



Zeleni tehnologiji za ekološko čiščenje biološke  
obrasti s trupa ladij v severnem Jadranu

Tecnologie verdi di pulizia ecologica dell'incrostazione  
biologica sugli scafi nell'Alto Adriatico

# Fouling e aspetti biologici della pulizia delle imbarcazioni

# Obrast in biološki vidiki čiščenja plovil

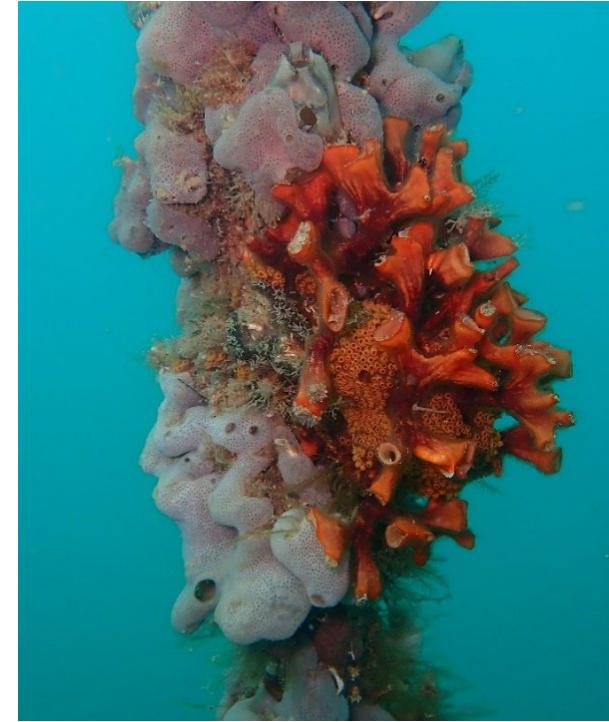
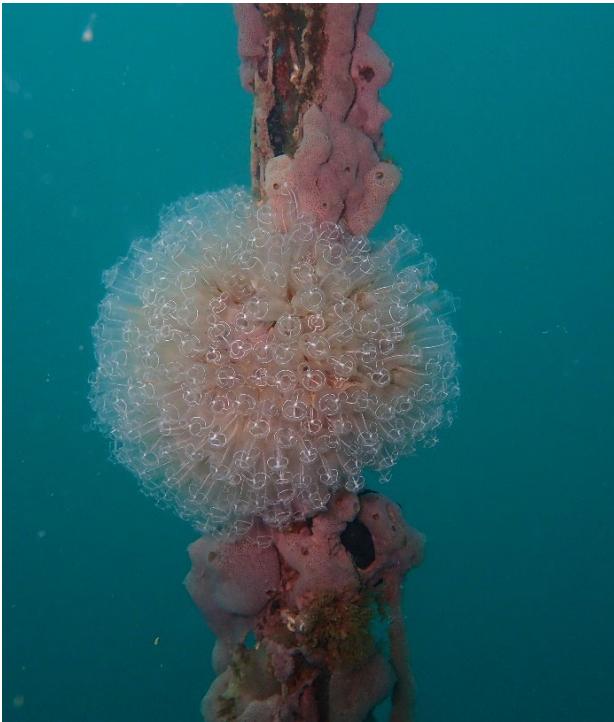
*Janja Francé, Ana Fortič, Borut Mavrič*

Titolo evento / Naslov dogodka

Luogo e data / Kraj in datum

# Marine biofouling communities

- Broad, ecological definition: *community of marine organisms*, which forms on hard substrates
- Narrower definition: *community of marine organisms*, which forms on man made structures and causes certain problems



# Marine biofouling communities

- Marine environment provides food without having to move a lot: filter feeding, planktonic larvae



May 2018



October 2018



May 2018



June 2018



July 2018



August 2018



October 2018

# Marine biofouling communities

- First arrivals: Biofilm - microorganisms and their extracellular, sticky excretions attracting sediment (“MICROFOULING”)



# Marine biofouling communities

- Animals and macroalgae (pioneer and late-successional species) (“MACROFOULING”)- availability of the light, current, substrate, predation, temperature-season etc.

**SPONGES**



**HYDROZOANS**



**BARNACLES**

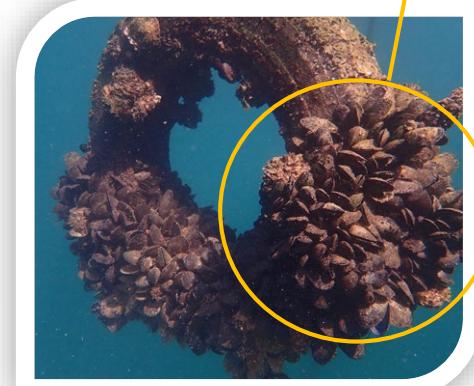


**TUNICATES**

**BRYOZOANS**

**BIVALVES**

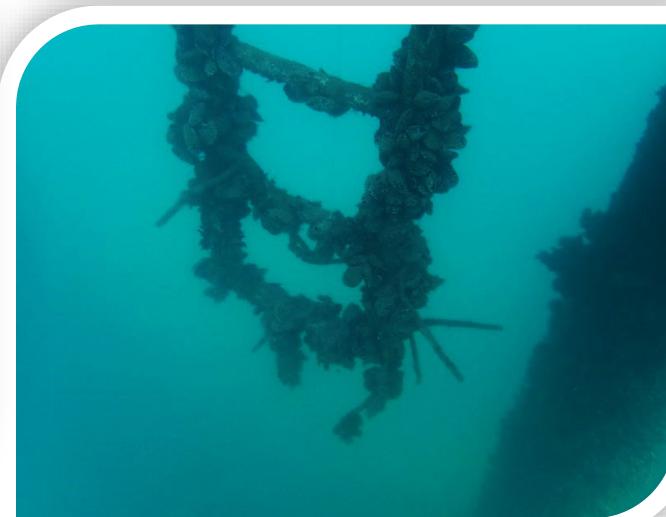
**POLYCHATES**



# Biofouling communities associated with man-made structures

- Problems associated with biofouling

Role in the ecosystem	Habitat forming	Filter feeding - clearing of the water column	
<b>Negative impact</b>	<ul style="list-style-type: none"><li>• creating frictional drag - increasing fuel consumption</li><li>• clogging pipes</li><li>• other</li></ul>	<ul style="list-style-type: none"><li>• accumulation of toxic substances</li></ul>	<ul style="list-style-type: none"><li>• Vessels are a potent vector of introduction for non-indigenous species (NIS)</li></ul>



# GreenHull results

## Detection of NIS in the samples from the fouling community on boat hulls and buoys

- *Tricellaria inopinata* d'Hondt & Occhipinti  
Ambrogi, 1985
- Arborescent bryozoan
- Origin: Pacific Ocean
- 1<sup>st</sup> record in the Med: Venice lagoon, 1982
- Introduction vector: hull fouling, mariculture



- *Paranthura japonica* Richardson, 1909
- Peracarid crustacean
- Origin: Northwestern Pacific Ocean
- 1<sup>st</sup> record in Europe: atlantic coast of France, 2007
- Introduction vector: mariculture, hull fouling

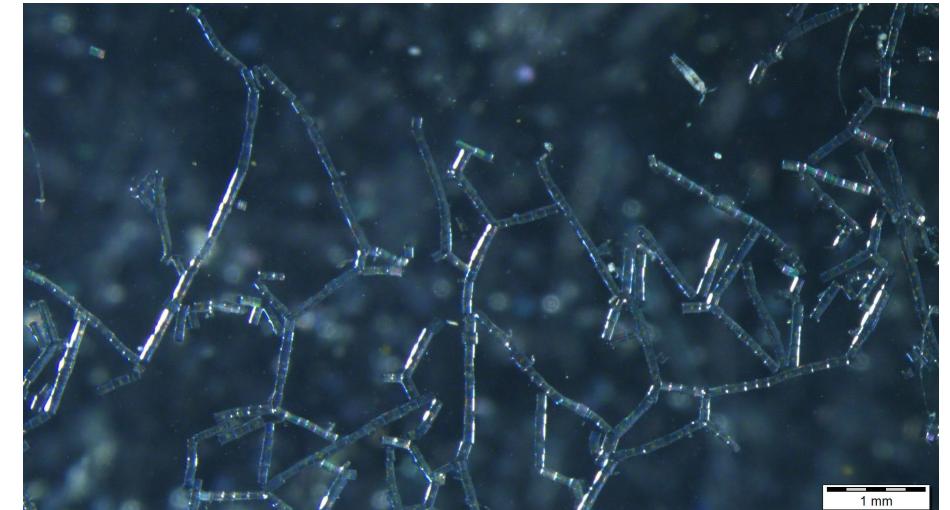
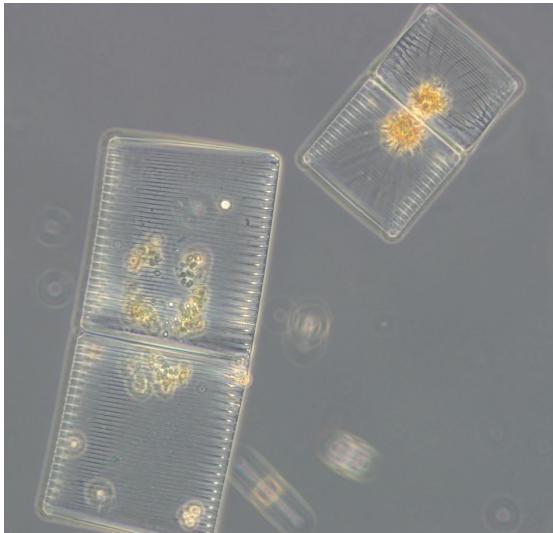


Both species were found during the first two test samplings of the fouling community in bays of Piran and Koper!

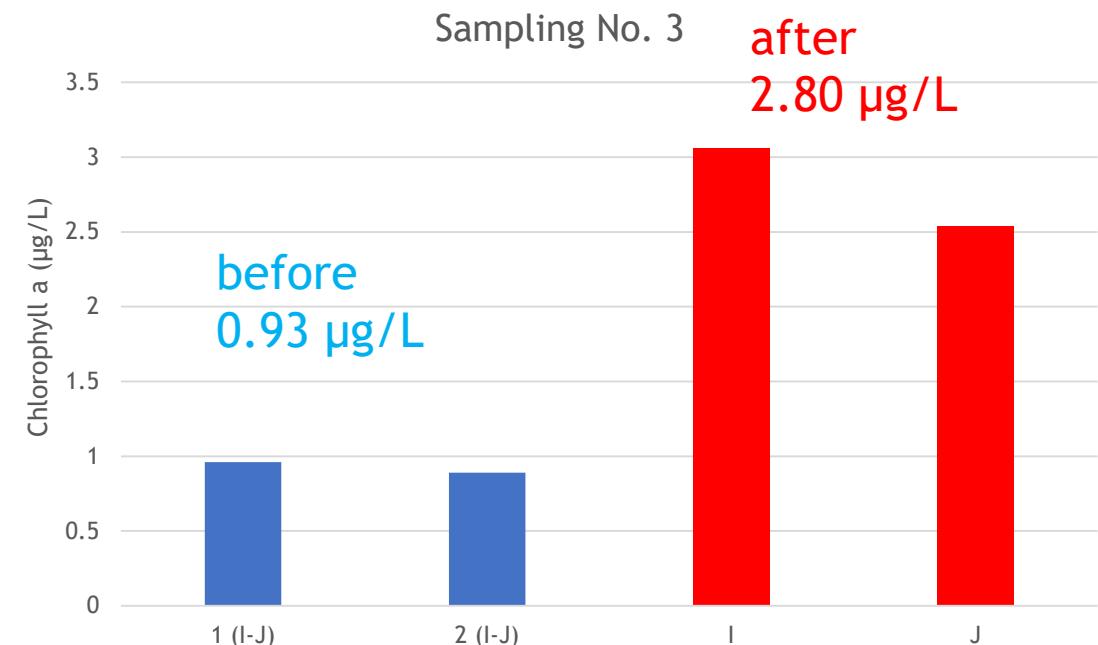
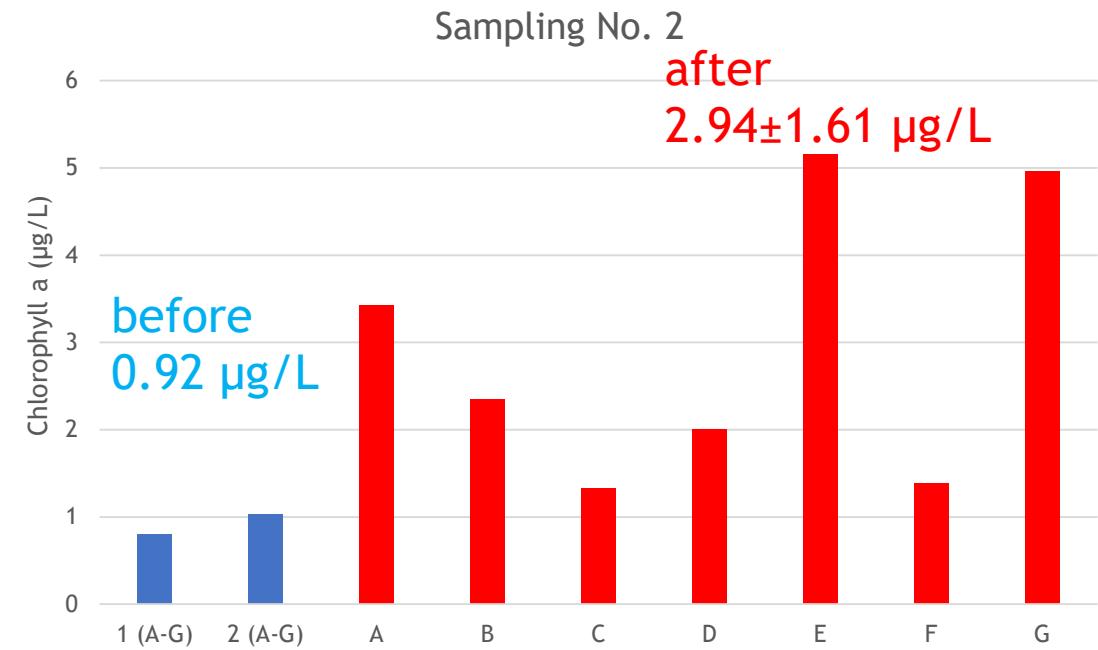
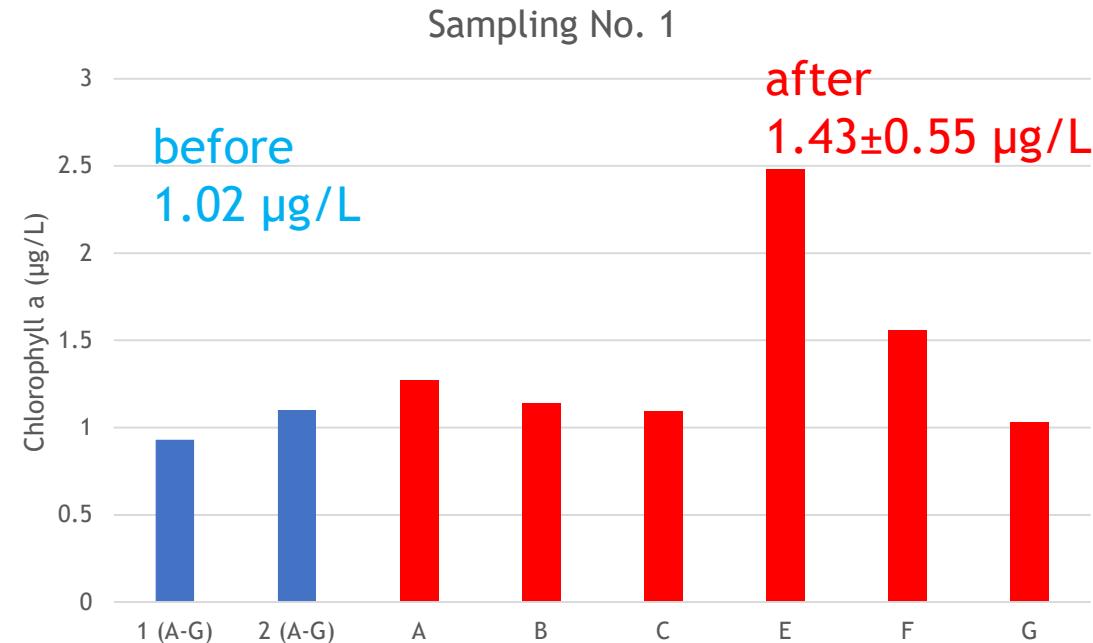
# GreenHull results

## Measurements of the chlorophyll *a* before and after the hull sampling

- **Chlorophyll *a*** : green pigment present in all green plants
  - its concentration good proxy of algal biomass
- microalgae are among the first organisms that colonise a bare surface in marine waters and are common in biofilms on boat hulls
- useful tracer, it helps detect biofilm remains in the water after the sampling process



# GreenHull results



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Hvala za pozornost!

Grazie per l'attenzione!

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[www.ita.slo.eu/greenhull](http://www.ita.slo.eu/greenhull)