

## Project "GEBIO": Achievements, lessons learned and best practices in management of biofouling and bioinvasion control in Brazilian coast



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- Marine bioinvasions caused by biofouling on vessels were reported worldwide despite the use of anti-fouling systems and other measures to prevent biofouling on ships and other structures.
- In the last decades, global commerce via shipping activities and ports operations have increased exponentially and it represents a risk of marine species transportation by ballast water and/or biofouling on vessels.
- Since 2011, the International Maritime Organization (IMO) requested urgent actions to minimize the transfer of invasive aquatic species by ships' biofouling (MEPC.207(62)).

- Aligned with this resolution, the project GEBIO just ended after five years of cooperation between IEAPM (Brazilian Navy) and CENPES (PETROBRAS). The primary goal of the project was create a basis for control and management of biofouling and bioinvasion in Brazilian coast.
- ✓ The project GEBIO met the goals of the proposal:
  - It was built a web-based database called "Marine Fouling Species from the Brazilian Coast" to provide open access information about Brazilian fouling species distribution. Nowadays the database contains 1081 fouling species, distributed over more than 9000 geographical occurrences.
  - 2) A scientific collection was implemented at IEAPM to catalogue fouling species (indigenous and non- indigenous) from Brazilian coast and it houses 2200 specimens until now.
  - 3) Arraial do Cabo harbor area (22°58'20"S, 42°00'50"E, Brazil) has been surveyed to early detect nonindigenous species establishment and to monitor invasive populations already established (e.g. *Tubastraea spp.).*
  - 4) The harbor was studied as a model area to risk assessment analysis as proposed by Campbell and Hewitt (2011).

# 1 - GEBIO DATABASE 2 - SCIENTIFIC COLLECTION 3 - EXOTIC/INVASIVE SPECIES 4 - RISK ASSESSMENT



Website of GEBIO Database www.incrustantesdobrasil.com.br

 Brazilian fouling species data, such as, taxonomic information, origin, status in relation to invasion, geographical distribution and geolocation are compiled in GEBIO data base.

• All information is available for consultation in the website www.incrustantesdobrasil.com.br.



Scientific Collection of the Instituto de Estudos do Mar Almirante Paulo Moreira (IEAPM)

 A Scientific Collection of fouling species of Brazilian coast was organized at IEAPM facilities.

 The collection facilitate taxonomic identification, consultation and type material exchange.

 Description and photos of the fouling organisms added to the collection is available in database.

### Invasive species – Sun coral



Colonization in brazilian natural environment Chromonephthea braziliensis

 Field surveys – Invasive and exotic species monitoring studies were performed at Arraial do Cabo, RJ, Brazil).

• Laboratory experiments – Physiological limits and reproduction studies of the invasive sun corals *Tubastraea* spp. were carried out.

### Exotic species





GLOBAL SHIPPING ROUT

• All the project achievements are important and they certainly contributed to best practices in biofouling management and bioinvasion control in Brazilian coast.

Azmi et al. (2015). *ICES*, 72(3): 1078-1091. Campbell, M. L., & Hewitt, C. L. (2011). *Biofouling*, 27(6): 631-644. IMO (International Maritime Organization) (2011). Resolution MEPC.207(62).

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