

Organization of the Center for Adriatic Biodiversity Conservation: “Aquarium Boka” in Institute of Marine Biology, Kotor, Montenegro



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Abstract The Center for Adriatic Biodiversity Conservation “Aquarium Boka” is established in 2020 as organizational unit of the Institute of Marine Biology, Kotor, Montenegro with two subunits: marine aquarium and rescue center. The aquarium is designed as first Montenegrin public aquarium and conservation advocacy center. Its mission is to be a catalyst for global sustainability through promoting and practicing effective conservation on behalf of the Adriatic Sea’s wildlife. Exhibit philosophy of the Aquarium Boka is developed to be mission-driven, message-driven, and visitor-driven and follows “community concept” type of display with 16 theme tanks grouped in four sections: Entrance section – exhibiting the World Sea and Mediterranean Sea life, Central section – exhibiting the Adriatic Sea biodiversity, Special section – exhibiting the Boka Kotorska Bay sea life, and Exit section – exhibiting tropical seas life. A flagship species was considered as an important support for conservation activities, promoting public awareness and raising funds for

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conservation. John Dory (*Zeus faber*) is selected as flagship species of the Aquarium Boka. The services of the Aquarium Boka are grouped into three clusters: research, education, and conservation. The Aquarium Boka is designed and set to move people to act on behalf of the marine species we seek to protect. The Rescue center is designed with four main roles: (1) Animal welfare: short-term shelter, care and rehabilitation center with the goal of finding a more suitable placement of threatened species for longer term stay elsewhere; (2) Law enforcement: receiving confiscated animals, providing expert testimony, helping the police, customs, and wildlife authorities pursue the prosecution of traffickers and animal abusers; (3) Raising awareness; and (4) Nature conservation and biodiversity.

Keywords Adriatic Sea, Aquarium, Aquarium mission, Conservation, Kotor, Marine biodiversity, Montenegro

1 Background

The Institute of Marine Biology was founded in 1961 with the aim of studying and protecting the Boka Kotorska Bay and the Adriatic Sea, with particular emphasis on its southern part, which is well known as unique environment [1] and one of the global centers of marine biodiversity [2]. Through decades of successful work, the Institute has had excellent cooperation with numerous universities from the region and Europe, through research projects, exchange of scientists and the student's visiting programs through which the latest scientific knowledge in marine sciences was presented.

During the continuous scientific work in the field of marine biology, the idea of establishing an Aquarium at the Institute or in Kotor often spread, as the scientists from the Institute at that time had good knowledge in aquaristics. The first such proposal originated in 1975 [3], when it was proposed to set-up an aquarium within the walls of the Old Town of Kotor, using the experience of the aquarium in Dubrovnik, Croatia. There were also attempts to build an aquarium in the Institute, or in other cities at the Montenegrin coast (personal communication), but one main reason would always be the lack of financial resources.

In 2017, the Institute was granted by the Norwegian Ministry of Foreign Affairs to implement a project "Marine Biodiversity Conservation Center Boka Aquarium – MonteAqua." The project is under implementation till October 2020. One of the main activities of the project is reconstruction of about 300 m² of the ground floor in the Institute of Marine Biology (Fig. 1) and setting-up the infrastructural preconditions to host the Center for Adriatic Biodiversity Conservation – "Aquarium Boka." Funds are also allocated for purchasing the aquarium equipment. In 2019, the Ministry of Agriculture and Rural Development of Montenegro, through the World Bank loan for implementation of the Second Institutional Development and



Fig. 1 Institute of Marine Biology in Kotor (in the middle, on the small cape) – photo by University of Montenegro

Agriculture Strengthening Project – MIDAS 2, allocated additional funds for the procurement of aquarium equipment.

An executive project for the adaptation of the ground floor in the Institute is developed by architectural studio Enforma from Kotor, Montenegro. Reconstruction works were done by the company LD Gradnja from Nikšić, Montenegro. Specialized Italian company Panaque is delivering and assembling the aquarium tanks with all associated equipment [4]. It is expected that reconstruction and assembling works will be finalized by October 2020.

2 Concept Design

Concept design of the Center for Adriatic biodiversity protection “Aquarium Boka” is developed by [5], envisages it as organizational unit of the Institute, following extensive discussion with the Institute top management. Concept design acknowledges the state of the art approach and mission of aquaria, as presented by [6]. Instead of “taxonomic concept” of displaying specimens, a “community concept” type of display is developed. It envisages 16 theme tanks: (1) Mediterranean rare fish; (2) Flagship species; (3) Invasive species (splash tank); (4) Allochthonous algae and invertebrates; (5) Shallow littoral; (6) Mid littoral; (7) Deep littoral; (8, 9) Endangered species; (10) Mediterranean moray; (11) Sharks and rays; (12) Boka Kotorska Bay (touch tank); (13) “Vrulja” (underwater spring); (14) Tropical corals; (15, 16) Invasive species and tropical fish.

Theme tanks are grouped in four sections, as presented in Fig. 2. (A) Entrance section – exhibiting the World Sea and Mediterranean Sea life (tanks 1–4), (B) Central section – exhibiting the Adriatic Sea biodiversity (tanks 5–11), (C) Special section – exhibiting the Boka Kotorska Bay sea life (tanks 12–13), and Exit section – exhibiting tropical seas life (tanks 14–16).

It is suggested that all sections should be connected by the open space [5], while exhibit pathway represents interconnection among seas, sea currents, and vertical profile of the sea – from coastal area to the open sea (Figs. 2, 3, and 4). See also [4].

3 Setting-up

The Center for Adriatic Biodiversity Conservation “Aquarium Boka” is designed as organizational unit of the Institute with two subunits: Public marine aquarium and Rescue Center. As presented [7], the aquarium is designed as the first Montenegrin public aquarium and conservation advocacy center. Its role will be to promote implementation of marine protected areas in Montenegro and all means of marine biodiversity protection. Particular role will be in promotion of sustainable seafood choices. It is expected that Aquarium Boka will become main player in conservation and restoration of key threatened marine wildlife species in Montenegrin Adriatic, and beyond. The rescue center is designed with four main roles: (1) Animal welfare: short-term shelter, care and rehabilitation center with the goal of finding a more suitable placement of threatened species for longer term stay elsewhere; (2) Law enforcement: receiving confiscated animals, providing expert testimony, helping the police, customs, and wildlife authorities pursue the prosecution of traffickers and animal abusers; (3) Raising awareness; and (4) Nature conservation and biodiversity.

The Center is established by the decision of the Board of Directors of the University of Montenegro in February 2020, as a suborganizational unit of the Institute of Marine Biology. According to the decision, the Center performs activities related to fundamental and applied research in the fields of aquaristics, protection and study of sea turtles and dolphins, and in particular:

- Setting-up a public aquarium on economic self-sustainable principle, its regular maintenance and care for its functionality in accordance with the best principles, and rules of keeping animal species in captivity
- Establishment of the sea turtles and other endangered species Rescue Center, its regular maintenance and care for its functionality
- Experimental research on the behavior and survival of marine organisms in artificial conditions
- Organizing educational workshops and courses for children and youth of all ages
- Organizing an open-air exhibition “Museum of the Sea” and its regular maintenance
- Organizing exhibitions and other outdoor activities within the Boka Aquarium complex

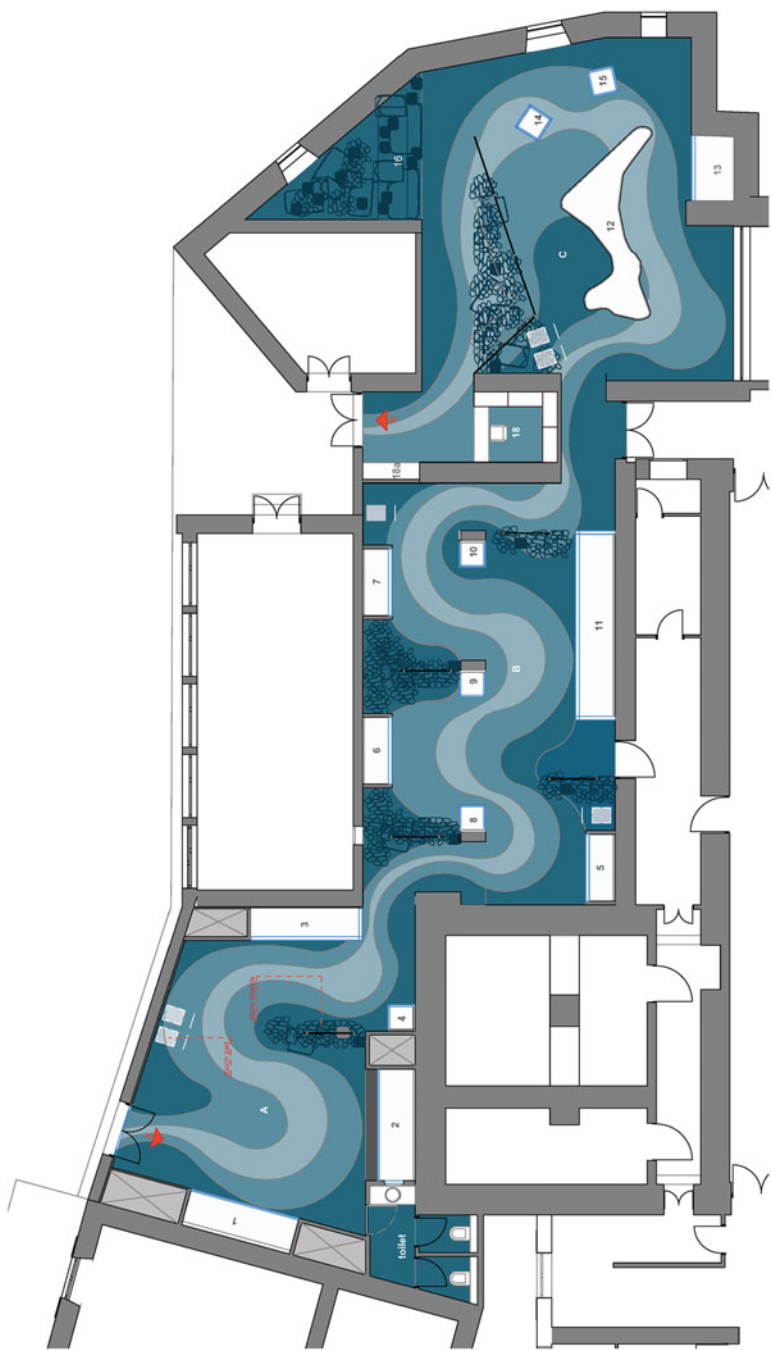


Fig. 2 Layout of concept design of Aquarium Boka – Enforma doo Kotor



Fig. 3 Adriatic room, part B of Aquarium Boka – Enforma doo Kotor

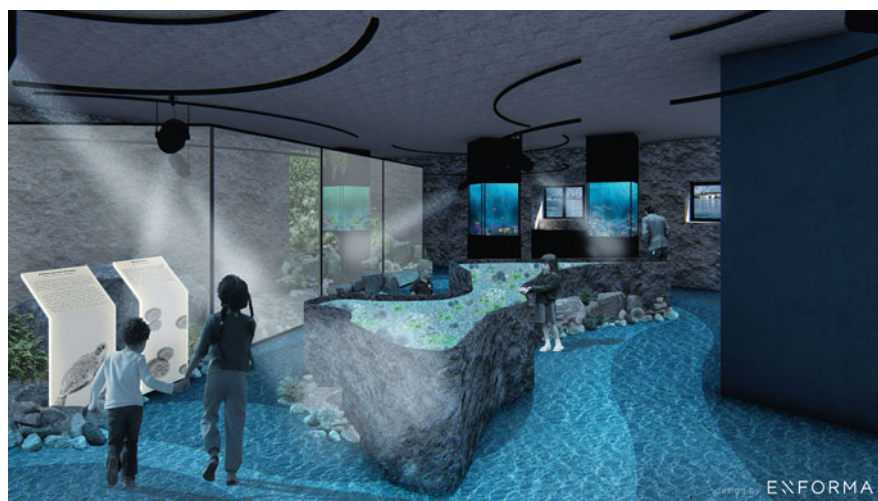


Fig. 4 Boka Kotorska room, part C of Aquarium Boka – Enforma doo Kotor

- Connecting with colleagues from the country and the region, for exchanging experiences, joint work, developing project applications, implementation of joint international projects, writing joint scientific papers, organizing scientific conferences, promotion of marine science, and more.

4 Public Outreach and Flagship Species

During the setting-up process two developed methodologies were tailored to enable efficient public outreach [8]: stakeholder analysis [9] and public opinion assessment [10]. Stakeholder analysis resulted in the list of important stakeholders who were invited to four workshops, organized from May to November 2018. All workshop participants were invited on MonteAqua e-platform, based on 9mCollab platform [11]. E-platform also enabled pilot assessment of public opinion on the Adriatic biodiversity among platform members. Results indicate that respondents have well-developed awareness and knowledge about the importance of biodiversity. The future activities of the Aquarium should be dedicated to the promotion of importance, protection, and vulnerability of biodiversity among all identified stakeholders [10].

Following the approach suggested by [12], during setting-up process of the Aquarium Boka a flagship species was considered as an important support for conservation activities, promoting public awareness and raising funds for conservation. For the selection of Montenegrin marine species as flagship species of the Aquarium Boka a simple methodology was developed, based on valuing six criteria: (1) Vulnerability status; (2) Visual identity of species; (3) Importance for local community; (4) The attractiveness of the species; (5) Economic valuing, and (6) Gastronomic value (character). Based on 60 analyzed species the highest value of the final score was obtained for species John Dory (*Zeus faber*). It is selected as flagship species of the Aquarium Boka [13] (Fig. 5).



Fig. 5 John Dory – photo by Ivana Orlovic Kranjc

5 Mission, Services, and Goals

The Center for Adriatic Biodiversity Conservation “Aquarium Boka” is established with *a mission to be a catalyst for global sustainability through promoting and practicing effective conservation on behalf of the Adriatic sea’s wildlife* [7]. Exhibit philosophy of the Aquarium Boka is developed to be mission-driven, message-driven, and visitor-driven [14].

Considering concept design and established mission, the Center for Adriatic Biodiversity Conservation “Aquarium Boka” has several services, grouped in three main service clusters:

- Research
 - Aquarium scientists advise seafood companies on methods to enhance the sustainability of commercial fisheries and trade.
 - The Aquarium is hosting various research programs on the Adriatic wild flora and fauna.
 - The Aquarium collaborates with partners around the world to protect marine ecosystems and establish marine protected areas.
- Education
 - The Aquarium Boka showcases the diversity and importance of marine wildlife with particular focus on the Adriatic Sea.
 - The Aquarium Boka tanks inspire visitors with the beauty and complexity of the marine ecosystem through replication of various marine habitats.
 - Aquarium educators lead a nationwide initiative on climate change and inspire future Adriatic Sea protectors with hands-on programs such as Boka Discoveries Camps, mainly summer camps for students in marine biology
- Conservation
 - Rescue Center leads national and regional efforts to rehabilitate and release endangered species.
 - Rescue Center rescues endangered sea species.
 - Breeding and reintroduction programs for species otherwise endangered or extinct in the wild.

It is expected that services of the Center for Adriatic Biodiversity Conservation “Aquarium Boka” will enable achievement of the set goals:

- Building public awareness and action;
- Protecting aquatic species and habitats;
- Advocating for conservation solutions;
- Serving as role models; and
- Moving people to act on behalf of the marine species we seek to protect

6 Rescue Center

The Rescue center is designed with the main role in animal welfare. It will represent unique Montenegrin short-term shelter, care and rehabilitation center with the goal of finding a more suitable placement of threatened species, with particular focus on the sea turtles [15], for longer term stay elsewhere. As successful return of sea turtles in their natural habitats requires their good health [16], the function of the Rescue Center is even more pronounced. Similar rescue centers already exist in the Adriatic in all countries and their financing and construction are largely supported through the EU program of the Instrument for Pre-Accession Assistance for the Adriatic region – the NETCET project. Although the Institute of Marine Biology was a participant in the NETCET project, the setting-up of such a center was not foreseen in the project proposal, so to date there is no such center in Montenegro.

The Rescue center will also have an important role in law enforcement as it will receive confiscated animals, provide expert testimony, help the police, customs, and wildlife authorities in pursuing the prosecution of traffickers and animal abusers. The Rescue center will work on raising awareness for marine biodiversity protection and nature conservation in general.

7 Conclusion

The Center for Adriatic Biodiversity Conservation “Aquarium Boka” is set as organizational unit of the Institute of Marine Biology, Kotor, Montenegro to integrate research and education for promoting and practicing effective conservation on behalf of the sea’s wildlife. The Center builds public awareness and action for protecting Adriatic Sea species and habitats, but also actively contributes to various conservation solutions and serve as role models. The establishing of the Center is especially important from the aspect of opening the possibilities for closer cooperation between science and business entities, particularly those engaged in fishing, as well as aquaculture, production of fish and seafood products. Rescue center develops capacities in Montenegro for rescuing endangered sea species. The Center as whole is strengthening capacities of Montenegrin institutions for the European integration process under Chap. 27 of the negotiating process: Environment, and further improve position of Montenegro in terms of regional and international scientific cooperation in the field of conservation of biological resources of aquatic ecosystems. And most importantly, the Aquarium Boka moves people to act on behalf of the marine species we seek to protect.

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biodiversity at the Institute was born. The scientific and professional assistance provided to us through the project, in order to establish the Center, is of inestimable value.

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