary revised management plan, United States of America Interdepartmental Directors' Consultative Committee, (2005). Integrated Management Plan for the North Sea 2015 (IMPNS 2015), The Netherlands.

United States Environmental Protection Agency. (EPA), (2014). In web, http://water.epa.gov/type/rsl/monitoring/vms55.cfm, last checked on january of 2014.

Vallega, A. (1992). Sea Management A theoretical approach. Elsevier Science Publishers LTD. ISBN 1-85166-772-5. 259 pp

Vallejo, M.S. (1988). Development and Management of Coastal and Marine Areas: An international perspective. In (Vallega, 1992)

Vallejo, S. M. A. (1991). The development and management of coastal and marine areas. In (Williams & Micallef, 2009)

Williams, A. & A. Micallef. (2009). Beach Management. Principles and Practice. First published by Earthscan in the UK and USA in 2009. London, 2009. 480 pp.

Wilson, E. & Piper, J., (2010). Spatial Planning and Climate Change, 1st ed. Routledge, Abingdon, Oxon, United Kingdom445.

YANES, A. (2013). Importancia de la Planificación Marítima en la Gestión Túristica de Playas. La Timonera, 20: 62-65. ISSN-2145-4655. Diciembre de 2013.

Young O.R., Osherenko, G., Ekstrom, J., Crowder, L.B., Ogden, J, Wilson, J.A., et al. (2007). Solving the crisis in ocean governance: place-based management of marine ecosystems. Environment 2007;49: 20–32.

APPENDIX.

APPENDIX I.

QUICK CHARACTERIZATION SHEET FOR BEACHES

TESIS "PLANIFICACION ESPACIAL MARITIMA COMO HERRAMIENTA DE GESTION TURISTICA"
FICHA DE CARACTERIZACIÓN COSTERA RÁPIDA

VERSIÓN: 01

INFORMACIÓN GENERAL

No Formulario: ☐ **Evaluador:** _____

Fecha: **Año:** ☐☐☐☐ **Mes:** ☐☐ **Día:** ☐☐

Coordenadas

Departamento: _____ N _____ W _____

Ciudad: _____ N _____ W _____

Nombre de la playa: _____ Largo _____ Ancho 1 _____

Tipo de playa: Ancho 2 _____ Ancho 3 _____

imagen de la playa en la coordenada

1. USOS Y ACTIVIDADES ACTUALES DE LA PLAYA

1.1 Espacio
- a. Parque Natural ☐
- b. Área Protegida sociedad civil ☐
- c. Zona de amortiguamiento ☐
- d. Otros _____

1.2 Asentamientos humanos
- a. Zona Urbana ☐
- b. Zona Rural ☐
- c. Ninguno ☐
- d. Otros _____ ☐

1.3 Defensa*
- a. Espolones ☐
- b. Rompeolas ☐
- c. Malecón ☐
- d. No hay obras de defensa ☐
- e. Otros _____ ☐

1.4 Receptor de vertidos*
- a. PTAR ☐
- b. Descargas incontroladas ☐
- c. Rellenos sanitarios ☐
- d. No aplica ☐
- e. Otros _____ ☐

1.5 Infraestructura e instalaciones*
- a. Tendidos de electricidad ☐
- b. Torres de comunicaciones ☐
- c. Tuberías (gas, agua potable, etc.) ☐
- d. Vías principales ☐
- e. Aeropuertos ☐
- f. Ninguna ☐
- g. Otros _____ ☐

1.6 Actividades Básicas*
- a. Agricultura ☐
- b. Ganadería ☐
- c. Silvicultura ☐
- d. Acuicultura ☐
- e. Comercio ☐
- f. Ninguna ☐
- g. Otros _____ ☐

1.7 Act. extractivas o primarias*
- a. Pesca cerca de la playa ☐
- b. Pesca dentro de la playa ☐
- c. Extracción maderera ☐
- d. Minería ☐
- e. Petrolera ☐
- f. Ninguna ☐
- g. Otros _____ ☐

1.8 Actividades Industriales*
- a. Ind. Maderera ☐
- b. Ind. Pesada ☐
- c. Ind. Minera ☐
- d. Ind. Petrolera ☐
- e. Ind. Eléctrica ☐
- f. Ninguna ☐
- g. Otras _____ ☐

1.9 Actividades de turismo y recreación
- a. Turismo masivo ☐
- b Turismo temático ☐
- c. Buceo ☐
- d. Careteo ☐
- e. Deportes Naúticos ☐
- e. Otros _____ ☐

1.10 Actividades de comercio y transporte marítimo*
- a. Puerto(s) de menor calado ☐
- b. Puerto(s) de gran calado ☐
- c. Puerto(s) Naútico(s) deportivo(s) ☐
- d. Puerto(s) pesquero(s) ☐
- e. Muelle(s) turístico(s) ☐
- f. Ninguno ☐
- g. Otros _____ ☐

2. CARACTERÍSTICAS AMBIENTALES DE LA PLAYA

2.1 Ecosistemas*
- a. Arrecife de coral ☐
- b. Pastos Marinos ☐
- c. Dunas ☐
- d. Manglares ☐
- e. Litoral de fondo rocoso ☐
- f. Litoral de fondo arenoso ☐
- g. Otro _____

2.2 Unidad Geomorfológica mayoritaria
- a. Delta ☐
- b. Ciénaga ☐
- c. Acantilado ☐
- d. Islas ☐

2.3 Tipo de sedimento de la playa*
- a. Piedras ☐
- b. Grava ☐
- c. Arena ☐
- d. Fango ☐

2.4 Signos de erosión*
- a. Obras de defensa ☐
- b. Dragados ☐
- c. Escarpes ☐
- d. Arboles caidos ☐
- e. Construcciones ☐
- f. Otros _____ ☐

2.5 Ancho de la playa
- a. < 30m ☐
- b. 30-50 m ☐
- c. >50 m ☐

2.6 Oleaje
- a. Olas Pequeñas ☐
- b. Olas Medianas ☐
- c. Olas Grandes ☐
- d. Olas Muy Grandes ☐

2.7 Turbiedad
- a. Baja ☐
- b. Media ☐
- c. Alta ☐

2.8 ¿Se realiza el Monitoreo o actividades de protección a*
- a. Calidad de Agua ☐
- b. Paisaje ☐
- c. Calidad de Arena ☐
- d. Ecosistemas ☐
- e. Ruido ☐
- f. Calidad Aire ☐
- g. No hay act. protección ☐
- h. No se realizan monitoreos ☐

2.9 Afluentes*
- a. Río grande ☐
- b. Río mediano ☐
- c. Rio pequeño ☐
- c. Ningún afluente ☐

2.9.1. Ubicación Afluentes*
- a. Centro de la playa ☐
- b. En un extremo ☐
- c. En los dos extremos ☐
- d. En centro y un extremo ☐

2.10 Color de la arena
- a. Gris ☐
- b. Marrón ☐
- c. Rojiza ☐
- d. Amarilla ☐
- e. Blanca ☐

2.11 Color del agua
- a. Azul Oscuro ☐
- b. Azul Claro ☐
- c. Verdoso ☐
- d. Café ☐
- e. Azul Turquesa ☐

2.9.2. Cantidad Afluentes
- a. 1 ☐
- b. > 1 y < 4 ☐
- c. > 4 ☐

2.12 Cobertura Vegetal*
- a. Hierba, Vegetación baja ☐
- b. Matorrales, bosque bajo ☐
- c. Arbustos ☐
- d. Árboles grandes ☐

2.13 Forma del Terreno
- a. Plano ☐
- b. Ondulado ☐
- c. Muy Ondulado ☐
- d. Montañoso ☐

3. FUENTES DE CONTAMINACIÓN DE LA PLAYA Y CONTROL CONTAMINACION

3.1 Signos de Contaminación*
- a. Vertimientos ☐
- b. Residuos Sólidos ☐
- c. Emisiones atmosféricas ☐
- d. Ruido ☐
- e. Otro _____

3.2 Tipo de Canecas*
- a. Canecas alrededor de la playa ☐
- b. Contenedores ☐
- c. Canecas Separadoras ☐
- d. Canecas por Establecimiento ☐
- e. Ninguna ☐
- f. Otro tipo _____ ☐

3.2.1. Cantidad Canecas en la playa
- a. Ninguna ☐
- b. De 1 a 3 ☐
- c. De 4 a 6 ☐
- d. Mayor de 6 ☐

3.2.2. Estado Canecas
- a. Excelente ☐
- b. Muy Bueno ☐
- c. Regular ☐
- d. Malo ☐

3.3 Tipo de Residuos Sólidos*
- a. Plásticos ☐
- b. Metales voluminosos ☐
- c. Papel y Cartón ☐
- d. Vidrios ☐
- e. Sanitario y/o Biológico ☐
- f. Orgánicos ☐
- g. Otro(s) _____ ☐

3.4 Disposición Residuos Sólidos
- a. Dispersos uniformemente ☐
- b. Dispersos en zonas ☐
- c. Acumulados en una zona ☐
- d. Acumulados varias zonas ☐
- e. No hay residuos ☐

3.5 Nivel Ruido
- a. Ausente ☐
- b. Leve ☐
- c. Moderado ☐
- d. Alto ☐

3.6 Fuentes Emisiones*
- a. Restaurantes ☐
- b. Lanchas ☐
- c. Vehículos ☐
- d. Industrias ☐
- e. Otro(s) _____ ☐

3.7 Tipo de Vertimientos*
- a. Maritimos ☐
- b. Domésticos ☐
- c. Pluviales ☐
- d. Industriales ☐
- e. Otro(s) _____ ☐

4. SERVICIOS DE LA PLAYA

4.1 Servicios de la Playa*
- a. Limpieza ☐
- b. Parqueaderos ☐
- c. Instalaciones para discapacitados ☐
- d. Instalaciones Sanitarias ☐
- e. Dispensadores de Agua ☐
- f. Iluminación ☐
- g. Áreas Act. Lúdicas ☐
- h. Servicios Comerciales ☐
- i. Servicios de Sombra ☐
- j. Sillas ☐
- k. Alojamientos ☐
- l. Otro(s) _____

4.2 Frecuencia Limpieza
- a. Diario ☐
- b. Semanal ☐
- c. Mensual ☐
- d. Ocasional ☐
- e. No se realiza ☐

4.3 Capacidad Parqueaderos
- a. Insuficiente ☐
- b. Suficiente ☐
- c. Excesivo ☐
- d. Solo Motos y/o Bicicletas ☐
- e. No aplica ☐

4.4 Instalaciones para Discapacitados*
- a. Rampas ☐
- b. Pasarelas ☐
- c. Información en Braile ☐
- d. Sillas anfibias ☐
- e. Señales Acústicas ☐
- f. Ninguna ☐
- g. Otra(s) _____

4.5 Acceso público
- a. Libre ☐
- b. Controlado ☐
- c. Prohibido ☐

4.6 Medio(s) de Acceso*
- a. A pie ☐
- b. En vehículo ☐
- c. Marítimo ☐
- d. Aire ☐

4.7 Dificultad Acceso*

a. Para todo tipo de personas por cualquier medio ☐
b. Para todo tipo de personas solo por un medio ☐
c. Sólo personas con buen estado físico ☐
d. Personas con estado físico promedio ☐
e No apto para ancianos y niños ☐

4.8 Áreas para actividades ludicas*

a. Ciclovías ☐
b. Canchas deportivas ☐
c. Parques biosaludables ☐
d. Juegos para niños ☐
e. Otros _____ ☐

4.9 Tipo de Instalaciones Sanitarias*

a. Baños Portátiles ☐
b. Gratuito establecimientos públicos ☐
c. Baños estáticos ☐
d. No hay Baños ☐

4.10 Dispensadores de Agua*

a. Potable ☐
b. No tratada ☐
c. No hay Dispensadores ☐

4.11 Tipo de Iluminación*

a. Alumbrado Público ☐
b. Alumbrado Privado ☐
c. No hay Iluminación ☐

4.12 Estado Areas Lúdicas

a. Excelente ☐
b. Bueno ☐
c. Regular ☐
d. Deficiente ☐
e. No hay Act. Lúdicas ☐

4.13 Estado Inst. Sanitarias

a. Excelente ☐
b. Bueno ☐
c. Regular ☐
d. Malo ☐

4.14 Servicio Sombra*

a. Carpas ☐
b. Parasoles ☐
c. Árboles ☐
d. Kiosko ☐
e. Otro _____

4.15 Mobiliario descanso*

a. Sillas Plásticas ☐
b. Tumbonas ☐
c. Esteras ☐
d. Hamacas ☐
e. Otro _____

4.16 Servicios Comerciales*

a. Bares ☐
b. Restaurantes ☐
c. Artesanias ☐
d. Vend. Ambulantes ☐
e. Otro _____

4.17 Estado Infraestructuras

a. Excelente ☐
b. Bueno ☐
c. Regular ☐
d. Malo ☐

4.18 Organización V. Ambulantes

a. Muy organizados ☐
b. Algún tipo de organización ☐
c. Baja organización ☐
d. Nula organización ☐
e. No aplica ☐

4.19 Cantidad V. Ambulantes

a. Insuficientes ☐
b. Suficientes ☐
c. Demasiados ☐
d. No aplica ☐

5. RIESGOS Y SEGURIDAD DENTRO DE LA PLAYA

5.1 Servicios Seguridad*

a. Salvavidas ☐
b. Vigilancia Privada ☐
c. Policías ☐
d. Guardia Costera ☐

5.2 Organización Salvavidas*

a. Uniformado ☐
b. Acreditado ☐
c. Difícil de Identificar ☐
d. No aplica ☐

5.3 Organización Vigilancia Privada*

a. Uniformado ☐
b. Acreditado ☐
c. Difícil de Identificar ☐
d. No aplica ☐

5.4 Organización Policia*

a. Uniformado ☐
b. Acreditado ☐
c. Difícil de Identificar ☐
d. No aplica ☐

5.5 Organización Guardia Costera*

a. Uniformado ☐
b. Acreditado ☐
c. Difícil de Identificar ☐
d. No aplica ☐

5.6 Infraestructuras Salud y Seguridad*

a. Centro médico ☐
b. Estación Policía ☐
c. Casetas Salvavidas ☐
d. Estación Guardia Costera ☐
e. Otra(s) _____ ☐
f. Ninguna ☐

5.7 Restricciones en la Playa*

a. Ingreso Animales ☐
b. Camping ☐
c. Ingreso vehiculos ☐
d. Ingreso embarcaciones ☐
e. Otro(s) _____ ☐
f. Ninguna ☐

5.8 Riesgos naturales*

a. Animales peligrosos ☐
b. Deslizamientos ☐
c. Tsunami ☐
d. Huracanes ☐
e. Otro(s) _____ ☐
f. Ninguno ☐

5.9 Situaciones de riesgo*

a. Cargue Combustible ☐
b. Bañistas en zonas prohibidas ☐
c. Embarcaciones en zona de bañistas ☐
d. Vehículos todoterreno ☐
e. Ninguna ☐

5.10 Riesgos Sociales

a. Prostitución ☐
b. Mendicidad ☐
c. Inseguridad ☐
d. Otro(s) _____ ☐

5.11 Prevención Riesgos

a. Paneles de Información ☐
b. Banderas ☐
c. Boyas ☐
d. Horarios de Baño ☐
e. Ninguno ☐
f. Otro(s) _____ ☐

6. INFORMACIÓN Y EDUCACIÓN EN LA PLAYA

6.1 Señalización en la Playa

a. Accesos
b Zonas de Riesgo
c. Prohibiciones
d. Restricciones
e. Otro _____

6.2 Información Básica de la Playa

a. Mapa de la Playa
b. Información bilingüe
c. Puntos de Información Turística
d. Folletos
e. Calidad Ambiental
f. Zonificación de la Playa
g. No hay información visible

6.3 Información Adicional y/o Pertinente

a. Código de Conducta
b. Recomendaciones de Seguridad
c. Resultados Monitoreos Ambientales
d. Capacidad de Carga
e. Caracterización de la Playa

7. ACTIVIDADES SOBRE AREA MARITIMA

7.1 Usos Marítimos

a. Transporte de pasajeros embarcaciones pequeñas
b. Transporte pasajeros en ferry
c. Embarcaciones pesqueras
d. Zona de Buceo/Careteo
e. Migración Especies
f. Ductos y cables submarinos
g. Emisario Submarino
h. Deportes Náuticos
i. Plataformas Offshore/eolicas
j. Zona de Baño
k. Cultivos marinos
l. Conservación
m. Otros _____

7.2 Migración Especies

a. Aves
b. Mamíferos Marinos
c. Peces
d. Reptiles
e. Anfibios
f. No aplica

7.3 Tipo de embarcaciones pequeñas

a. Lanchas de pasajeros
b. Yates y lanchas privadas
c. Motos marinas
d. Lanchas para inflables
e. Bicicletas marinas
f. Kayak y botes a remo
g. Otros _____

7.4 Tipo de Embarcaciones Grandes y Artefactos Navales

a. Barcazas
b. Buques
c. Embarcaciones de Vela
d. Cruceros
e. Ferry
f. Ninguno
g. Otro(s) _____

8.MANEJO Y ORDENACIÓN DE LA PLAYA

8.1 Zonificación Playa

a. Existe y se cumple
b. Existe pero no se cumple
c. Ningún tipo de zonificación

8.2 Zonificación Área activa

a. Area Activa
b. Area de Reposo
c. Area Recreativa
d. Zona de Embarcaciones

8.3 Zonificación Área Marítima

a. Zona de Bañistas
b. Zona de Operación de Bicicletas Marinas y Kayacs
c. Zona de Seguridad
d. Zona de Operación de Lanchas, Motomarinas y Sky
e. Zona de Conservación

8.4 Mecanismos de control

a. Horarios de operación de naves y/o artefactos navales
b. Horarios de uso y goce aguas marinas
c. Horarios de uso y goce de playas marítimas
d. Prohibiciones tránsito de vehículos
e. Prohibiciones tránsito de embarcaciones
f. Ningún mecanismo de control
g. Otro(s) _____

8.5 Cumplimiento Mecanismos Control

a. Control DIMAR
b. Control Policía Nacional
c. Control Alcaldía
d. Control Comunitario
e. Ningún tipo de control
f. Otro(s) _____

APPENDIX II.

QUICK CHARACTERIZATION SHEET FOR BEACHES

GUIDELINES

Section 0. Beach General Information

In this section the basic information is collected from the beach. In addition to geographical location a photo is added in the digitalized version of the sheet to identify the relevant aspects of it. Additional information includes the evaluator's name, date and type of beach.

Section 1. Current uses and activities on the beach

This section seeks to identify both economic and social activities taking place on the beach, as well as help identify any conflicts of use, or activity not permitted by applicable law.

The subcategories of this section are:

- Space: to identify for example is the beach is protected or is part of a bigger protected area, and if there are native communities on the place.
- Settlements: If in the beach are located urban or rural settlements.
- Defense Structures: If there are or not defense structures built for coastal erosion.
- Dumping Receptor: if the beach is used to dump solid waste, wastewaters and so on.
- Infrastructure and facilities: if on the beach are present infrastructure and facilities such as airport, highways, pipelines, communication towers, etc.
- Basic activities: If there are economic activities such as agriculture, aquaculture, forestry and commerce.
- Extractive and primary activities: Specify whether near the beach economic activities based on resource extraction are developed, for example fishing, mining, oil extraction, etc.
- Industry activities: Indicate if a specific industry at the beach is dedicated to extractive activities explained in 1.7.

- Tourism and leisure activities: identify what kind of tourism is developed on the beach, and specific activities for leisure like aquatic sports, diving or snorkeling.
- Commerce and Maritime Transport Activities: If are present on the beach different port structures such as marinas, deep-water ports, docks, fishing ports, and so on.

Section 2. Environmental features of the beach

The main objective of this section is to identify the natural characteristics of the beach such as ecosystems, geomorphological features, sediment type, signals of coastal erosion, turbidity, is there are tributaries nearby, vegetation and so on.

- Ecosystems: if on the beach the type of ecosystem if coral reef, seagrass, dunes, mangroves, rocky seabed littoral, sandy seabed littoral or another.
- Majority geomorphologic unit: the options for this question were selected according to the Colombian Hydrology, Meteorology and Environmental Studies Institute (IDEAM), who indicated that the most common geomorphologic units on coasts in Colombia are deltas, islands, swamps and cliffs (IDEAM, 2010)
- Sediment type: if on the beach the type of sediments if gravel, pebbles, sand or mud.
- Erosion signals: Coastal erosion depends on wave climate, sediment input and coastal structures that are present alongshore, thus beaches can change their shape from day to day or even from hour to hour (Pranzini, 2008). The options for identifying coastal erosion were chosen having in consideration some signals that can be observed. For further information of erosion on the studied beach are necessary advanced studies. Some of the signals that can be observed are defense structures (Groynes, seawalls, breakwaters), dredging activities, falling trees, another kind of infrastructure like ports or docks, buildings on shoreline, etc.
- Beach width: defined as the distance between dune crest and shoreline position at high tide, is an important parameter measuring the 'health' of a beach.

Understanding how beach width changes over varying timescales is vital for future shoreline management planning, identifying locations of enhanced erosion and the possible threat they pose to human structures and/or recreational activities (UNESCO, 2005). The options to select are less than 30 meters, between 30 and 50 meters or more than 50 meters.

- Wave type: refers to the dominant force of waves on coastal processes of open coasts, these waves are generated by the transfer of energy from the wind blowing over a water surface (SNET, 2009). If there is some manifestation of waves, it can be chosen according to the following characteristics of the element (**Figure 1**).

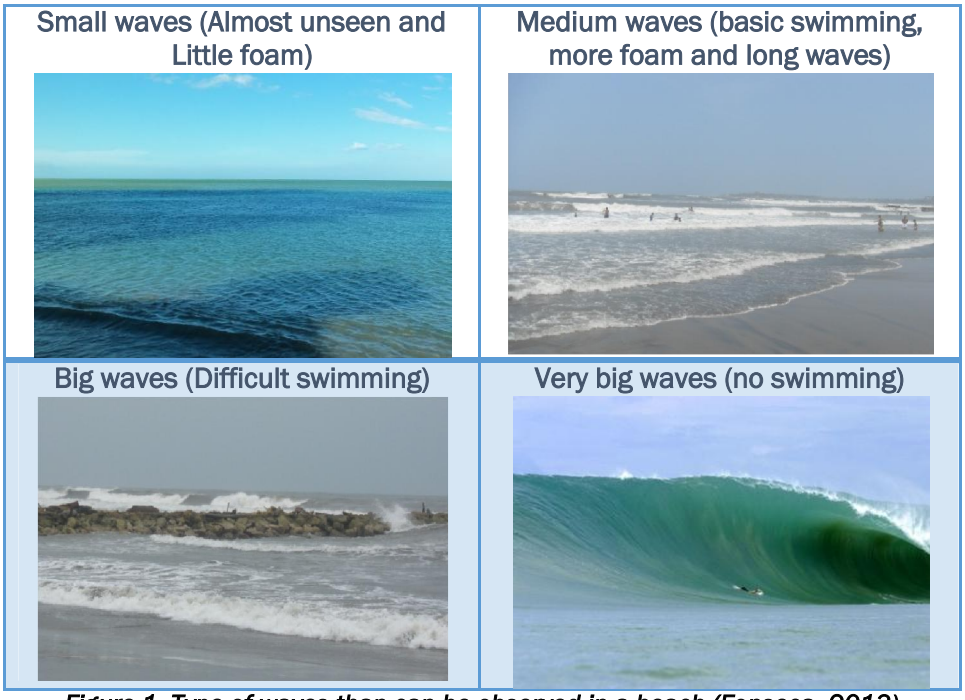


Figure 1. Type of waves than can be observed in a beach (Fonseca, 2013)

- Turbidity: defined as the measure of water quality that allows to know how much the material suspended in water decreases the passage of light through the water, and how the water color is affected by turbidity (EPA, 2014)
- Monitoring activities: in order to know if on the beach there is some control activity for water quality, landscape, sand quality, ecosystems, noise levels, air quality, or another monitoring or protection activity. This can be known by checking the information panel of the beach if there is.

- Tributaries: A tributary does not flow directly into a sea or ocean, but it with the main stem river serve to drain the surrounding drainage basin of its surface water and groundwater by leading the water out into an ocean or sea (Pidwirny, 2006). This question allows to identify if there are tributaries, how many of them and where are located.
- Sand Color: Beach sand color is one of the most important components of coastal landscape, this characteristic is determined by the minerals/rock fragments that compose a beach, which are produced within the watershed or by cliff/platform erosion; frequently shelf sediments and bioclasts produced in the marine environment also enter the beach sediment budget (Pranzini et al, 2010). Color of the sand is often described in a subjective and qualitative manner, using non-standardized terminology and leading to noncomparable results in environmental studies which consider this aspect (Pranzini & Vitale, 2011). In this case the scale color of the sand used for this study was the following (**Figure 2**):

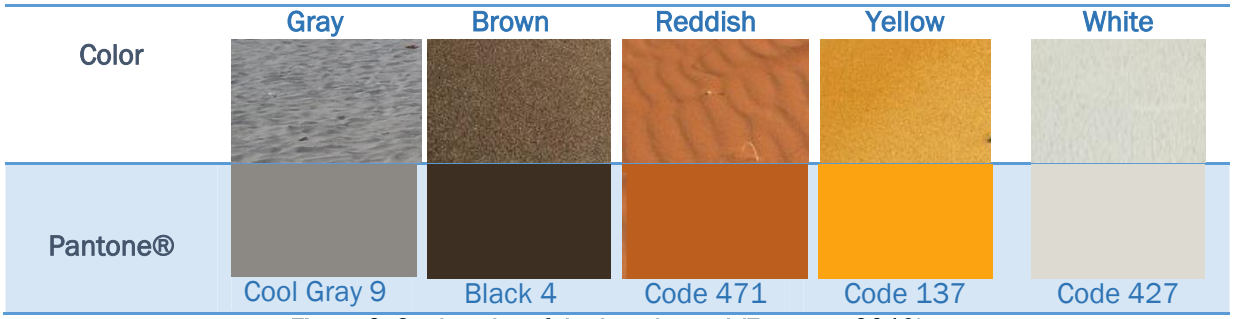


Figure 2. Scale color of the beach sand (Fonseca, 2013).

- Seawater color: refers to the color reflected by seawater, these colors are generally within the range of the blues, but may have combinations with green tones and even brown color, when is affected by wastewater discharges. Each has a "Pantone®" equal on the figure below (**Figure 3**). It has to be chosen only one of the colors found below.

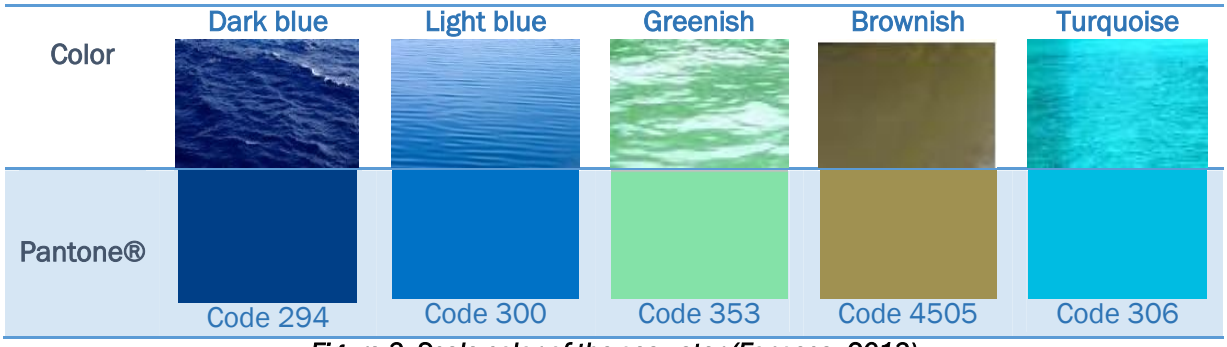


Figure 3. Scale color of the seawater (Fonseca, 2013)

- Vegetation: represents the flora in the beach, located close enough to visually affect beach users (Evrim, 2004). The type of vegetation present can be grass, scrubs, shrubbery and/or big trees.
- Land shape: refers to the degree of undulation of the site, which depends on the natural features and its relief. It can be chosen from the following features (**Figure 4**).

Figure 4. Land shape seen on the beach (Fonseca, 2014)

Section 3. Pollution sources and control

This section seeks information on sources that negatively affect the environment and health of the beach. In this are included:

- Signs of pollution: if on the beach can be seen or listened wastewater spills, solid waste, emissions to air and/or noise.
- Solid waste types: specify the type if there are disposed on the beach solid waste, like plastics, bulky metals, paper and carton, glass, biologic, organics and/or anothers.
- Cans: if on the beach there are some kind of can for solid waste disposal, how many they are, and how well preserved they are.
- Solid waste disposal: how solid waste are disposed along the beach, if accumulated by zones, dispersed by zones or uniformly or there isn't any solid waste at all.
- Noise levels: how high are the levels of noise of is there is no noise at all on the beach.
- Emissions sources: if there is disturbance on air quality where this come from, if by restaurants chimneys, motor boats, vehicles, industries and/or another source.
- Type of wastewater spills: on the sea (maritime area), domestic, from the rain, industrial and/or another.

Section 4. Beach services

This section is intended to assess aspects of compliance services, these refer to the infrastructure and equipment and their condition, as well as the economic activities developed on the beach by people, public institutions and/or private companies, in order to meet the needs of tourists and visitors (Noguera, 2012). Some of the subcategories of this section are the following:

- Services: indicate what kind of services are present on the beach, it can be chosen more than one, and these are cleaning, parking, facilities for

handicap, sanitary facilities, water dispensers, lighting, leisure areas, commerce, shade, chairs, lodgings and/or another.

- Access to the beach: to know if the access to beach is free, controlled or forbidden. There is also important to know how difficult the access is for elders and children.
- Access meanings, if the beach is just reached by boat, car, air, or by foot. It can be indicated more than one mean.
- Facilities for handicaps: if there are facilities for handicap people, specify which kind of facility, such as ramp, wheelchair gateways, Braille information, acoustic signals and/or amphibious wheelchairs
- Leisure activities areas: like bicycles road, sport fields, playground areas and/or others.
- Lighting type: if the lighting service is private, public or is absent.
- Peddlers: indicates if there is presence of peddlers in the beach and allows to know how they are organized (if they are).

Section 5. Risks and Security

In order to assess the safety requirements, this section presents these requirements referring to the physical safety of users, defining guidelines for both surveillance and monitoring of personal protection through police presence, as well as risk management on the beach. Some of the subcategories included in this section are:

- Safety services: identify which kind of these services are present on the beach, such as lifeguards, private vigilance, police and/or coastal guard.
- Organization of safety services: each of the services for safety has a subsection that allows to know what kind of organization they have, like if they are accredited, difficult to identify, have uniforms and so.
- Health and Safety Infrastructures: specify if on the beach there are or not buildings for medical care and safety of the beach users, such as medical center, police station, lifeguard huts and/or coastal guard station.

- Beach restrictions: allows to know if on the beach there are or not implemented restrictions of any type, like pets allowance, camping activities, vehicle entry, boats entry and/or another kind of restriction.
- Natural risks: if the beach is known for risks of dangerous animals, landslides, tsunami, hurricanes and/or other.
- Situations of risk: if there are or not some situations than can put in danger life of the beach users, such as fueling, bathers on forbidden zones, boats on bathing areas, speeding vehicles.
- Social risks: if there are or not social problems like prostitution, beggary or insecurity (robbery, killings, etc.)
- Risk prevention: if there are or not activities for prevent the risks mentioned, like information panels, flags, buoys, bathing schedule.

Section 6. Information and Education on the Beach

This section seeks to assess the level of compliance with information requirements. These requirements evaluate all plans and programs to be carried out at the beach to encourage users in an environmentally responsible behavior and to increase environmental awareness of promoters, workers and visitors, both sporadic and recurrent from the beach. As well as all the criteria for disclosure for the beach. Subcategories are the following:

- Signaling in the beach: to know if there are or not signalized the access, risk zones, prohibitions and restrictions.
- Basic information of the beach: if there are or not beach map, bilingual information, tourist information sites, information on pamphlets, environmental quality information, beach zoning.
- Additional and/or pertinent information: such as code of conduct, safety recommendations, environmental monitoring results, carrying capacity and/or beach characterization.

Section 7. Activities on maritime area

The organization and management of activities in a maritime area is the aim of Maritime Spatial Planning. In order to accomplish this, if necessary to identify the activities and conditions present in the maritime area of the beach analyzed, and this section is the appropriate to achieve that. Subcategories of this section are:

- Maritime uses: the maritime space of the beach is used for transporting passengers on small boats, ferries or even cruiser ships; fishing boats, route of migration of species, pipelines, marine outfall, aquatic sports, offshore or windmill platforms, bathing area, mariculture, conservation and/or another.
- Migration of species: if there are, such as birds, marine mammals, fishes, reptiles, amphibian.
- Small boats type: which kind of small boats are on maritime area, such as passenger boats, yachts, jet ski, kayaks and rowboat, inflatable boats and/or another.
- Big ships and/or naval artifacts: identify which kind of big ships or naval artifacts are or not using the maritime space, such as barges, ships, sailboats, cruiser ships, ferry.

Section 8. Beach Management and Planning

Management requirements are criteria that promote, facilitate or require a better organization on the beach seeking for the sustainable development of the same, through environmental, participatory and/or integrated beach management (Botero, 2008). They can also be interpreted as the way to manage the daily activities taking place in coastal areas, or as the total control of the activities that the institutions or organizations plan on the beach. Subcategories of this section are:

- Beach zoning: if there is or not zoning of beach areas, and if this is implemented or not.

- Active area zoning: according to the Maritime General Direction of Colombia, the active area is the beach fringe next to the shoreline, contiguous to the low tide line that has to be totally free and can have minimum 15 meters of width (DIMAR, 2012). The objective of this subcategory if to identify if there is or not zoning of the different areas like resting area, recreative area and zone for boats.
- Maritime area zoning (DIMAR, 2012): includes bathing area, marine bicycles and kayaks operation zone, safety zone; Jet Ski and boats operation zone; conservation zone.
- Control mechanisms: specify what kind of mechanisms are or not for controlling the maritime area, such as timetables for naval artifacts operation, marine waters use and maritime beaches; and prohibitions for vehicle and boats transit.
- Control mechanisms accomplishment: if there is or not presence of local authorities for controlling maritime areas activities, such as DIMAR, Police, Mayoralty, local committees.

APPENDIX III.

INTERACTION MATRIX OF USES AND ACTIVITIES IDENTIFIED ON THE BEACH

	USE/ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	∑fa	*In*	Type of Relationship
		Urb	SC	Pd	Fishing	Diving	Snork	AqS	Bath	SWR	Facil	Lodg	Playg	PTS	Marsig	Cabot	EqRent			
1	Urbanization		2	1	0	0	0	0	0	-2	0	0	0	0	0	0	0	1	2	Type A
2	Stationary Commerce	2		-2	0	0	0	0	0	-2	2	2	0	0	0	0	0	2	-1	Type B
3	Peddlers	-1	-2		0	0	0	0	0	-2	-1	-1	-2	0	0	0	-2	-11	-7	Type D
4	Fishing	0	0	0		0	0	-2	0	0	0	0	0	0	2	-2	0	-2	0	0
5	Diving	0	0	0	0		-2	-2	-2	0	0	2	0	-2	-1	-2	2	-7	-1	Type D
6	Snorkeling	0	0	0	0	-2		-2	-2	0	0	2	0	-2	-1	-2	2	-7	-1	Type D
7	Aquatic Sports	0	0	0	-2	-2	-2		-2	0	0	1	0	-2	-1	-2	2	-10	-2	Type D
8	Bathing	0	1	1	0	-2	-2	-2		-2	2	2	0	-2	-1	-2	-2	-9	0	0
9	Solid Waste Receptor	-2	-2	-2	0	-1	-1	0	-2		-2	-2	-1	1	0	0	0	-14	0	0
10	Facilities	0	2	1	0	0	0	0	2	-2		2	-2	0	0	0	-2	1	2	Type A
11	Lodging	0	2	1	0	2	2	1	2	-2	2		0	2	0	0	2	14	2	Type A
12	Playground areas	0	0	-2	0	0	0	0	0	-1	-2	0		0	0	0	-2	-7	0	0
13	Passengers Transportation by sea	0	0	0	0	-2	-2	-2	-2	-1	0	2	0		2	-2	0	-7	-2	Type D
14	Maritime Signaling	0	0	0	2	1	1	1	1	0	0	0	0	2		1	0	9	10	Type A
15	local Cabotage	0	0	0	-2	-2	-2	-2	-2	0	0	0	0	-2	-1		0	-13	-2	Type D
16	Equipment Rental	0	0	-2	0	2	2	2	-2	0	-2	2	-2	0	0	0		0	0	0
	∑ca	-1	3	-4	-2	-6	-6	-8	-9	-14	-1	12	-7	-5	-1	-11	0			

Appendix III. Interaction Matrix of Uses and Activities identified on the beach