PREGLEDNI ČLANAK / *REVIEW*

THE ISSUES OF BEACH MANAGEMENT IN CROATIA, WITH EMPHASIS ON ZADAR COUNTY

Pitanja o upravljanju plažama u Hrvatskoj s naglaskom na Zadarsku županiju

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Summary

Beaches are resources that significantly enrich the tourist offer of the countries situated on the seashore, river coasts and lakes. Apart from economic significance, beaches also have recreational importance, and are, therefore, vulnerable to various potentially adverse influences that result from natural or manmade causes which gradually destroy them. That is the reason which explains the importance of defining all the impacts and pressures on the beaches in order to include the beach management in the global and local development strategies that are the result of integrated coastal zone management. In order to use the beach within acceptable limits, as a resource for tourism, while simultaneously supporting the beach ecosystem's biodiversity, various methods of analysis and beach evaluation are being applied recently. The authors of the paper start from the basic definition and classification of the beach as a resource. They give an overview of analysis methods and their evaluation, and provide guidelines and recommendations for the sustainable management of beaches. The importance of education is emphasized to understand and accept the development as a qualitative component as opposed to growth as a quantitative category. The authors analyze the legal framework of beach management in Croatia, with emphasis on Zadar county.

Key words: beach management, biodiversity conservation, beach evaluation, measures and recommendations, Zadar County

Sažetak

Plaže su resursi koji znatno obogaćuju turističku ponudu zemalja smještenih na morskoj obali, na obalama rijeka i jezera. Uz ekonomsko značenje, plaže također imaju rekreacijsku važnost i zato su osjetljive na različite potencijalno negativne utjecaje što proizlaze iz uzroka koji su ili prirodni ili su izazvani ljudskom djelatnošću, a koji ih postupno

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uništavaju. Iz tog se razloga objašnjava važnost definiranja utjecaja i pritisaka na plaže kako bi se upravljanje plažama uključilo u globalne i lokalne razvojne strategije, koji su rezultat integriranog upravljanja obalnom zonom. Da bi se upotrijebile plaže s prihvatljivim limitima, kao resursi za turizam, a i istovremeno podržavajući bioraznolikost ekosustava plaža, različite metode analize evaluacije plaže primjenjuju se u novije vrijeme.

Autori članka počinju osnovnom definicijom i klasifikacijom plaže kao resursa. Daju pregled metoda analize i njihovu evaluaciju te pružaju smjernice i preporuke za održivo upravljanje plažama. Naglašena je važnost obrazovanja da bi se razumio i prihvatio razvoj kao kvalitativna komponenta suprotna rastu kao kvantitativnoj kategoriji. Autori analiziraju pravni okvir upravljanja plažama u Hrvatskoj s naglaskom na Zadarskoj županiji.

Ključne riječi: upravljanje plažama, očuvanje biološke raznolikosti, vrednovanje plaža, mjere i preporuke, Zadarska županija.

INTRODUCTION / *Uvod*

Croatia, as a tourist country has to encourage and develop sustainable design solutions and services on the beaches as valuable resources. The administrative division of Croatia into counties defines beach management authority on a smaller geographical area. Therefore, inter-county beach management practices may differ, but in essence they must meet the criteria of integrated coastal zone management, and positive law regulations in Croatia. Beach management is usually carried out through the institute of concessions, in accordance with maritime domain management plans at the county level. The aim of this paper is to show the importance of beach management by establishing a balance between preserving the natural values of beaches and ensuring sustainable use of their development (recreational) potential. In this regard, the purpose of this study is to assess the possibilities and limits of efficient and sustainable beach management in Croatia.

DEFINING THE ISSUES / *Definiranje problema*

In order to elaborate on the issues of beach management, it is important to point out different classifications and a number of definitions as well as the importance of the beach as a resource.

Beach Type Classification / *Definiranje i razvrstaj plaža*

Many authors define the beach by content or conceptually, so one of the definitions states that the beach represents:[1]

„The zone of unconsolidated material that extends landward from the low water line to the place where there is marked change in material or physiographic form, or to the line of permanent vegetation (usually the effective limit of storm waves). The seaward limit of a beach unless otherwise specified is the mean low water line."

The beach may also be defined in relation to a wide range of natural and manmade determinants which, inter alia, include:[1]

- **Physical Oceanography** (primarily related to the impact of the waves), which, as the two extremes of a broad spectrum, leads to a dissipative (high energy) or reflective (low energy) beach.

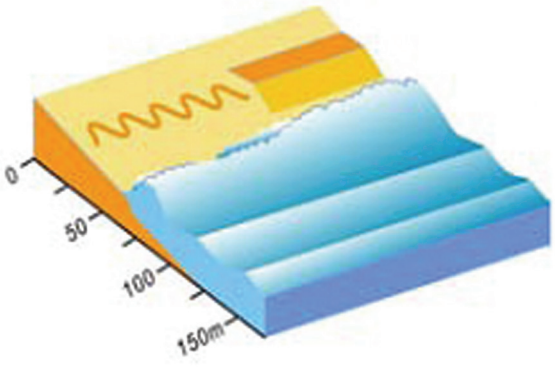

Figure 1 Reflective beach

Slika 1. Zrcalna plaža

Source: www.naturalhazards.net.nz, 08th June, 2011

[1] Group of authors, *Beach Management Manual (second Edition)*, CIRIA,2010

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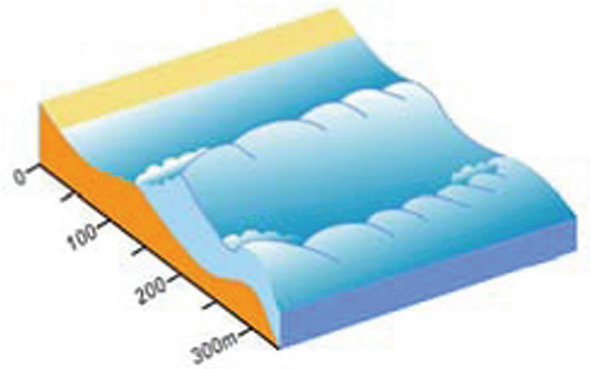

Figure 2 Dissipative beach
Sika 2. Rasprostranjena plaža

Source: www.naturalhazards.net.nz, 08th June, 2011

- **The composition of the material**, whereby the beach can be defined as a muddy beach, sand, gravel beach, or a mixture thereof.
- **Beach sediment color** is often used to describe different types of beaches. For example, there is the white coral beach, black volcanic sand, white pebble beach, etc.
- **According to their form** beaches may be *linear, pocket* (Figure 3), *curved* (Figure 4), etc., reflecting different types of beaches on the basis of their shape.

Figure 3 Pocket beach type
Slika 3. Tip plaže oblika džepa

Source: http://www.ask.com/wiki/Slieve_League

Figure 4 Curved beach type
Slika 4. Tip zakrivljene plaže

Source: www.enjoygower.com/beaches

- Stability, as an entry / loss function of materials. Approximately two thirds of beaches retreat and others show signs of growth or stability. In the context, types of beaches can be defined as *growing, stable* and *erosive.*

In relation to the anthropogenic dimension, the type of beach can be determined by three fundamental criteria:

- The level of naturalness (*natural, artificial* or beaches with *applied nourishment*)
- The level of utilization (*intensive*, *moderate and little used beach*)
- Beach surrounding and services offered (*remote, rural, local, urban or resort beach within the tourist complex*).

There are very few papers devoted to beaches in the legal literature of the Republic of Croatia[2]. Nevertheless several authors shall be mentioned in this paper.
According to Anic, the beach is "the area along the shore, river or lake, especially adapted for swimming"[3]. Beaches along the rivers and lakes are distinguished from sea beaches primarily by the fact that they may be in the property regime which is contrary to the beaches along the seashore that fall within the maritime domain. Maritime domain is a common good which means that it is not and cannot be in a regime of ownership and belongs to goods outside commerce (res extra

[2] Capar, R.: Trebaju li nam propisi o plažama, Pomorski zbornik No. 38, Rijeka, 2000.
[3] Anić, V.: Rječnik hrvatskoga jezika, Third, Extended Edition, Novi Liber, Zagreb 1998. page 768.

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commercial).[4]

Different definitions of beaches can be found in the decisions regarding the adoption of spatial plans, as a result of failure to deliver clear and unambiguous rules by the competent authorities. Regarding the types of beaches, they can be divided according to the following criteria:

• origin

o Natural – beaches with natural origin, i.e. beaches formed by natural processes without being influenced by man's actions on their forming or arrangement.

o Artificial - beaches that originate or are arranged by human activity so that they more or less fit into the natural environment.

• level of their arrangement

o unarranged - natural or artificial beaches that have no additional content that users would use on the beach

o semi arranged beaches are only partly equipped with facilities used by customers in a broad sense

o arranged - beaches that are equipped with amenities such as restrooms, showers, changing rooms, beach props (chairs, umbrellas, sports equipment, etc.), and other[5]

• purpose

o open - beaches that are accessible to all users equally and do not require special access permits or payment of tickets

o semi open beaches - access is limited to certain categories of users or only part of the users has to pay the ticket. For example, *hotel, hospital (medical)*, etc. as well as beaches for patients in a hospital facility, beaches for hotel guests, beaches for the users of the camp, nudist beaches, etc. Access to these beaches is permitted to everyone else who fulfills certain conditions, such as paying the tickets or agreeing to the nudist swim. *Or arranged for the use of persons with special needs.*

o closed - beaches that permit access only to certain categories of users, and besides them no one else under any circumstances has the right to use them.

• beach access

o accessible from land and sea - that can be freely accessed.

o accessible from sea only – that cannot be accessible from the land side because of the terrain and lush vegetation, which is characteristic of Croatian islands.

• possibility of arriving by means of transportation

o accessible by land transportation – which includes a passenger car, motorcycle or bicycle.

o accessible by vessels - should be available on all beaches except in rare cases, but not all beaches possess the berthing ability for vessels to moor directly at the beach.

o accessible without the means of land or maritime transport - some beaches have such a configuration that provides access only to individuals without the use of any means of transportation.

The Beach as a Resource / *Plaža kao resurs*

Resources are considered to be "... funds, possibilities, stocks, reserves, sources, natural resources ...." There are different aspects of the beach as a resource:

- The beach as a natural resource. Sandy beaches or sandbanks are different forms of the same material, which together form an extremely flexible and efficient system, specially developed to absorb the force of the sea. This combination is one of the best forms of coastal protection because of its natural ability to act in compliance with coastal processes, producing or storing coastal sediment. However, in the past (even recently) it was not always recognized - beaches were devastated in many ways: building houses, golf courses, military installations, etc. Such constructions destroy beaches and sandbanks, which inevitably threatens the capital investments in the area near the sea.
- The beach as a social resource. Mutual interaction of man and the beach in the past was known as the only access to the sea, which was primarily used for fishing and trade, and later for transport. Expanding the road and other transport networks has resulted in a large and relatively rapid increase in construction of residential buildings along the edge of the coast, visibly manifest by mass tourism in early 1940-s. By introducing the concept of integrated coastal management in California in 1972, the beaches started to be considered more as valuable social-economic, and ecological national resources. From the social point of view, effective management of the

[4] see Kundih, B.: Hrvatsko pomorsko dobro u teoriji i praksi, Croatian Hydrographic Institute, Split, 2005., Vojković, G.: Pomorsko dobro i koncesije, Croatian Hydrographic Institute, Split, 2003.

[5] example from Monte Negro, Pravilnik o uslovima koje moraju ispunjavati uređena i izgrađena kupališta (Republic of Monte Negro, No. 63/02-see alsowww.morskodobro.com/orgplaza.php), see regulation in Anex III

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swimming area results in creating a safer recreational environment (ensuring a clean environment, lifeguard, first aid, etc.).

- The beach as an economic / recreational resource. The beaches are definitely the main focus of global tourism and are generally considered the main factor of the tourism market. Therefore, depending on the organizational structure of the beach, there are various financial sources for managing the beaches. The financing of environmental protection is based on the principles "polluter pays" or "user pays". In addition to charging the entrance to the beach, the funds are also provided through the rental of beach facilities, parking fees, as well as the compensation for economic activities on the beach.

PRESSURES AND IMPACTS ON THE BEACHES / *Pritisci i utjecaji na plaže*

Nowadays the sea coasts as well as the beach are threatened by:

- urban industrialization,
- proliferation of apartments and tourist development,
- (il)legal devastation of the coast in the form of filling, concretizing and other manmade activity.

A number of authors identified the following pressures that are leading to environmental degradation of beach systems[6]:

- **Recreation,** including off road vehicles, trampling (walking), sunbathing, swimming, equestrian use, camping (on beaches and dunes),
- **Pollution,** including sewage and storm-water discharge, beach litter, eutrophication (harmful algal blooms), thermal pollution, oil and other chemicals,
- **Coastal development,** including construction (housing, infrastructure, roads, etc.) and engineering works (seawalls, revetments, breakwaters, etc.),
- **Ecologically harmful beach management,** including inadequate cleaning, nourishment, filling and armoring,
- **Resource exploitation,** including fisheries, mining, etc.,
- **Climate change,** including sea level rise.

Destruction and loss of habitat is one of the problems that threaten the fauna. Such an example can be seen east of the city of Antalya in Turkey on the beach of Cirali, which is one of the most important nesting grounds of loggerhead sea turtles (Caretta caretta). The mere presence of these turtles is an indicator of sea water purity. Turtles swim thousands of miles to return to this very beach, and make their nests. Therefore, the mass tourism that develops at this particular site and concreting of the coast present a serious threat to this species.

Another problem is the removal of nutrients from the beach, such as algae Posidonia oceanica, which is the main source of carbon for sandy beach macrofauna community. Tourists (and swimmers) do not appreciate the ecological role of seaweed on the beaches, so it is often removed from the beach. Farmers in the past (even in ancient time) on the shores of the Mediterranean traditionally used seaweed as compost because of its large content of carbon, nitrogen and phosphorus. Desalination of this plant did not present technical problems because a simple rinsing would cleanse it almost entirely of chloride.

The impact of coastal erosion or growth is not limited to morphological changes, it is responsible for the profound impacts, often enriched, ecological groups that are identified with the coastal environment, for example through direct degradation / destruction and / or indirect impacts which arise due to salt water intrusion, compaction of coastal habitat, etc. Nourishment or filling the beach with certain material is increasingly used as a suitable mild form of intervention on the beach, which tends to solve the problem of beach erosion. One of the latest, innovative approaches in addressing coastal erosion is so called “Ecoplage principle”, which consists of drainage systems, pumping stations and drainage pipes installed beneath the surface.

Furthermore the problem of environmental disruption of the beach includes the destruction of sandy dune vegetation and litter on the beach (Figure 5).

Figure 5 Cleaning action of the bay Siroka on the island of Ist

Slika 5. Akcija čišćenja zaljeva Široka na otoku Istu

Source: Photo taken by author

[6] Defeo, O., McLachlan, A., Schoeman, D.S., Schlacher, T.A., Dugan, J., Jones, A., Lastra, M. I F. Scapini (2009.). Threats to sandy beach ecosystem: A review. *Estuarine, Coastal and Shelf Science*. 81, pp 1-12.

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ANALYSIS METHODS AND VALORISATION OF THE BEACHES / *Metode analize i vrednovanja plaža*

There are numerous beach evaluation and analysis methods. This chapter provides the description of the Bare methodology and functional analysis of the environment used to evaluate the natural resources and their recreational potential of the areas.

Methodology / *Metodologija*

BARE is a relatively new methodology which has been often applied since 2001 to a wider Euro-Mediterranean area. Regional Activity Centre of the priority action (PAP / RAC) in Split, as part of its program of integrated coastal management in 2004 conducted research of beaches using the BARE methodology in several Mediterranean countries, among others, in Croatia, Malta, Tunisia, Turkey and Spain.

By using the Bathing Area Registration and Evaluation System (BARE) during 2005 and 2006 a large number of Croatian beaches were evaluated, but this process was never completed. The evaluation process is carried out simultaneously with implementation of cartographic representation project of beaches. The expectations show that the future database will contain the classification data of each individual beach.

The Croatian research included the evaluation of Splitsko-Dalmatinska and Dubrovacko-Neretvanska County beaches in cooperation with the Sunce Association. Meanwhile, PAP / RAC started to create guidelines for BARE evaluation system application, which would be applied throughout the Mediterranean.[7] Beach evaluation was conducted in other counties as well. The BARE methodology classifies each beach into one of five possible categories: *remote* (so called wild, hardly accessible beaches), *rural* (the beach outside the settlements), *village* (in smaller settlements), *urban* (urban settlements) and *resort* (beaches in tourist complexes). All evaluation criteria do not apply to all types of beaches; more precisely, *rural* and *remote* beaches are evaluated **based on the quality of bathing water, beauty of the landscape and cleanliness of the beach, while other types of beaches apply all the criteria.** Taking into account the type of beach and these criteria, beaches are rated on a scale of one to five stars. The criteria in the order of importance relate to: security aspects, water quality, supporting content, layout of bathing areas and waste disposal. Five different types of beaches were analyzed and evaluated according to the proposed technique, which rated the beaches with one to five stars. The project was implemented in two phases.

Assessment procedures and beach award systems (e.g. Blue Flag, etc.) are usually focused on one or a few elements of interest to swimmers or completely ignore the nature of different types of beaches and requirements that should satisfy a certain type of beach. In order to evaluate the beaches in Croatia objectively and applicably, some authors proposed basic criteria for the assessment of beaches[8]:

- safety,
- quality of sea water,
- features (equipment),
- location and landscape context (urban settlement, island, etc.), and
- Communal waste management (organized waste disposal).

Previous research in Croatia has shown that these criteria are usually the most important among tourists.

Functional Analysis of the Environment / *Funkcionalna analiza okoliša*

Determining the economic - ecological values (expressed in monetary unit) is very difficult to achieve, so there are a number of alternative approaches for assessing the natural values and recreational potential of the area. One such approach is the functional analysis of the environment.[9] It includes natural features of the environment and their ability to supply resources from the environment itself (i.e. the function of the environment), and can be used as a tool for planning and decision making. The assessment methodology includes 4 steps:

1. Defining the boundaries of the area,
2. Identification of characteristic parameters of subjective environment that describe and distinguish ecological and socio-economic components of the environment,
3. Evaluation of characteristic parameters identified through the use of key indicators, and
4. Comparison of natural values and recreational potentials in order to determine the quality of the environment and its sustainable development strategy.

[7] for detailed description see www.mzopu.hr/doc/izvjesce_kakvoca_mora_2006.pdf

[8] Kovačić, M.; Favro, S.; Perišić, M.: The Issue of Coastal Zone Management in Croatia - Beach Management, Tourism&Innovation Journal, Year 3, No.1-2, July 2010, ISSN 1855-3303, recenzirano.

[9] Cendrero, A.. i D.W. Fischer (1997.). A procedure for assessing the environmental quality of coastal areas for Planning and management. *Journal of Coastal Research.* 13, page 732-744.

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The World Tourism Organization defines carrying capacity as *''the maximum number of people who can simultaneously visit a tourist destination without causing the destruction of its physical, economic and socio - cultural environment and unacceptable reduction in the quality of visitor satisfaction''.*

Further, some authors differentiate[10]:

- Physical carrying capacity - a threshold beyond which a certain number of people cause damage to the natural and cultural heritage of a destination
- Ecological carrying capacity - the number of people that the beach ecosystem can bear so that the rate of extinction of species does not exceed the rate of their formation
- Social carrying capacity - the concentration of people beyond which the beach users begin to feel uncomfortable because of overcrowding
- Institutional carrying capacity - the maximum number of visitors which can be adequately managed in a certain area.

BEACH MANAGEMENT / *Upravljanje plažama*

Certain authors[11] define beach management as a process of managing a beach:

„whether by monitoring, simple intervention, recycling, recharge, the construction or maintenance of beach control structures or by some combination of these techniques, in a way that reflects an acceptable compromise in the light of available finance, between the various coastal defense, nature conservation, public amenity and industrial objectives.“

Effective management of the beach enhances the biological function of the coastal zone (through increased biodiversity, management of sandbanks and non-mechanical beach cleaning), a positive effect on the socio-economic structure of the beach environment, and allows greater effect as a result of well planned and executed beach management, especially in urban and resort beaches through the sustainable use of the beach, reduced maintenance costs and renewal as a result of deliberate management of the beach oriented to prevent degradation of the environment and improving the protection of the coast from (natural) disasters (providing high-efficiency natural protection from the effects storms), good beach management contributes not only to the physical protection of the coast but also to achieving the general objectives of integrated coastal zone management.

[10] Group of authors, Sustainable Beach Management in Croatia, Guidelines and Priority Actions, CRA/PPA

[11] Simm, J.D., Beech, N.W. i S. John (1995.). A Manual for Beach Management.(U): *Proceedings of Conferenceon Coastal Management'95 Putting Policy into Practice.* Institution of Civil Engineers, Bournemouth, Thomas Telford, U.K. pp 143-162.

The Legal Aspect of Beach Management in Croatia / *Zakonodavni aspekt upravljanja plažama u Hrvatskoj*

Coastal zone management as a complete unit is not fully covered by any law except the Legal Provision on the Protected Coastal Area (ZOP). The most important legal acts for the protection of the Croatian coast are: the Physical Planning and Construction Act (Official Gazette 76/07, 38/09), the Nature Protection Act (OG 70/05, 139/08, 57/11), the Environmental Protection Act (OG 110/07), Maritime Domain and Seaports Act (OG 158/03, 141/06, 38/09) and the Islands Act (OG 34/99, 32/02, 33/06). The Environmental Protection Act and related bylaws ensure that land management (including coastal areas) is carried out by taking into account environmental protection. Furthermore, the Environmental Protection Act defines the concept of integrated coastal zone management (ICZM) as:

„a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land ports .“ (Article 24)

According to the Environmental Protection Act, the Directive 2006/07/EZ of the European Parliament and the Council on the management of bathing water, the Guidelines on the quality of bathing waters of the Mediterranean Action Plan (MAP) and the Guidelines on the safety of water intended for swimming and recreation of the World Health Organization (WHO), the Regulation on Quality Standards at Sea Beaches (OG 33/96) entered into force which accurately defines the chemical elements allowed in bathing areas.

Sea bathing management measures were established, whose implementation is ensured by the competent counties, and whose conduct is coordinated by the Ministry of Environmental Protection, Physical Planning and Construction. Based on the results of monitoring the quality of the water, an individual, annual and final evaluation is determined, according to threshold values of microbiological parameters.

In Zadar County during the 2010 season, 93 points of inquiry were sampled, as well as during the 2009 season, and a total of 924 samples taken, of which

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893 (96.64%) samples were evaluated with the grade *excellent,* 22 (2.38%) samples with grade good, and 9 (0,97%) samples with the grade *sufficient.* None of the samples was evaluated with the grade *poor.*

In accordance with the implementation of the Regulation on the Quality of Bathing Water, the Ministry of Environment, Physical Planning and Construction (MEPPPC), established a database for entering, processing, data evaluation, reporting and informing the public about the quality of bathing water at beaches on the Croatian Adriatic Sea. The base is an integral part of the Database and indicators of marine environment, aquaculture and fisheries of Environmental Protection Agency.

MEPPPC has developed a bilingual web browser in order to inform the public[12]. The browser enables the view of collected data from the sampling locations, real time sea water quality evaluations during the season, information on hydrological and meteorological conditions on the day of sampling, and information about sudden and short-term pollution. Sea bathing water quality evaluations in the browser are visible on Google maps backgrounds, and besides the sea water quality it is possible to obtain information about the beach facilities, the main features, see photos of beaches, provide comments for each beach, and propose new sampling locations.

Other provisions related to the prevention and control of environmental pollution are: Regulation of the environmental impact assessment (OG 67/09), Decree on Strategic Environmental Assessment of the Impact of Plans and Programmes (OG 64/08), Regulation on Informing and Participation of Interested Public in Environmental Protection Matters (OG 64/08), the National Environmental Strategy (OG 46/02), National Environmental Action Plan (OG 46/02), and the Strategy of Sustainable Development of the Republic of Croatia (OG 30/09).

Maritime Domain and Seaports Act (Article 3 and 4, OG 158/03, 141/06) defines the maritime domain where the term seashore describes in this context only onshore maritime domain, i.e. land components of the maritime domain, and therefore defines that the sea shore:

„extends from the middle line of higher high water level of the sea and includes the belt of land that is limited to a line that is reached by the largest storm waves, as well as the part of the land, which by their nature or purpose is being used for maritime transport and sea fishing, and for other purposes related with the use of the sea and wide at least six meters horizontally from the line of mean higher high water level."

The Physical Planning and Construction Act (OG 76/07) defines a **Protected Coastal Area** (PCA), and includes all islands and the continental belt up to 1000 meters and 300 meters from the sea. Regulation on the Procedure for Granting Concessions on the Maritime Domain defines:

1. Organized public beaches,
2. Organized special beaches and
3. Natural beaches.

Practice of Beach Management in Croatia / *Praksa upravljanja plažama u Hrvatskoj*

The value of the beach as a resource in Croatia is recognized not only from an anthropogenic dimension, but is also essential for the functioning of the entire coastal ecosystem. Beaches, especially sand beaches, are very important coastal habitats.

The beach can also be seen as an important economic resource that generates significant revenue. The Croatian Bureau of Statistics shows that income from tourism in 2007 amounted to 6.2 billion euros, and has been increasing ever since.

Economic instruments, such as beach entrance charges, etc. are not yet fully developed in Croatia. Thus, the most famous beach in Croatia, Zlatni Rat on the island of Brac achieved annual revenue of 4,380,000 HRK (€700,000) in the year of 2008. These revenues minimally increased in 2009 and 2010. The annual expenditure for the concession amounted to 1,103,305 HRK (€ 150.000), and the beach included 30 employees.

Other beaches generate revenues as well, but there is still resistance in the minds of people about the economic use and sustainable management of beaches.

Currently Croatia does not possess a comprehensive program for managing the beaches. The only active initiative is the Blue Flag program, which is oriented to the beach as a recreational zone. As a signatory to the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, Croatia is one of the first countries in the Mediterranean which began to conduct a systematic sea quality monitoring program (since 1989).

Some of the beaches are, because of their exceptional natural value, protected as important natural areas. For example, these beaches are Sakarun (Dugi Otok) in Zadar County, Saplunara (on the island Mljet) and Prapratna (peninsula - important landscapes); Stiniva and Zlatni rat - monuments of nature; Neretva River delta - ichtyological-ornithological reserve, etc.

[12] Source: www.mzopu.hr, http://www.izor.hr/kakvoca/ and http://www.izor.hr/bathing/, 08th June, 2011.

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Management of these beaches, as well as valuable coastal natural areas, (formally) is entrusted to county public institutions which manage the protected natural areas. However, these institutions are often not fully able to implement the measures necessary to manage those parts of nature, and only because these institutions are usually financially and technically (including lack of staff) under-capacitated, together with the problem of overlapping jurisdiction, especially in managing beach areas, as part of the maritime domain. Public institutions are, under the Nature Protection Act, designated as the competent institutions for the management of protected natural areas. However, according to the Maritime Domain and Seaports Act it is stipulated that the maritime domain (on behalf of the Republic of Croatia) be managed by the counties.

However, the legislature does not clearly define the authority and responsibility in cases when an area is simultaneously a part of the maritime domain and protected part of nature. This leads to a situation in which public institutions have a responsibility over such areas, but not real jurisdiction. Thus, public institutions cannot grant a concession for the area (because it is the responsibility of county), and cannot control the granting of concessions for the (beach) area nor the terms of use of these areas. One initiative that has successfully solved the problem of jurisdiction is an initiative of the Public Institution for the Management of Protected Natural Areas of Zadar County, which has requested a concession over a part of the bay of Sakarun (Figure 6) on the island Dugi Otok in order to set the anchoring buoys, with the main goal of protecting the algae Posidonia oceanica. By the decision of the Zadar county's executive government the concession was granted for a period of five years at a symbolic price of 0,07 Euros per square meter (that is, with respect to the surface of 7,200 square meters, 490 Euros per year). By this action a public institution established management in an area over which it previously had only formal competence.

Figure 6 Beach Sakarun on Dugi Otok
Slika 6. Plaža Sakarun na Dugom Otoku

Source: http://www.057info.hr/vijesti/2010-12-07/, 09th June, 2011.

Zadar County / *Zadarska županija*

Zadar County has a coastline length of about 1350 km (about 22% of the total Croatian coastline), over 3600 square kilometers of water surface area, more than 120 islands and archipelagos. With regard to development risks and challenges associated with coastal areas, Zadar County implemented the process of Integrated Coastal Zone Management (ICZM), which includes a comprehensive assessment, goal setting, planning and management of coastal systems and resources, thus representing a living and continuous process to achieve sustainable development. As a professional basis for initiating a process of ICZM in Zadar County, a Study on Exploitation and Protection of the Sea and Underwater Areas of Zadar County was completed in 2003, which became the first step in establishing the ICZM process. The Programme for Monitoring the Environmental Indicators and Pollution of Coastal and Marine Areas of Zadar County was drafted and adopted in 2005, as the main program, together with the Environmental Monitoring Program for the Area of Aquaculture in Zadar County, functioning as a segment or the primary sector subprogram of the main program.

Project COAST - "Conservation and Sustainable Use of Biodiversity in the Dalmatian Coast through the Green Coastal Development" has been actively implemented in the area of Dalmatia, including in Zadar County since 2007. The overall aim of the COAST Project is to influence effectively the business activities and practices in tourism, agriculture, fisheries and aquaculture in the four Dalmatian counties and influence the banking sector in order for them to include sustainable resource use and protection of biodiversity in their practices.

The project ensured, as part of the conservation and

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sustainable use of biodiversity through a partnership with Zadar County and other institutions, easier mapping of the southeastern part of the island of Pag; mapping of flora, fauna and habitats of Dalmatia with the priority areas; the defining of fishing resources and recommendations for sustainable fishing in the central Adriatic.

Developmental problems in Zadar County refer to illegal construction, illegal disposal of waste, drying the Bokanjačko blato Lake and Nadinsko blato Lake out near Posedarje, while on the other side the development needs refer to sustainable tourism, development and implementation of action plans. In the field of sea protection, developmental problems are referred to the lack of equipment for wastewater treatment and water pollution equipment, while the developmental needs refer to establishing a sea and sea pressures monitoring system, along with reducing land-based marine pollution.

One of the national parks (Paklenica) is situated in the area of Zadar County, which was declared as national park because of its exceptional geomorphologic characteristics, such as the canyons of Velika and Mala Paklenica, and the natural wealth of fauna and flora, which emphasize a high degree of endemism. Velebit Nature Park is part of Zadar County as well. Telascica Nature Park occupies the southeastern part of Dugi Otok with associated islands and part of sea water area situated within Zadar County. Lake Vrana Nature Park is located northeast of the town of Biograd. Population disproportion in the hinterland and on the coast / islands and depopulation, i.e. the negative demographic trend is one of the problems of Zadar County. The current Regional Operational Programme emphasizes, among other things, the implementation of specific measures of improving tourism development (especially rural and island), environmental and cultural heritage. All measures are subject to monitoring by which the County Development Agency collects and rationalizes data.

Data of the Croatian Bureau of Statistics indicate that Zadar County was visited by a total number of 971.092 guests in 2010, which is 8,6 % more than the year before, thus realizing 6.223.824 overnight stays, or 7 % more than in year 2009. Foreigners realized 5.312.335 overnight stays, while 911.489 overnight stays were realized by domestic visitors.

In order to achieve an acceptable balance between the use of beaches and cultural heritage and environmental preservation, Zadar County enables the investors to perform specific operations on the arrangement of the beach: renaturalisation (restoring the beach to the natural state that was previously damaged by interventions), recovery (improvement of beaches that were previously damaged by interventions), and *the arrangement of morphologically unchanged parts of the beach* which includes the certain specified range of interventions (such as filling, construction of trails, installation of pontoons, etc.) which can be realized by the investor, but based on the previously approved conceptual design.

MEASURES AND RECOMMENDATIONS / *Mjere i preporuke*

Beach management in Croatia has been entrusted to the regional and local governments, which more or less successfully understand and accept the development in accordance with the nature and growing demands of tourists. The function of beach management and decision-making about how to treat beaches is very important, but it is not effective in public administration in Croatia due to the excessive number of hierarchical levels.[13] Growing tourist demand for destinations that are rich in natural beauty and plenty of good offers requires public administration to use a holistic approach to beach management.

The effectiveness of managing the beaches as part of the maritime domain in public administration depends on the skills and abilities of management and employees as well as the knowledge of the public administration system and environment. Management must increasingly be the carrier of the communication processes and encourage the use of information technology.

Sustainable beach management requires clearly defined short-term objectives within the framework of long-term objectives of sustainable development. The following measures are necessary for their implementation::

- continuously provide safe swimming for visitors and local residents,
- determine the limits of ecological carrying capacity,
- determine the limits of social carrying capacity,
- ensure the respect of physical carrying capacity,
- set up the proper recreational facilities on the beach, provide sanitary conditions, etc.

At the regional level is particularly important to define an appropriate action plan in order to achieve the active management of beach resources. To implement the

[13] Kovačić, M.; Gržetić, Z.; Seršić, V.: Role and Importance of Public Administration Management with the Purpose of Integral Management of Maritime Estate. // 27th International Conference on Organizational Science Development. „Knowledge for Sustainable Development" 27 (2008.); Portorož, 1197-1202.

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Action Plan, it is necessary to establish a specialized agency for beach management. The Action Plan is defined for a short period of three years. Therefore, the Agency is responsible for defining and implementing a strategy for beach management. The Agency takes care of the maintenance of all beach facilities and carries out appropriate economic criteria for beach utilization. The Agency may initially act as a public institution. But in the long term, the agency should become self-sufficient and operate on the market.

CONCLUSION / *Zaključak*

Sustainable beach management should be included in the wider coastal zone management programs. One of these processes by which sustainable coastal management is achieved, is the integrated management of coastal areas. Croatia has a large number of beaches, but the exact number has not yet been determined. For those beaches with known information, the facts indicate that one third of the beaches do not have identified areas for zoning as one of the cornerstones of safety on the beaches, while more than a quarter of the beaches do not have posted sea water quality information, and more than one quarter have no beach rescue service (or facilities). In the process of sustainable beach management, regional center PAP / RAC has a great importance which promotes a holistic approach and sets the guidelines for better understanding of beach resources management.

For Croatia, it is important that the public administration as soon as possible see the importance and accepts the measures and recommendations for management of beach resources in order to conserve biological diversity, the beach as a social, recreational and economic resource.

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