EUROPEAN UNION OF AQUARIUM CURATORS

REPORTING FORM

FOR *IN SITU* CONSERVATION PROJECTS FUNDED in 2021

1 TITLE OF PROJECT	Poseidon's Garden – An artificial reef project in Valsaline bay, Pula
2 NAME OF APPLICANT	Dr Milena Micic, biologist
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DATE OF REPORT:	16th January 2023

PLEASE SEND YOUR REPORT TO ISABEL KOCH, SECRETARY-GENERAL OF EUAC
(ISABEL.KOCH@WILHELMA.DE)
AND COPY TO
João Falcato : jfalcato@oceanario.pt; Brian Zimmerman: bzimmerman@bzsociety.org.uk

3 LOCATION OF PROJECT (REGION & COUNTRY)
Northern Adriatic (Istria county), Valsaline (Soline) bay, Pula, GPS: 44°50'58.6"N 13°50'02.7"E

4 PROJECT START AND END DATES:
1st of July 2021 – 30th of June 2022

5 PROJECT CO-ORDINATOR, ADDRESS AND INSTITUTIONAL AFFILIATION
(IF DIFFERENT FROM APPLICANT)

6 PROJECT TYPE
(TICK ANY COMPONENTS THAT APPLY)

x BIOLOGICAL/ECOLOGICAL RESEARCH
☐ VETERINARY/CONSERVATION MEDICINE
x ANIMAL WELFARE
☐ CAPTIVE BREEDING
x RE-INTRODUCTION/RE-STOCKING/TRANSLOCATION
x HUMAN-WILDLIFE CONFLICT
X EDUCATION/PUBLIC AWARENESS
☐ TRAINING/WORKSHOPS
☐ COMMUNITY-BASED/SOCIAL POLICY
X ECOTOURISM/SUSTAINABLE DEVELOPMENT
☐ SUSTAINABLE USE
☐ WARDENING/LAW ENFORCEMENT
☐ PROTECTED AREAS MANAGEMENT
☐ OTHER: _____

7 FOCAL SPECIES (COMMON AND SCIENTIFIC NAME)
Various juvenile fish, focal species Labridae, Sparidae, *Conger conger*, *Cromis cromis*
Eggs of *(*
Various benthic invertebrates (*Spongia officinalis*, *Tunicata,* order Gorgonacea, hermit crabs *Dardanus sp*.)

8 IUCN RED LIST STATUS (OR OTHER THREAT LISTING) **OF FOCAL SPECIES**
In the IUCN red list the mentioned species are mainly Data Deficient or Least Concern
CITES YES NO

9 PROJECT BACKGROUND
Coastal marine ecosystems are very significant to human well-being (Duarte, et al., 2013) by being highly productive areas serving as nurseries for many fish and invertebrate species. But they are among those facing the most rapid ecological degradation (Bugnot et al., 2020), resulting in declines in the goods and services provided to society (Costanza et al., 2014).
In the last few decades, the coastline of the Istria region has been severely affected by a decline in algal and seagrass species. The main reasons are physical alteration by human activities, invasive species (*Caulerpa cylindracea*) and global warming (personal communication).
A case of such degradation is Valsaline bay on the south of Pula city, well known for its vast biodiversity and wealthy benthic communities comprising *Posidonia oceanica*, *Zostera marina*, *Z. nolti, Cymodocea nodosa* and algal communities. In 2020 local authorities allowed an underwater construction of an incident overflow for disposing of communal wastewater in critical situations. It is a 500 m long and 2.5 meters wide concrete structure passing through the middle of the bay and covering the named biocoenosis. Exactly this wall inspired the concept of the project, namely to bring back the biodiversity of Valsaline bay.

10 WAS THE OVERALL PROJECT PURPOSE FULFILLED?

This project aimed to restore the benthic community of Valsaline bay by reforesting the algal, seagrass and invertebrate community and setting up nurseries for juvenile fish. With this project, 90 meters of artificial underwater construction have been prepared for the installation/placement of living organisms. As a pilot project, we tried to design the best solution to include the underwater structures in restoring the habitat and its floral and faunal elements. Besides the primary goal, the area will serve as an education site for students who can do their master's or doctoral theses.

The collaboration with the fisherman community was established. They were encouraged to gather the biological material (sessile invertebrates and accidentally caught eggs of cuttlefish, elasmobranchs and squids) for the "reforestation" of the area. Also, they were informed about the by-catch importance and how they can act to save the sea, which is the source of their well-being.

11 WHAT OBJECTIVES WERE MET?

The general objective of this project was to restore the seabed of Valsaline bay by developing an efficient restoration tool/concept for restocking habitats of degraded coastal areas, such as artificial concrete structures in the vicinity of coastal cities. The project results should create a biodiversity hotspot to strengthen the surrounding marine habitats.
The project met the following strategic objectives:
- expert cooperation providing support for historical data on the composition of the floral and faunal elements of the locality has been established. Aquarium Pula collaborated with a private company in charge of student education programmes, Meeresschule, which described the specific biological features of Valsaline bay comprising the changes in the habitat over the years.
- Aquarium Pula introduced benthic organisms (Spongia officinalis, Tunicata, hermit crabs and others) and eggs of focal species (Scyliorhinus canicula, Scyliorhinus stellaris, Loligo vulgaris, Sepia officinalis) to create spawning grounds and habitats for fish, plants and invertebrates (nursery cages).
- a collaboration with fishermen in collecting the by-catch has been established. Aquarium Pula made a program with the fisherman community involving their by-catch for restocking Valsaline bay.
- public awareness about sensitive marine ecosystems in times of ecological change and the need for their protection has risen.
- the underwater educational trail for schoolchildren, students and tourists is planned to be constructed during 2023 by the educational company, Meeresschule.

WHAT OBJECTIVES WERE NOT MET?

12 WHAT PROJECT ACTIVITIES WERE UNDERTAKEN?

Aquarium Pula implemented the project by gathering data on species distribution in the bay from Meereschule, a private company from Graz, Austria, led by scientists who educate students and continuously investigate the living communities of Valsaline bay. The authorities were informed about the project activities, and Aquarium Pula obtained the permit for the execution of the works on the artificial wall.

About 90 m2 of the underwater artificial building was prepared for restoration. Aquarium Pula produced ten nursery cages where juveniles of fish can grow and mature before migrating elsewhere as adults. The dimensions of each nursery are 0,7 m x 0,7 m x 0,5 m. Aquarium Pula organised the boat and professional scuba divers with experience in artificial constructions for underwater works. A minimum of two scuba divers went to the site to set the cages and biological material along the underwater structure. It is supposed that one nursery cage of this dimension corresponds to 700 m2 of natural habitat in the coastal area, which acts as a hiding place for the earliest and, simultaneously, the most vulnerable stages of fish life.

To organise the collection of their by-catch Aquarium Pula held a meeting with fishermen and informed them about its importance and how to dispose of it properly. Fishermen were motivated to collect the “reusable” by-catch (squid eggs, cuttlefish eggs, elasmobranch eggs and sessile invertebrates). Aquarium Pula delivered buckets, and portable air pumps to the fishermen for by-catch collection. The collected benthic organisms were attached to the wall. On 7th June 2022, Aquarium Pula, in collaboration with the University of Pula, held a press release for local and national media.

The restoration of the area by Aquarium Pula will continue in the future while Meeresschule will constantly monitor the site.

13 WHAT OUTCOMES WERE ACHIEVED DURING THE COURSE OF THE PROJECT?

The following outcomes were achieved during the course of the project:

- During the press release, students were encouraged to write their project/professional thesis to strengthen research activities in the area.
- Meresschule confirmed the future monitoring of the restored area and supported research activities from the Austrian students (writing of master thesis).
- Feedback from the public and fishermen about spreading local ecological knowledge was gathered after the launching of the by-catch collection

The news was shared on local and national social media, TV and radio

ARE ANY ONGOING?

- Writing a protocol for the performed restoration and spreading it across interest groups
- The future monitoring, together with further restoration of the area in collaboration with the University of Pula and Meeresschule

DID ANY EXPECTED OUTCOMES FAIL?

14 DID LOCAL PEOPLE/COMMUNITIES PARTICIPATE IN THE PROJECT? IF SO, HOW MANY AND WILL CONTINUED CONTACT BE MADE?

Fishermen were informed about the action and educated about the by-catch importance. The project activities were followed by the media, thus raising public awareness of the need to restore degraded underwater areas, especially of local importance..

15 DID THE GOVERNMENT OF THE HOST COUNTRY RECEIVE INFORMATION ON THE PROJECT’S RESULTS?

The Nature Protection Directorate from the competent ministry and the local authorities were informed about the concept of this project. The company in charge of the artificial wall management gave a permit for the project activities.

16 HOW DID THE RELATIONSHIP WITH OTHER NGOS WORK? WERE THERE ANY ISSUES?
The local NGOs were informed about the project activities by the media.

17 TOTAL PROJECT BUDGET AND EXPENDITURE (IN EUROS)
35.000,00 €

18 AMOUNT OF MATCHING FUNDS SPENT:
25.000,00€

19 AMOUNT SPENT FROM EUAC FUNDS:
10.000,00€

20 EXPENDITURE BREAKDOWN (IN EUROS)

TRAVEL	
SALARIES	
ACCOMMODATION	
EQUIPMENT	Nursery cages (10 pieces) - 4.000€ Diving suits and scuba gear (3 sets) – 3.500 € Buckets and air pumps for bycatch 1.000 €
COMMUNICATION	Meetings with collaborators – 500 €
MISCELLANEOUS	Consumables: Environment safe epoxy – 1.000 €
TOTAL	10.000 €

21 PUBLICATIONS PRODUCED AS A RESULT OF THE PROJECT

Links to the news:

https://www.facebook.com/page/545603248806761/search/?q=zapo%C4%8Deli%20projekt%20%E2%80%9CPosejdonov%20vrt

https://www.glasistre.hr/pula/predstavljen-projekt-posejdonov-vrt-umjetni-greben-u-zaljevu-valsaline-evo-o-cemu-se-radi-800824