SUSTAINABLE ESTUARINE ZONE MANAGEMENT FOR CONTROL OF EUTROPHICATION, TOXIC BLOOMS AND CONSERVATION BIODIVERSITY IN THE KAŠTELA BAY (CROATIA, ADRIATIC SEA)

Up-dated in August 2015

Demosite description

Lithology / Geochemistry

Kaštela Bay is submerged karst. Muddy sediments settled especially in the east and middle part of the bay, while in the west part prevail sandy sediment (Alfirević, 1980)

43°33'N 16°23'E

Courtesy of I. Marasovic

Main description:

- **Kaštela Bay is one of the largest bays on the eastern Adriatic coast.** Most of the freshwater enters the bay from the River Jadro (average annual inflow of 10 m³/s) and from numerous submarine springs.
- **Until 2005, the Bay received high quantities of organic matter and nutrients due to the discharge of untreated sewage waters from multiple rivers especially from the river Jadro.**
- **ECO Project** is the Integral Project of Kaštela Bay Protection and it is one of the widest ecological project in the Adriatic and the Mediterranean Seas.

Conserve Ecohydrological processes in natural ecosystems	Enhance Ecohydrological processes in novel ecosystems	Apply complementary Ecohydrological processes in high impacted systems
✖ NO	✖ NO	✔ YES

Ecohydrology Principles and Solutions

EH IMPLEMENTATION PRINCIPLES

*** Distribution of ecosystems and their relevant processes**

EH SOLUTIONS

In 2004, activation of a better sewage treatment system comprising a network of pipelines and pumping stations (fig.1)

Follow-up of the microbial food web structure

FAUNATECHNOLOGY

Lifezones

Life Zone
Warm Temperate Dry Forest

PPT (mm/yr) 831

T (°C) 16

PET ratio: 1,13
Elevation: at sea level
Humidity: sub-humid

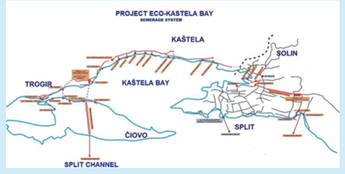
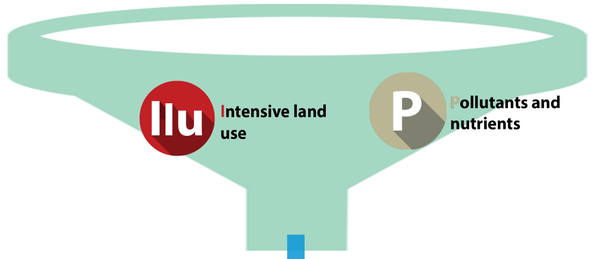


Fig.1- A carpent anemone (courtesy of K.S. Sealey)

Major Issues

- **Increase of nutrient levels and primary production (e.g: red tide blooms)**
- **Oxygen supersaturation/hypoxia events**
- **Presence of heavy metals (Hg)**
- **Intensive industrialized and urbanized area**
- **Lack of sewage treatments**



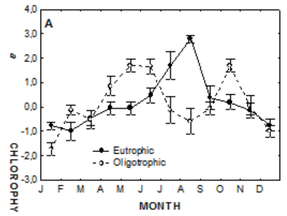


Fig.2- Comparison of phytoplankton biomass (represented by chlorophyll-a amount) during eutrophic periods (2001-2004) and oligotrophic periods (2005-2008)

Social-Ecohydrological System

Catchment Ecohydrological sub-system

EH Objectives

Water ●●●○○
Biodiversity ●●●●○
Services ●○○○○
Resilience ●●●●○

Are inputs to:

EH Methodology

* Ecosystem approach methodology will be applied (WFD, MSFD) in order to assess trophic status of the Bay
* For the same purpose, an index based on phytoplankton-related parameters will be developed and tested

Set conditions for:

Catchment Sociological sub-system

Objectives

* Protection of water quality
* Creation of conditions for safe development of economy
* Maintenance of achieved level of water quality

Set conditions for:

Stakeholders

* Ministry of Environmental and Nature Protection
* Ministry of Agriculture
* Croatian Waters
* Researchers
* Fishermen
* Major industries near the coasts such as food industries, ship building chemical industries
* Sewage treatment plants

Participate in:

ACTIVITIES

* Maintain the WFD and MSFD monitoring of water quality in the Kaštela Bay (physical, chemical & biological parameters)
* Scientific research of structural changes in the plankton food web (BU or TD control)
* Analysis of the human pressures and impacts, including impacts of climatic changes on ecological status of the Bay
* Filling and developing of database

Results

MAIN EXPECTED OUTCOME

Significant decrease in plankton abundance and primary production, especially during the summer time (fig.2)

LATEST RESULTS

- In the Kaštela Bay, significant changes in **food web structure** were found in response to changed environmental trophic status before and after activation of new sewage system (Solic M. et al, 2010). The differences also were evident in the **absence of nonloricate summer peak and reduction of** average nonloricate and tintinnid abundances (N. Bojanic and O. Vidjak, 2010). The most appropriate **metrics** to assess the degree of eutrophication turned out to be **phytoplankton community** (Ninčević Gladan et al., 2015).

CLICK HERE TO SEE THE REFERENCES

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