



# ECOSSISTEMAS AQUÁTICOS

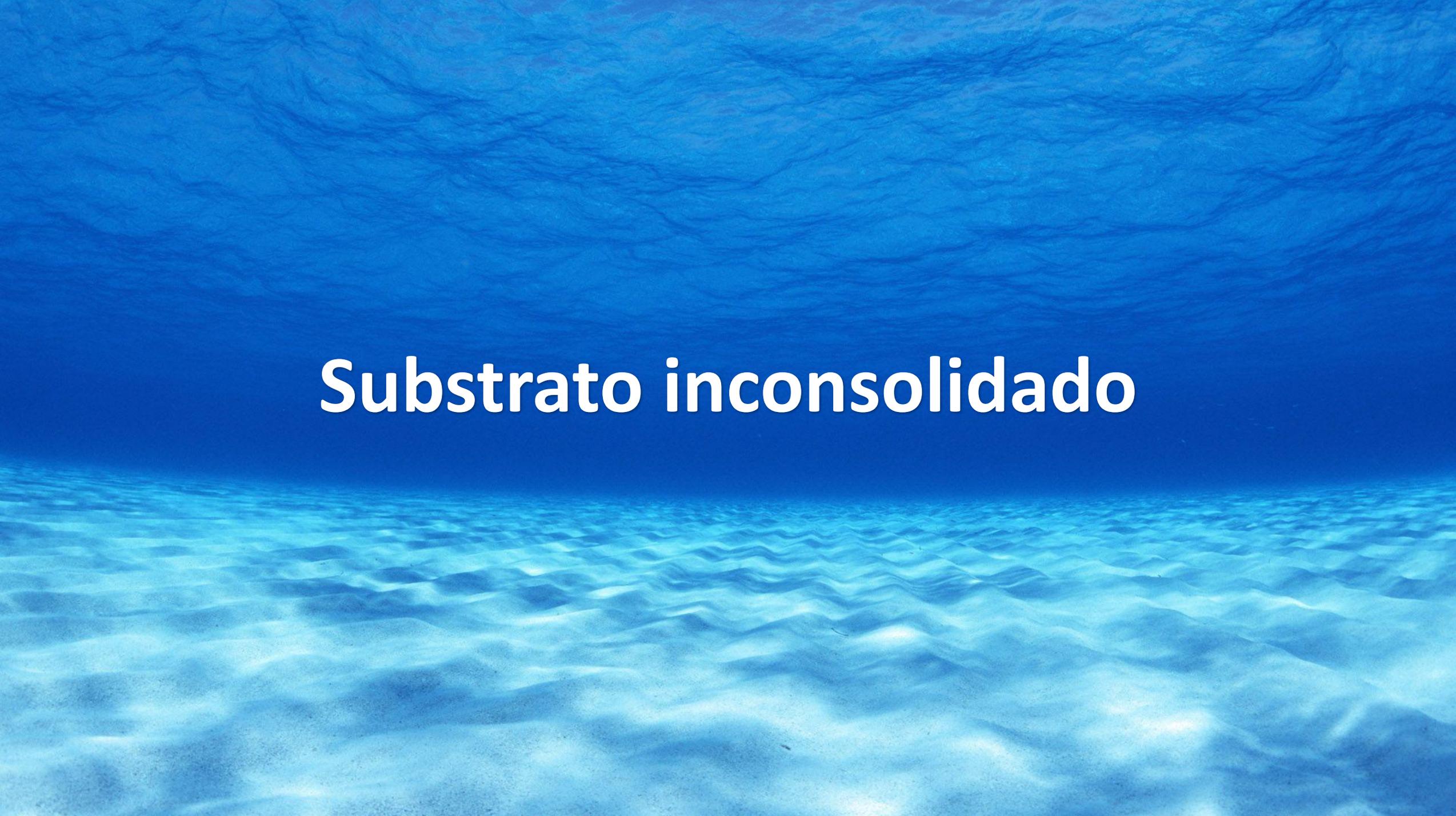
**Prof. Dr. Régis A. Pescinelli**

# **ECOSSISTEMAS MARINHOS:**

**Costão Rochoso, Recifes de corais e  
Recursos Pesqueiros**



# Costão Rochoso

An underwater photograph showing a sandy seabed with ripples. The water is clear and blue, with light filtering through from above, creating a shimmering effect on the sand. The text "Substrato inconsolidado" is overlaid in the center in white.

**Substrato inconsolidado**

The image is a split-view photograph. The top half shows a rocky coastline with a forested hillside in the background. The water is calm, reflecting the sky and the rocks. The bottom half shows an underwater view of a rocky seabed. Two bright green sea anemones are visible on the rocks. The water is clear, and the rocks are dark and smooth. The text "Substrato consolidado" is overlaid in the center of the image.

**Substrato consolidado**

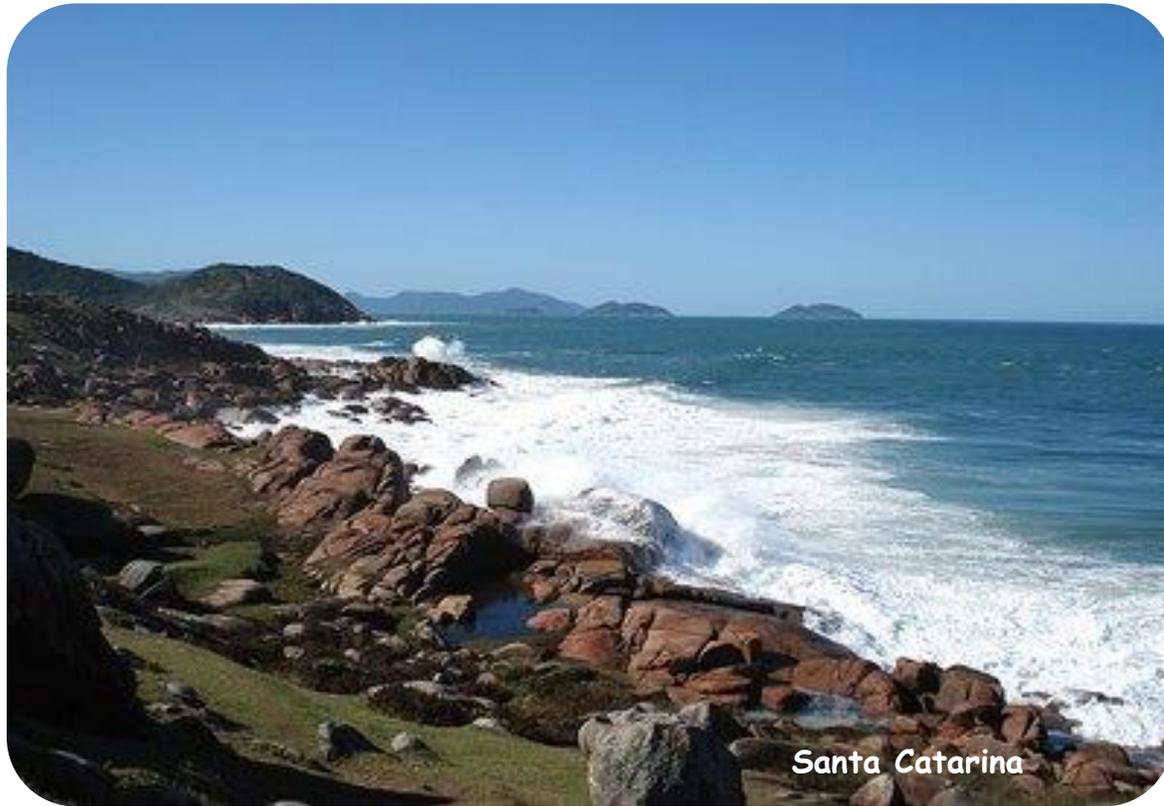
# Substrato consolidado

Recifes de Arenito (N e NE)

Costões Rochosos (SE e S)



É um ambiente com grande diversidade de espécies e heterogêneo



De acordo com Coutinho (2002) a ocorrência no BR - Torres (RS) até Baía de São Marcos (MA). Maior concentração: Sudeste (costa recortada).

- erosão por batimento das ondas;
- ventos;
- chuvas;
- temperatura ( expansão e contração dos minerais).



## Adaptações à vida nos costões rochosos

-Adaptações fisiológicas, morfológicas e comportamentais;

-Influência do ciclo de marés, hidrodinamismo, intensidade solar, temperatura, efeito do congelamento, concentração de O<sub>2</sub>, predadores;

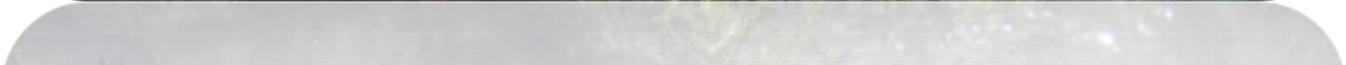
**-Influência no processo de fixação dos organismos:**

→Relação entre a superfície de fixação do organismo em resposta à superfície total do organismo;

→Forma e dimensão;

→Consistência.







## COSTÃO EXPOSTO (BATIDO)

- maior impacto de ondas;
- pouco fragmentado;
- forma de paredões lisos
- diversidade de habitats muito menor que os costões menos expostos às ondas;





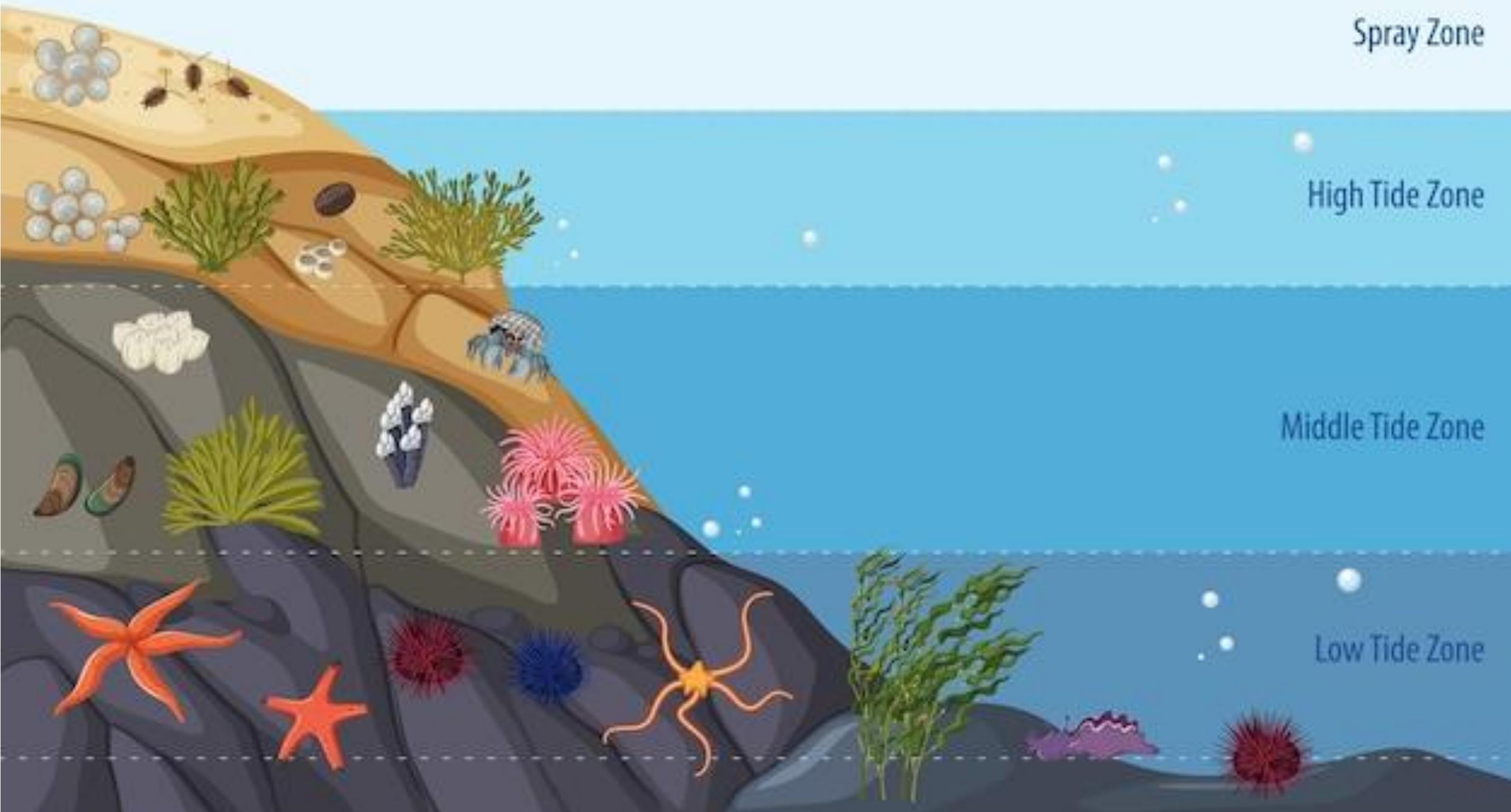


Spray Zone

High Tide Zone

Middle Tide Zone

Low Tide Zone





**Spray Zone**

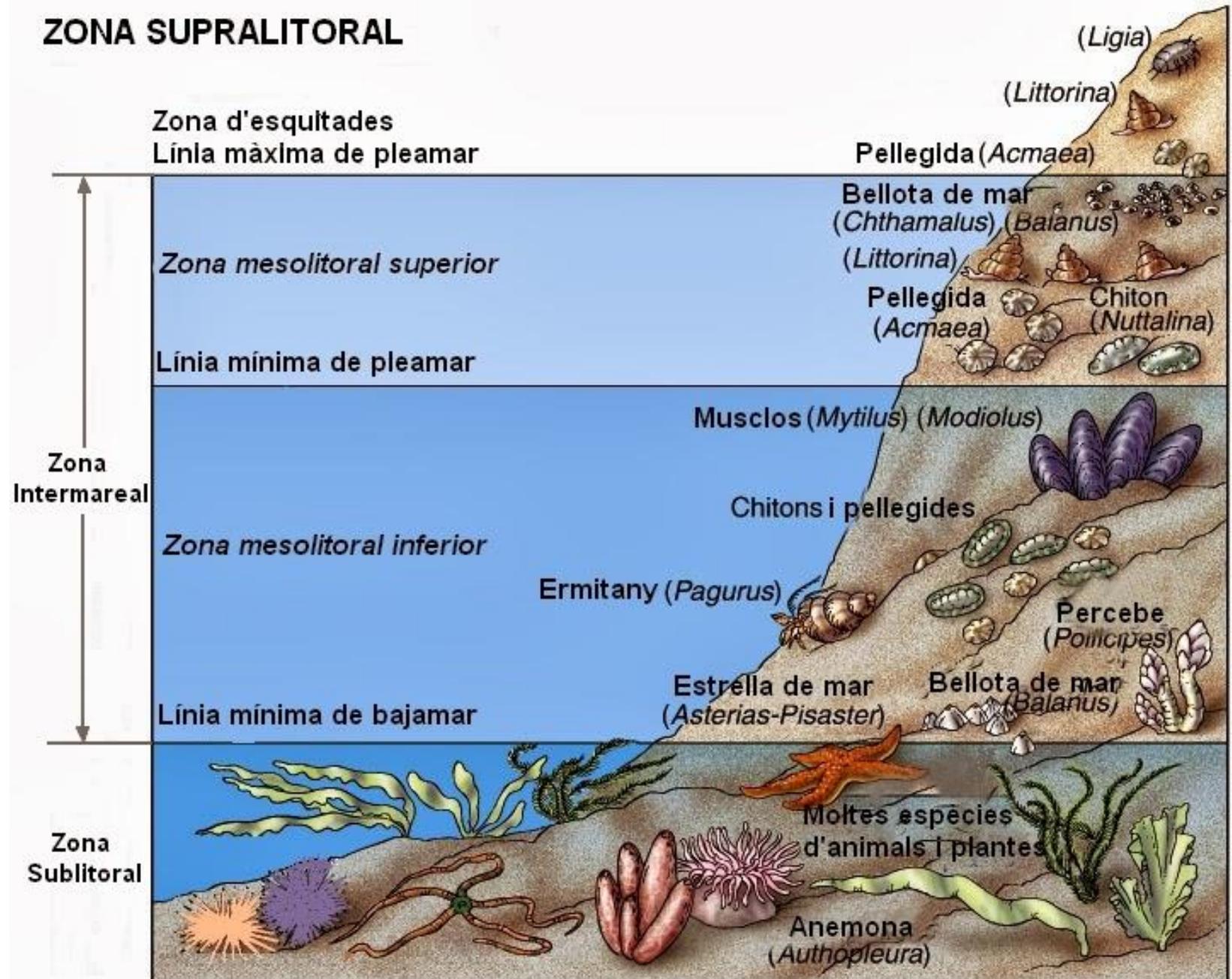
**Upper Intertidal**

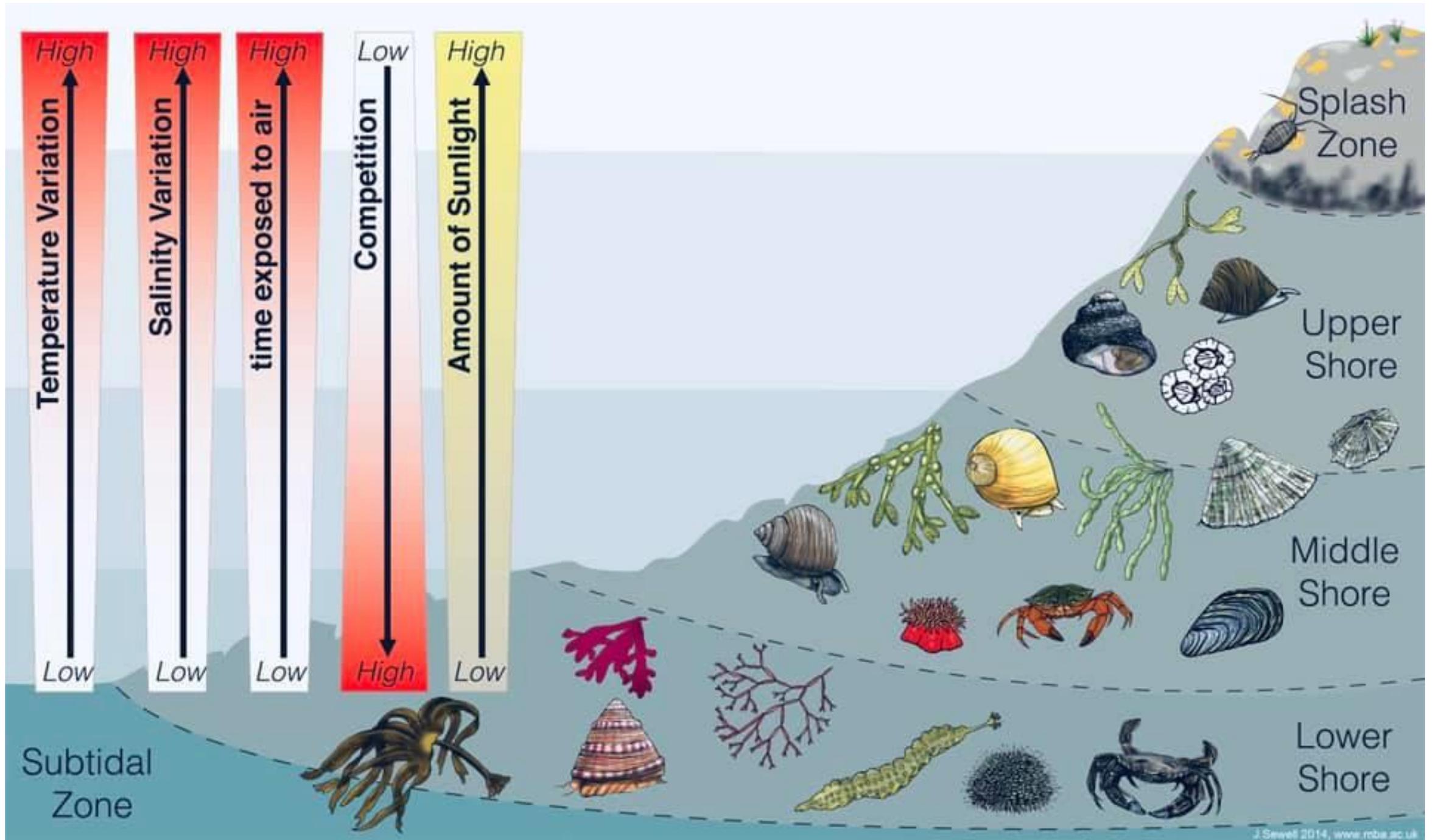
**Mid Intertidal**

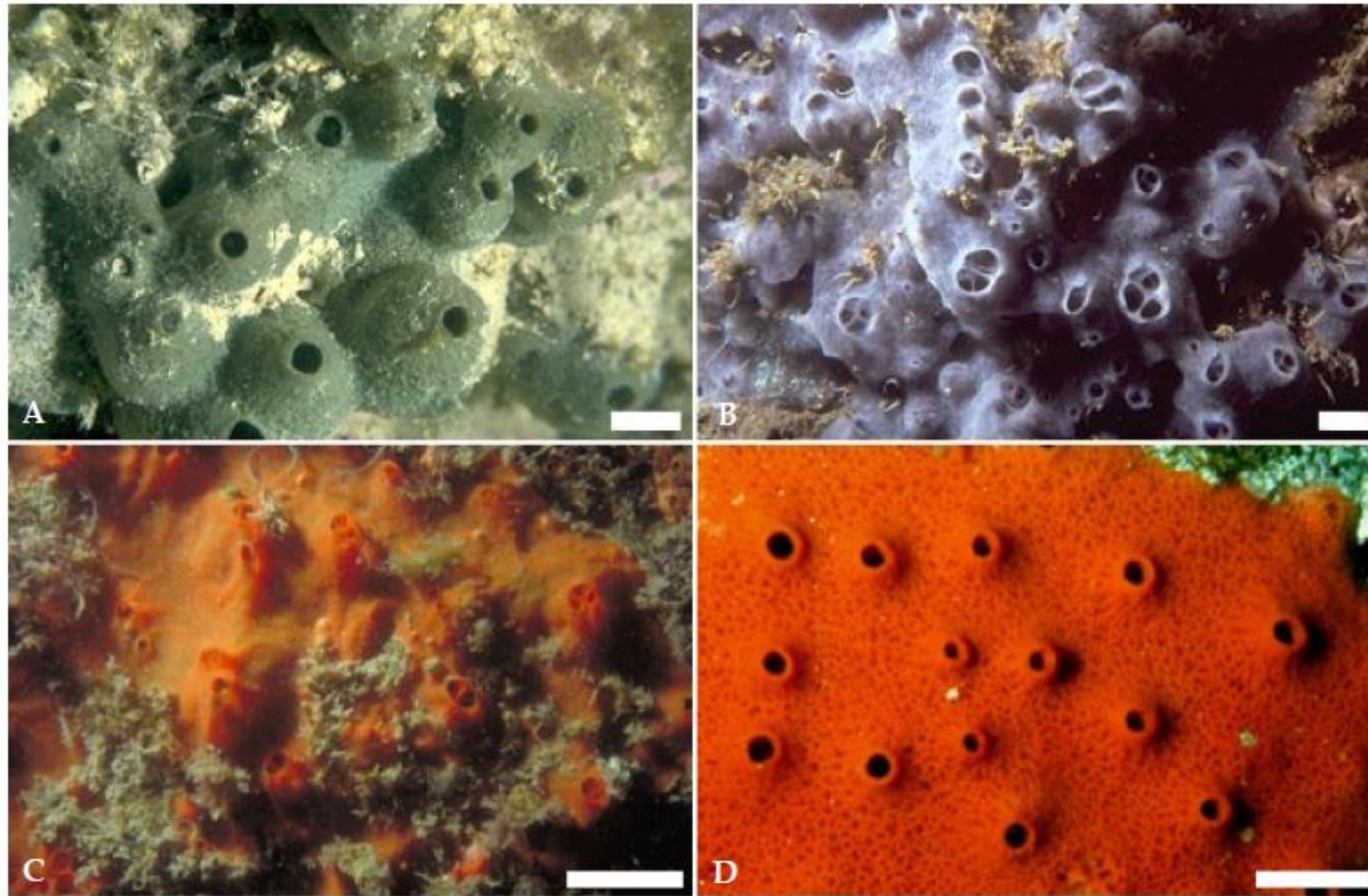
**Lower Intertidal**

**Subtidal**

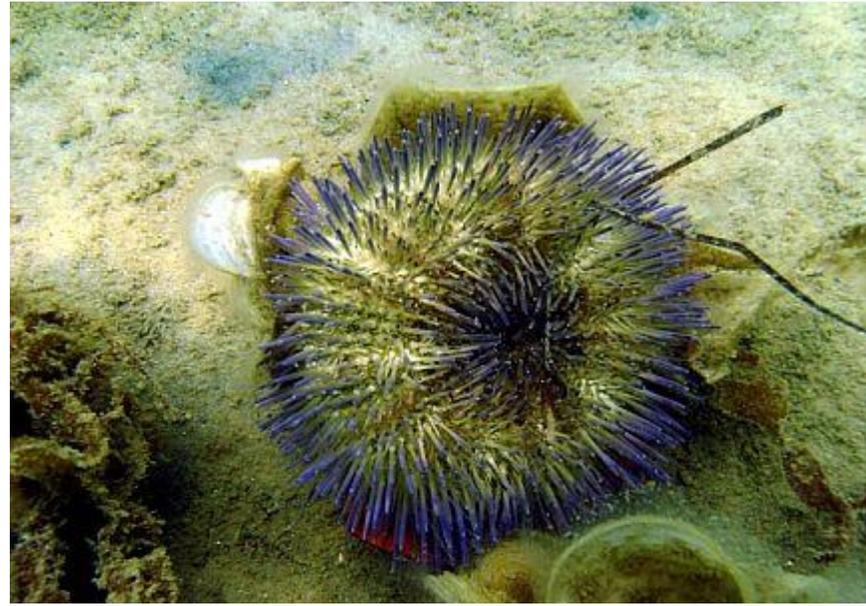
# ZONA SUPRALITORAL







**Figura 3.1** Porifera. Esponjas mais comuns do Litoral Norte do Estado de São Paulo. (A) Esponja verde, Niphatidae: *Amphimedon viridis*; (B) Esponja azul, Mycalidae: *Mycale angulosa*; (C) Esponja laranja, Tedaniidae: *Tedania ignis* (esponja-de-fogo); (D) Esponja vermelha, Axinellidae: *Dragmacidon reticulatum*. Escala: A-D = 1 cm. Fotos: Eduardo Hajdu.











## Mesolitoral

Submersa durante a maré alta e exposta durante a maré baixa.

**Limite Inferior** – *Sargassum* sp.

**Limite Superior** – *Chthamalus* (cracas).



# MESO LITORAL







# Supralitoral



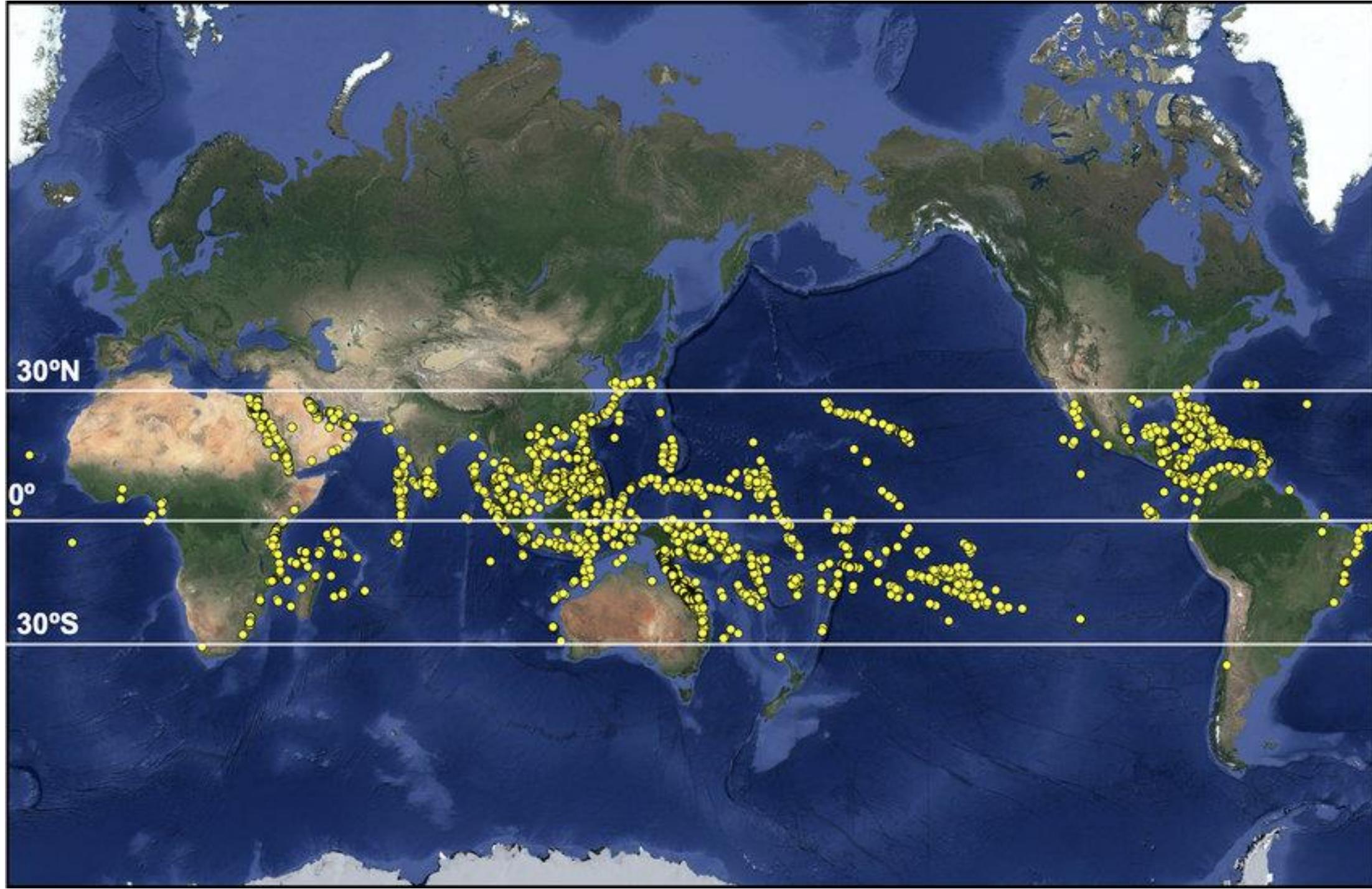
© Conquiliologistas do Brasil  
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# Recifes de corais

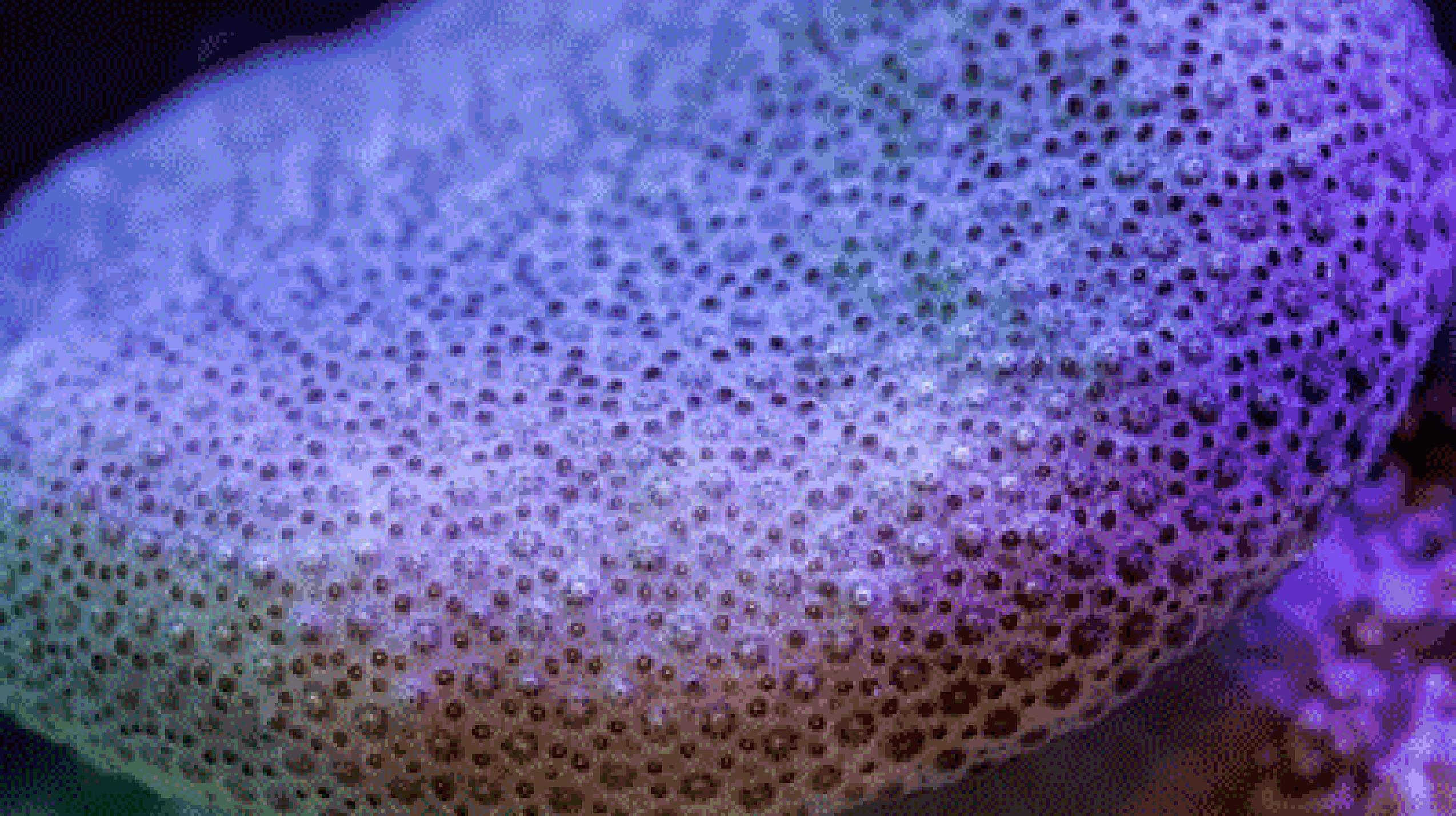


- Tridimensional.
- Diversidade de Micro-habitats.
- Complexidade das relações ecológicas.
- Importância no ciclo do carbono (para cada molécula de cálcio capturado, uma molécula de CO<sub>2</sub> é depositada)
- Metade do CO<sub>2</sub> que entra no mar é capturado na construção dos recifes

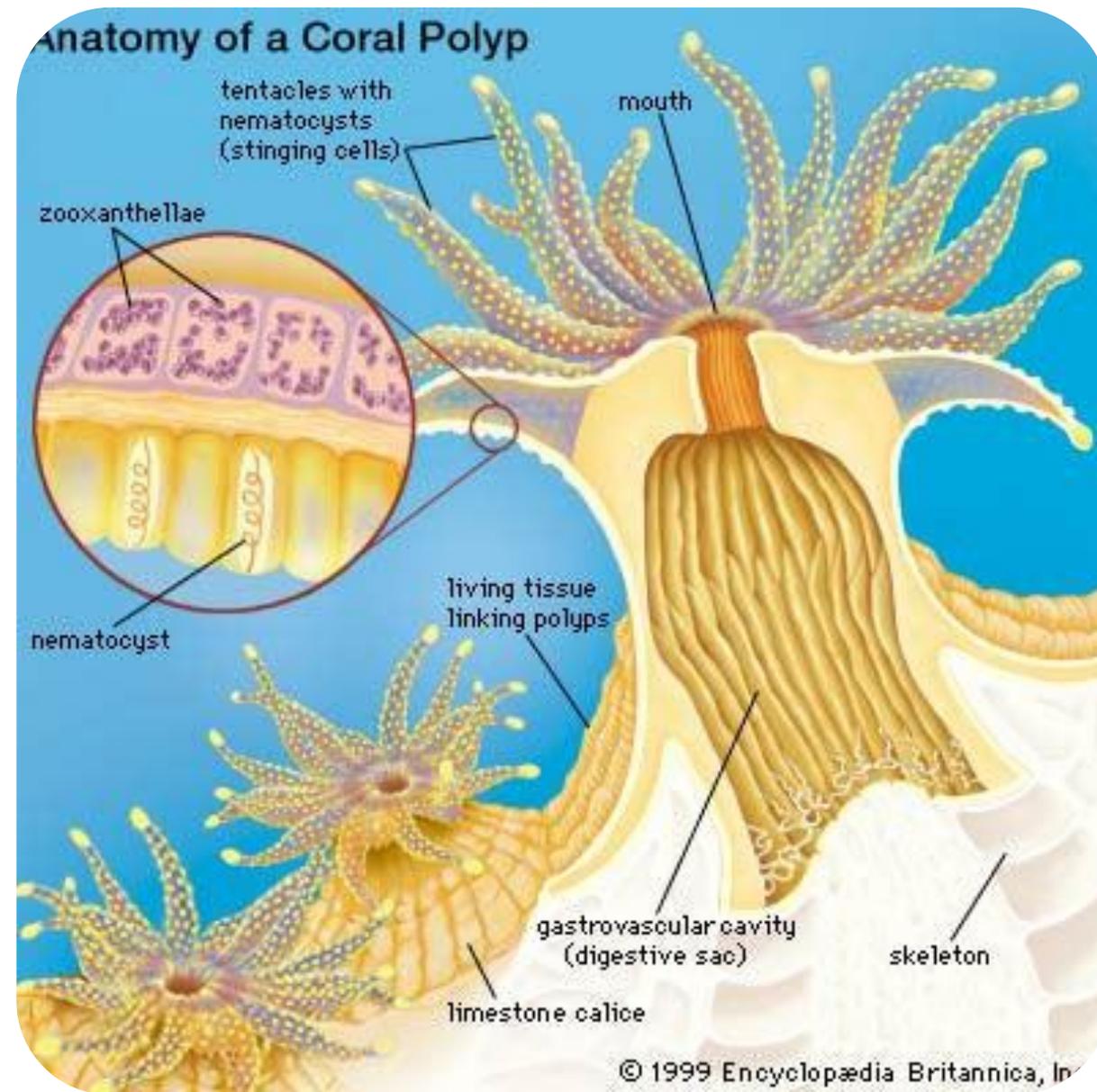
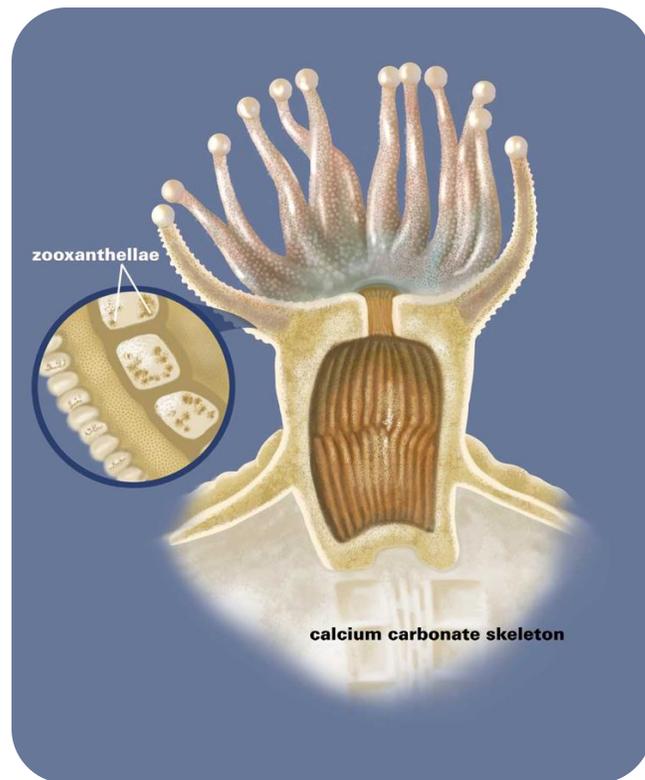


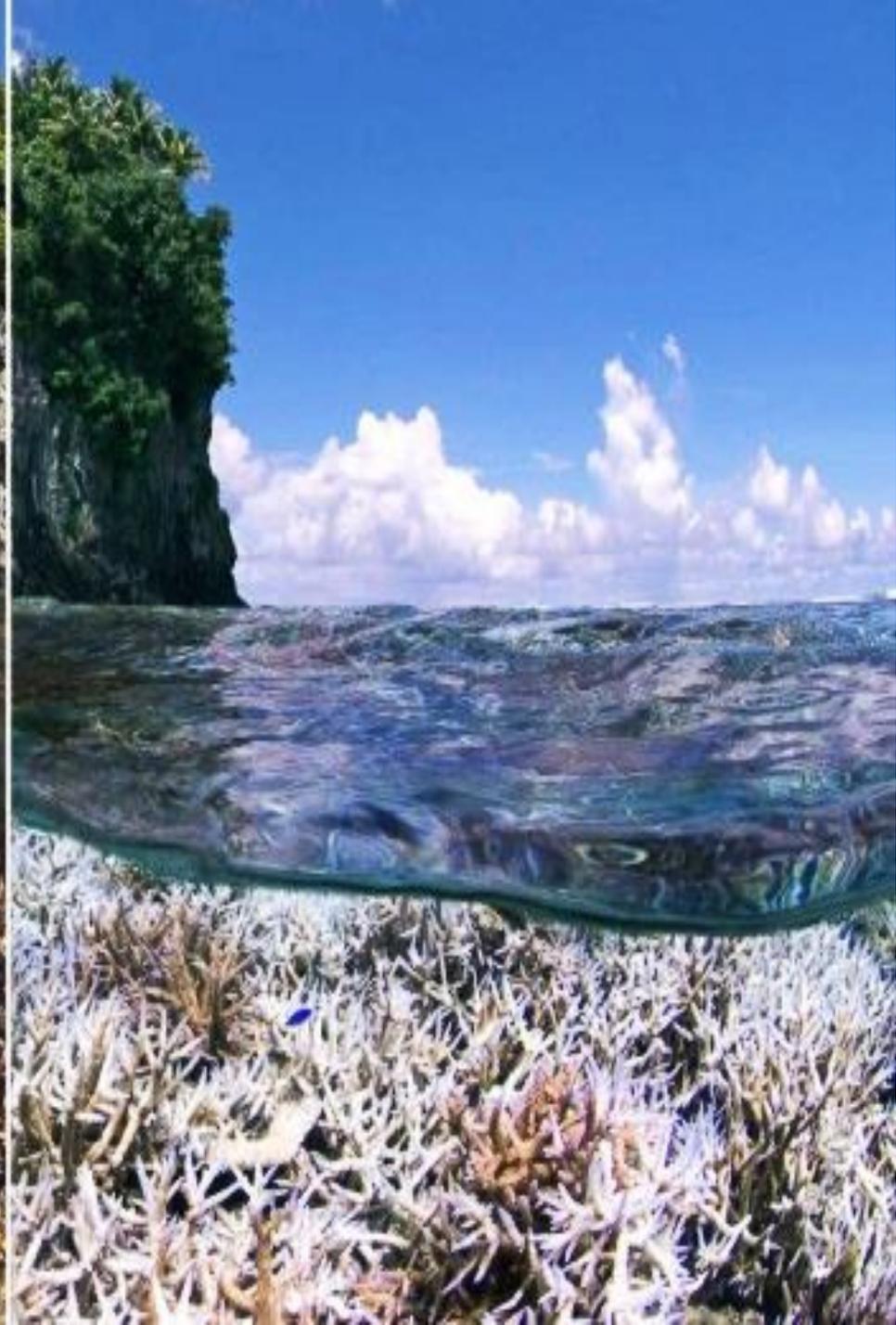
# CNIDARIA





**Zooxantelas** utilizam o CO<sub>2</sub> para fotossíntese o que aumenta o pH, aumentando os íons de carbonatos e a precipitação de cálcio – Crescimento do coral







Saudável - dezembro 2014

Morrendo - fevereiro 2015

Morto - agosto 2015



# ECOSSISTEMAS MARINHOS:

**Recursos Pesqueiros**



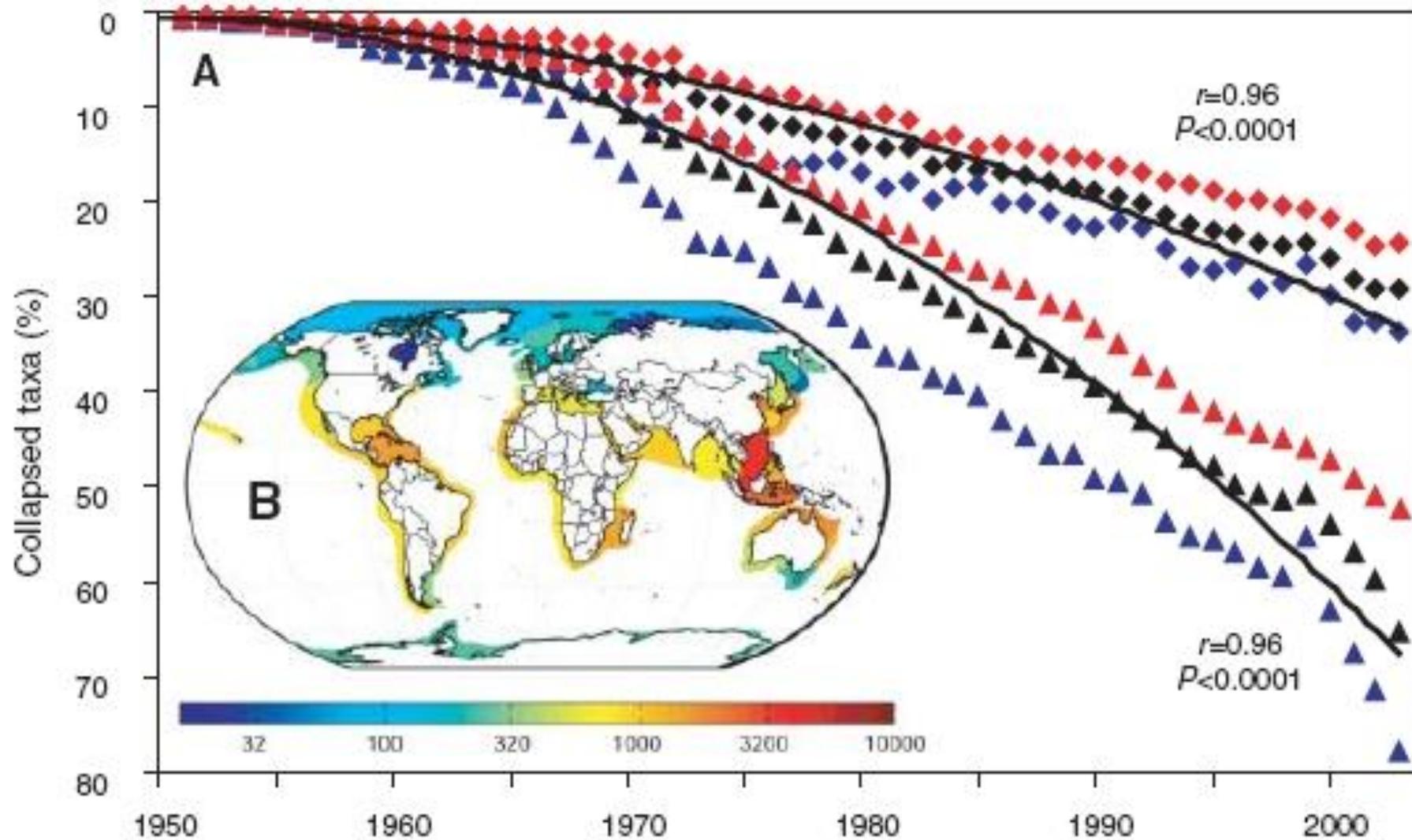
**FAO** (Organização das Nações Unidas para a Alimentação e a Agricultura): cerca de 90% dos estoques pesqueiros do planeta encontram-se sobre-pescados ou plenamente explorados



Nuno Barros

Nuno Barros

# Taxa de colapso dos estoques pesqueiros no planeta



# Mas o que são estoques pesqueiros ??



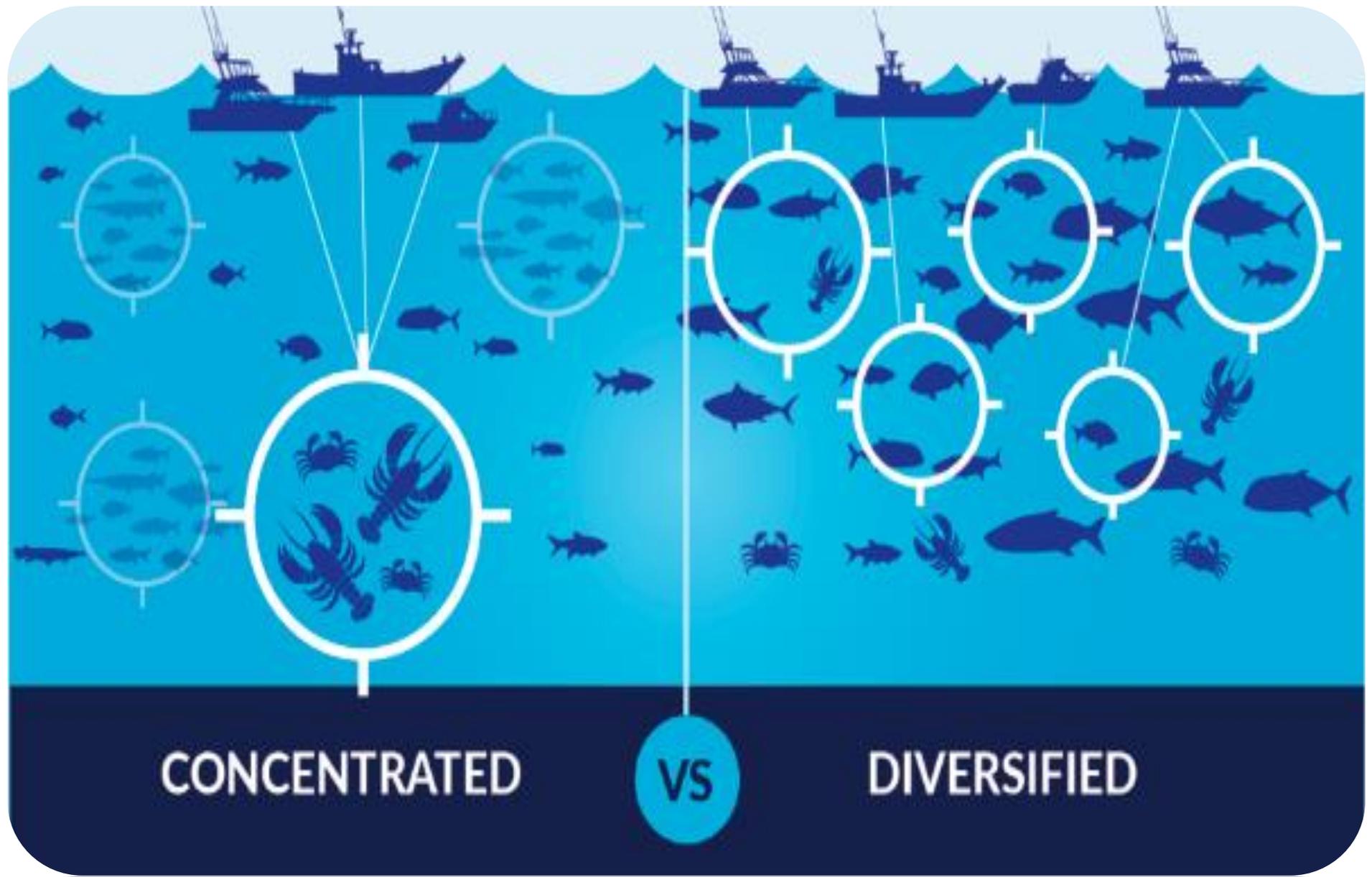
<https://www.eea.europa.eu/airs/2017/natural-capital/marine-fish-stocks>

**OS ESTOQUES** pesqueiros compreendem as espécies de peixes, moluscos e crustáceos, entre outras, que são exploradas economicamente pela pesca, e uma grande diversidade de espécies exploradas caracteriza a pesca marítima e nas águas continentais .









CONCENTRATED

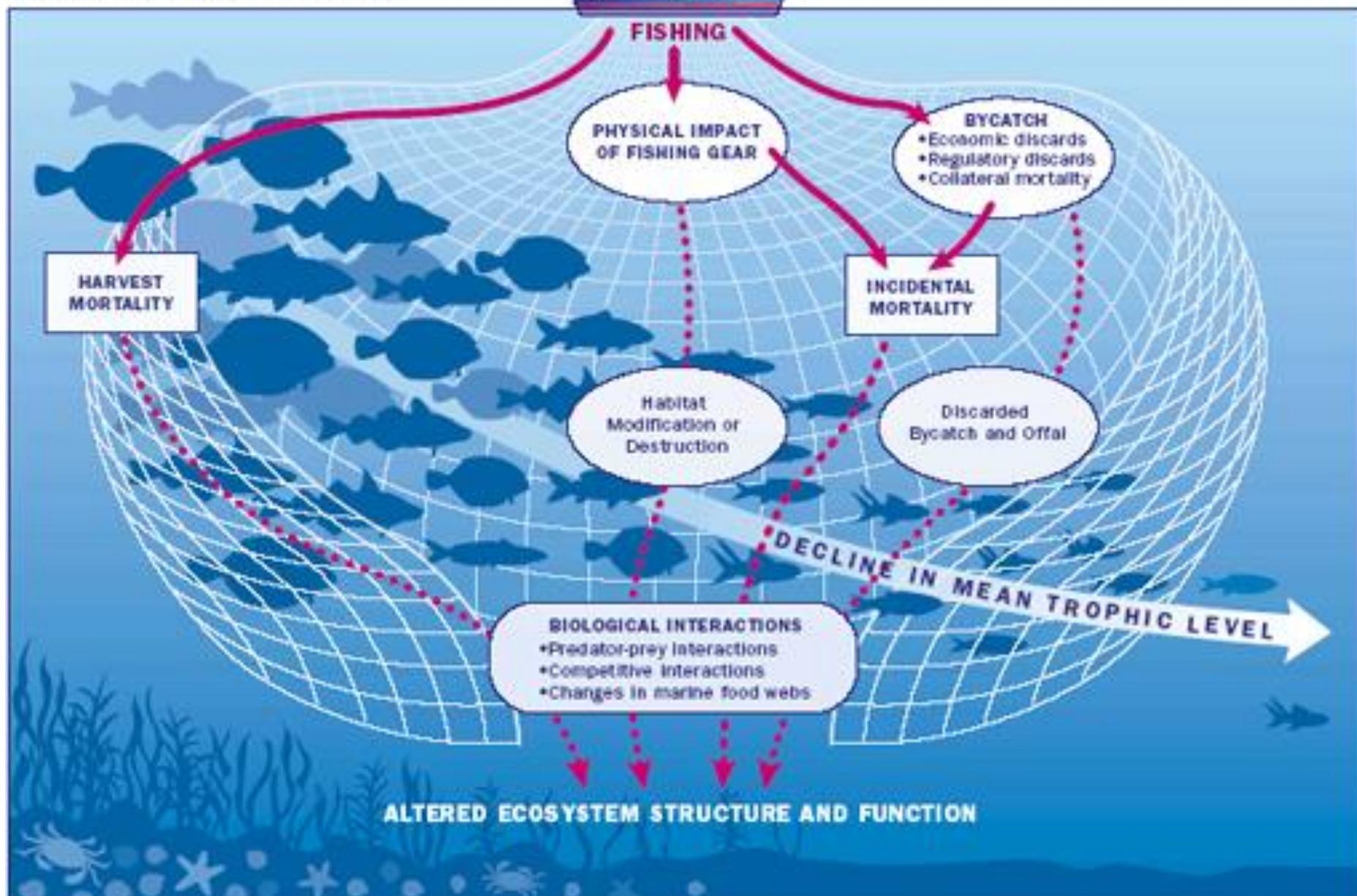
VS

DIVERSIFIED

CONCENTRATED VS DIVERSIFIED



## Ecosystem Overfishing



# OVERFISHING | 1234567890#%\$ BY THE NUMBERS



Overfishing occurs when fish are caught faster than nature can replace their supply. If the exploitation of our oceans' resources continues at its current rate, we can expect to see the total collapse of all edible fish stocks within 40 years.

## top 5 consumers of seafood

- Based on consumption per capita
1. Japan
  2. China
  3. United States
  4. Indonesia
  5. Russia

fishing stocks have seen a

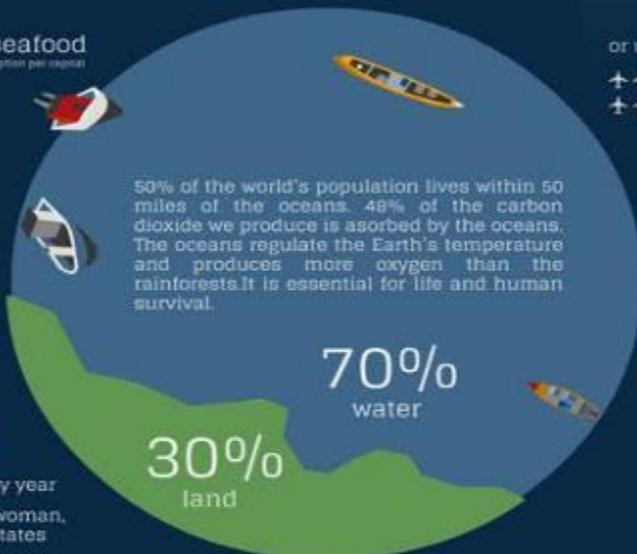
90% decrease  
1950  
↓  
2011

in the past sixty years

77.9 BILLION

tonnes of fish are caught every year

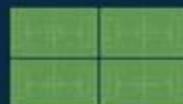
3x the mass of every man, woman, and child in the United States



a single net can hold 500 tonnes of fish



or up to 13 jumbo jets

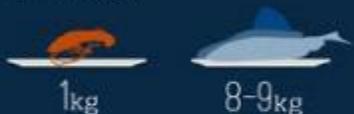


2300m<sup>2</sup>

the opening of a net can be as large as 4 football fields

## Bycatch

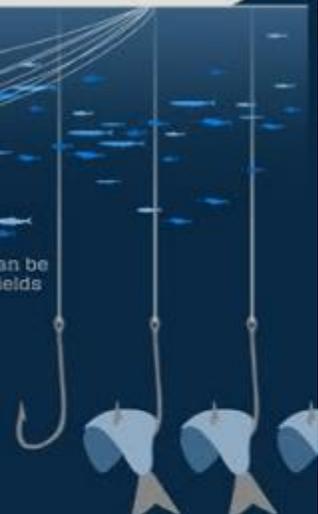
Bycatch is marine creatures incidentally caught. The percentage of bycatch is usually 50-90% of what is in the nets.



for every 1kg of shrimp, 8-9kg of bycatch is produced

## Hook, Line, and Sinker

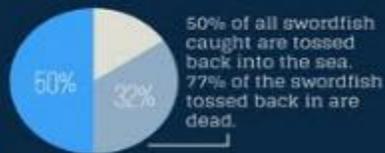
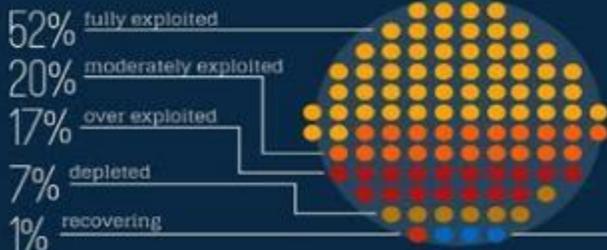
Long line fishing vessels deploy 1.4 billion hooks a year, each one with a small fish as bait.



1.2 billion people depend on fish as their source of protein in their daily diets.

## The State of Our Oceans

Almost 80% of the world's fisheries are exploited. 90% of the stocks of large predatory fish species are already gone.



Only 2% of our oceans are protected, compared to the 12% of protected land.

## Tragedy of the Commons



Cod in Canada was severely overfished during the first half of the 20<sup>th</sup> century. As a result, fishing stocks crashed in the early 1990's. In the 20 years since the crash, cod has not been able to return to its original population size.

## 8 Southern Atlantic Species in Severe Decline

The numbers show the remaining viable population for each species. Numbers below 30-40% show evidence of exploitation.



# OVERFISHING

1234567890#9  
BY THE N

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(based on consumption per capita)

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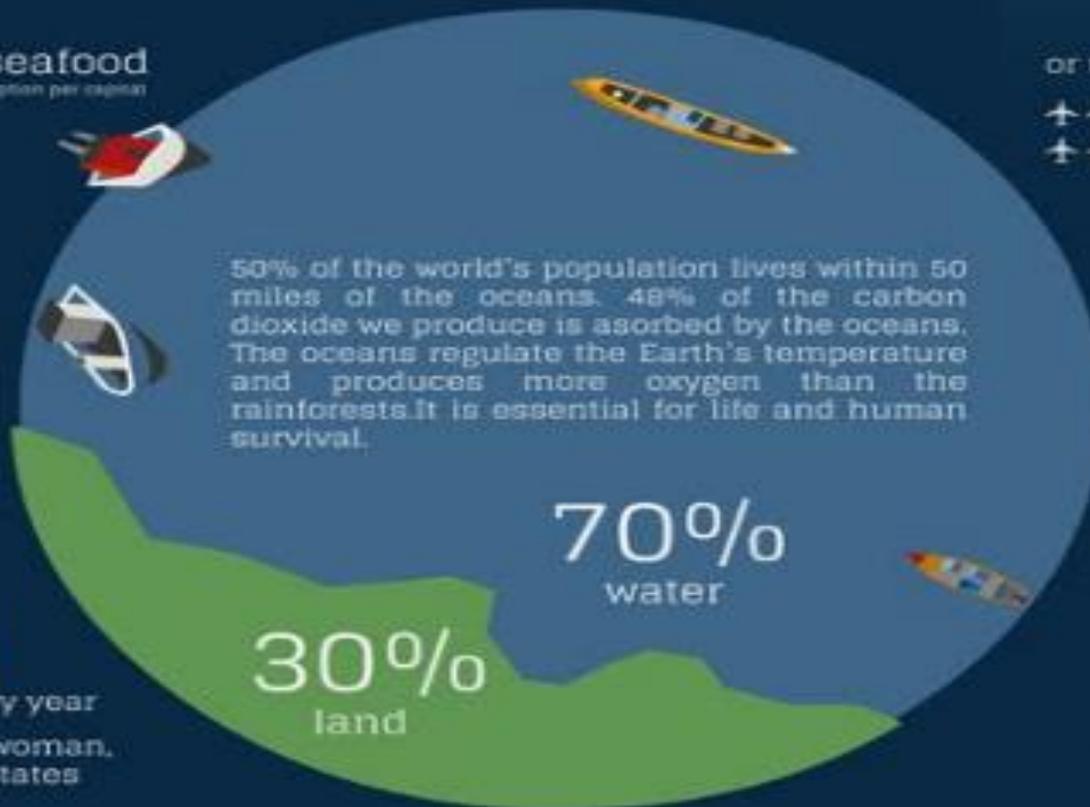
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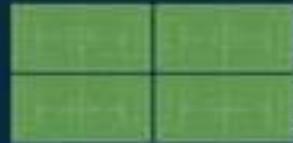


# THE NUMBERS

a single net can hold **500** tonnes of fish



or up to **13** jumbo jets



**2300m<sup>2</sup>**  
the opening of a net can be as large as 4 football fields

## Bycatch

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**1kg**



**8-9kg**

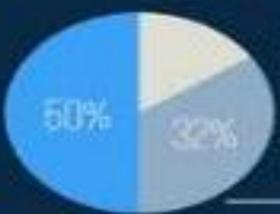
for every 1kg of shrimp, 8-9kg of bycatch is produced

## Hook, Line, and Sinker

Long line fishing vessels deploy 1.4 billion hooks a year, each one with a small fish as bait.

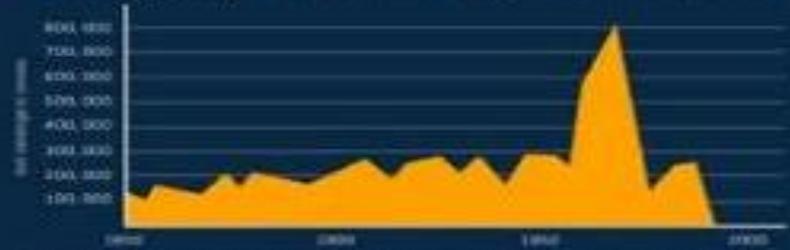


1.2 billion people depend on fish as their source of protein in their daily diets.



50% of all swordfish caught are tossed back into the sea. 77% of the swordfish tossed back in are dead.

## Tragedy of the Commons



Only 2% of our oceans

Cod in Canada was severely overfished during the

**Mas como o Biólogo pode atuar em relação aos estoques pesqueiros??**



# Meio acadêmico x Institutos especializados x Profissional liberal



Invertebrate Reproduction & Development



ISSN: 0792-4259 (Print) 2157-0272 (Online) journal homepage: <http://www.tandfonline.com/loi/irv20>

## Population biology and size at the onset of sexual maturity of the amphidromous prawn *Macrobrachium olfersii* (Decapoda, Palaemonidae) in an urban river in southeastern Brazil

Régis Augusto Pescinelli, Mariana Fronja Carosia, João Alberto Farinelli Pantaleão, Sabrina Morilhas Simões & Rogério Caetano Costa

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To link to this article: <http://dx.doi.org/10.1080/07924259.2016.1202338>

Journal of the Marine Biological Association of the United Kingdom, page 1 of 8 © Marine Biological Association of the United Kingdom, 10:17  
doi:10.1017/S0025315416000880

## Population dynamics, relative growth and sex change of the protandric simultaneous hermaphrodite *Exhippolysmata oplophoroides* (Caridea: Lysmatidae) close to an upwelling area

RÉGIS A. PESPINELLI<sup>1</sup>, THIAGO M. DAVANÇO<sup>1</sup>, JOÃO A. F. PANTALEÃO<sup>1</sup>, ABNER CARVALHO-BATISTA<sup>1</sup>, RAYMOND T. BAUER<sup>2</sup> AND ROGÉRIO C. COSTA<sup>1</sup>

<sup>1</sup>Laboratory of Biology of Marine and Freshwater Shrimp (L.ARCAM), Department of Biological Sciences, School of Sciences, University of São Paulo State (UNESP), Av. Eng. Luiz Edmundo Corrêa Côbes, 14-01, 17031-360 Bauru, SP, Brasil, <sup>2</sup>Department of Biology, University of Louisiana at Lafayette, Lafayette, Louisiana 70504-2451, USA

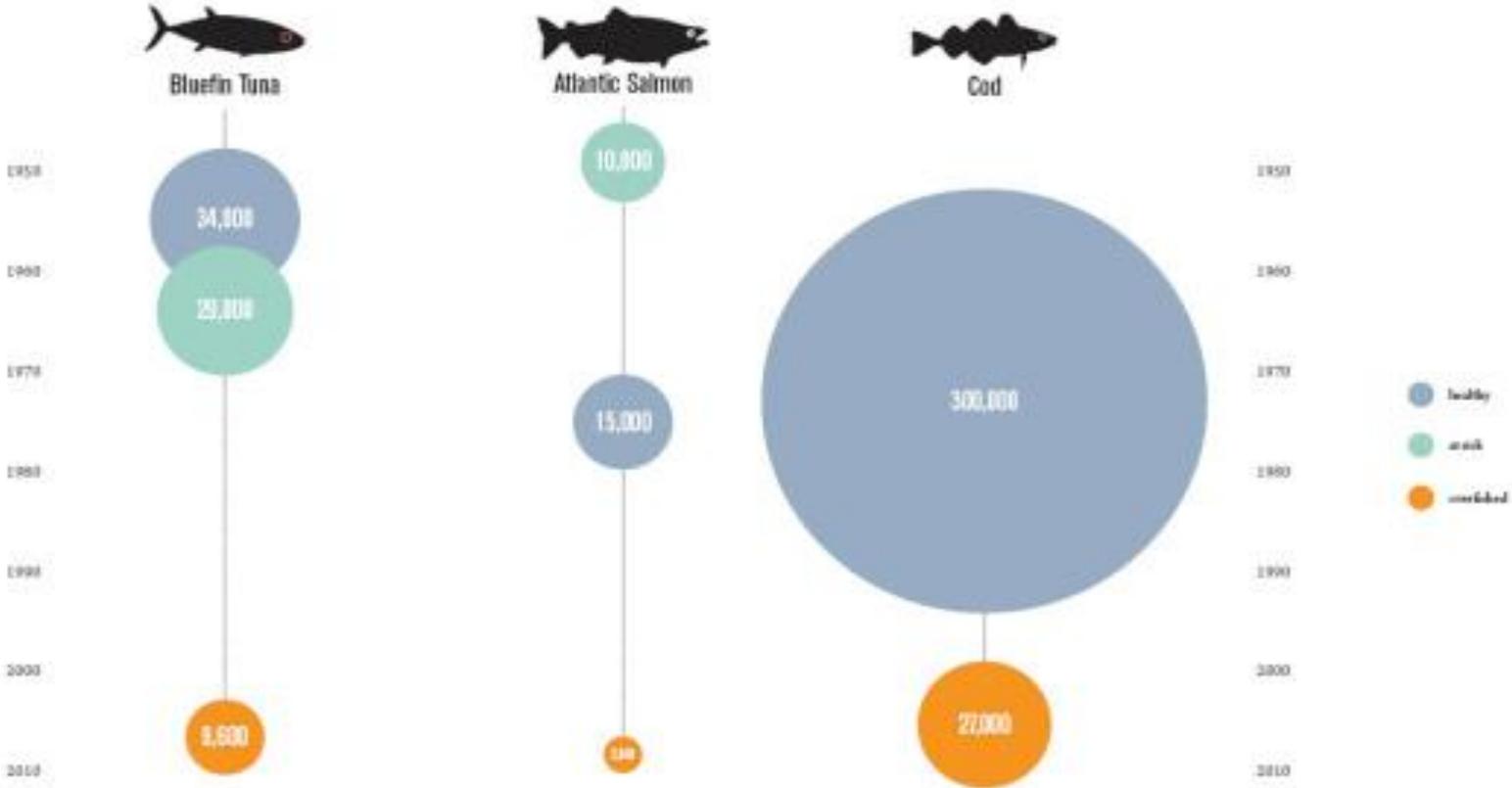
The present study investigated the population dynamics of *Exhippolysmata oplophoroides* in an area influenced by upwelling, focusing on reproductive period, sex ratio, growth rate, longevity, mortality, relative growth and size of sex change. We also tested the hypothesis that the appendices interme increased in size with sex change from the male to the simultaneous hermaphrodite phase as possible replacements for the male appendices masculine, which are reduced or lost at sex change. Population structure was assessed by the distribution of size frequency in three demographic groups: male phase, hermaph-



# Meio acadêmico

## What's Happening to the Fish?

Atlantic fish catches in tonnes



source: European Environmental Agency, ICCAT, Food & Agriculture Organization of the United Nations

# Growth rate and age at sexual maturity of Atlantic salmon smoltifying at one and two years of age

**Nævdal, Gunnar; Bjerk, Øyvind; Holm, Marianne; Lerøy, Rita; Møller, Dag**

## Working paper



## Original version

This report is not to be quoted without prior consultation with the General Secretary.

## Abstract

Postsmolt growth rate and age at first maturation are compared for sibgroup or population groups of salmon originating from Norwegian rivers and fish farms. Generally high correlations were found between corresponding values (lengths at different ages and proportions of mature fish in the second and third sea year) for one and two year smolt. One year smolt were smaller at the smolt stage and grew slower the first sea year, but the two categories reached practically the same total length after two years in the sea. In most groups and in the total material one year smolt gave higher proportions of grilse. Proportions of mature fish during their third sea year were similar for one and two year smolt of

## Tamanho mínimo de captura ?

ESPÉCIE	PORTARIAS DO IBAMA							MS	MT	MG
	1	2	3	4	5	6	7	8	9	10
	80cm	-	90cm	80cm	85cm	-	-	85cm	85cm	80cm
	80cm	80cm	70cm	-	80cm	70cm	70cm	80cm	80cm	-
	80cm	-	90cm	-	95cm	-	80cm	95cm	90cm	-
	55cm	-	60cm	60cm	65cm	-	-	65cm	65cm	60cm
	40cm	-	45cm	-	45cm	-	-	45cm	45cm	30cm
	-	-	-	-	38cm	-	-	38cm	35cm	-
	-	30cm	-	-	38cm	-	-	38cm	30cm	30cm
	-	-	-	-	30cm	-	-	30cm	30cm	-
	-	-	50cm	-	60cm	-	50cm	60cm	60cm	50cm

**Seleção ?**



# Biólogo Embarcado



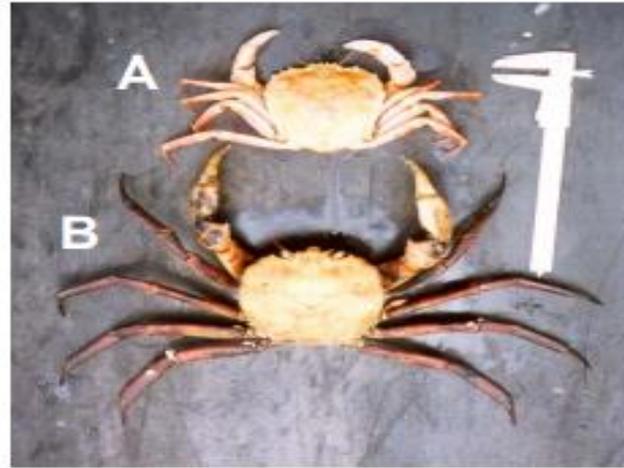


Figura 1 - Dois exemplares de *Chaceon ramosae* capturados na operação de pesca do Kinpo Maru nº 58, sendo (A) uma fêmea e (B) um macho. Obs.: paquímetro, usado como escala de referência, com 20 cm de comprimento.

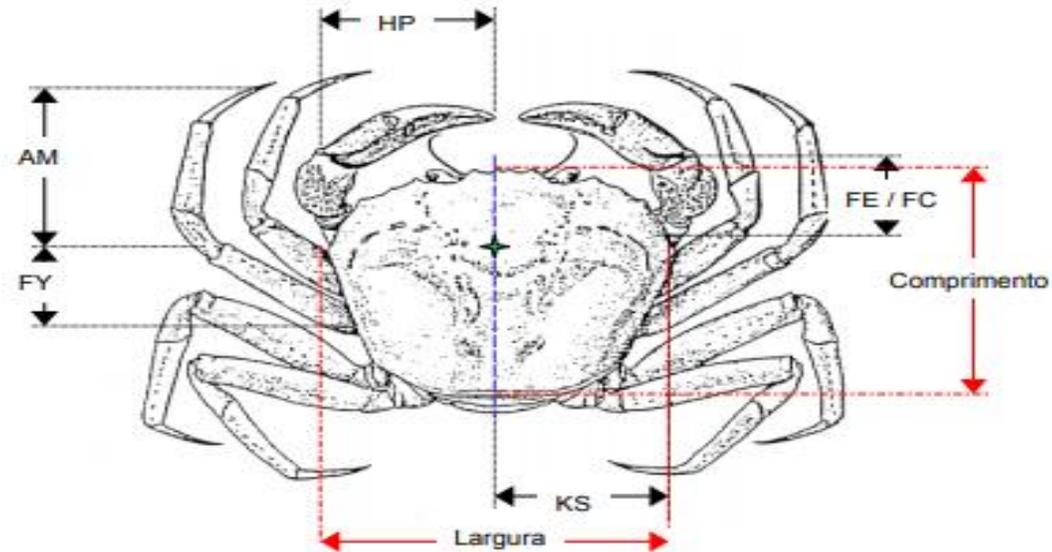


Figura 2 - Esquema de um *Chaceon ramosae* com destaque para as medidas morfométricas de comprimento e largura (traço vermelho) e altura (estrela verde); também são evidenciadas as partes do caranguejo de onde são obtidos os produtos (em preto) para comercialização: FE - carne fibrosa, FC1 - caldo grosso e FC2 - caldo fino, todos oriundos da moagem; HP - dactilos ou quelas; FY - cilindro de carne, AM - carne macerada, ambos provenientes das patas; e KS - metade de

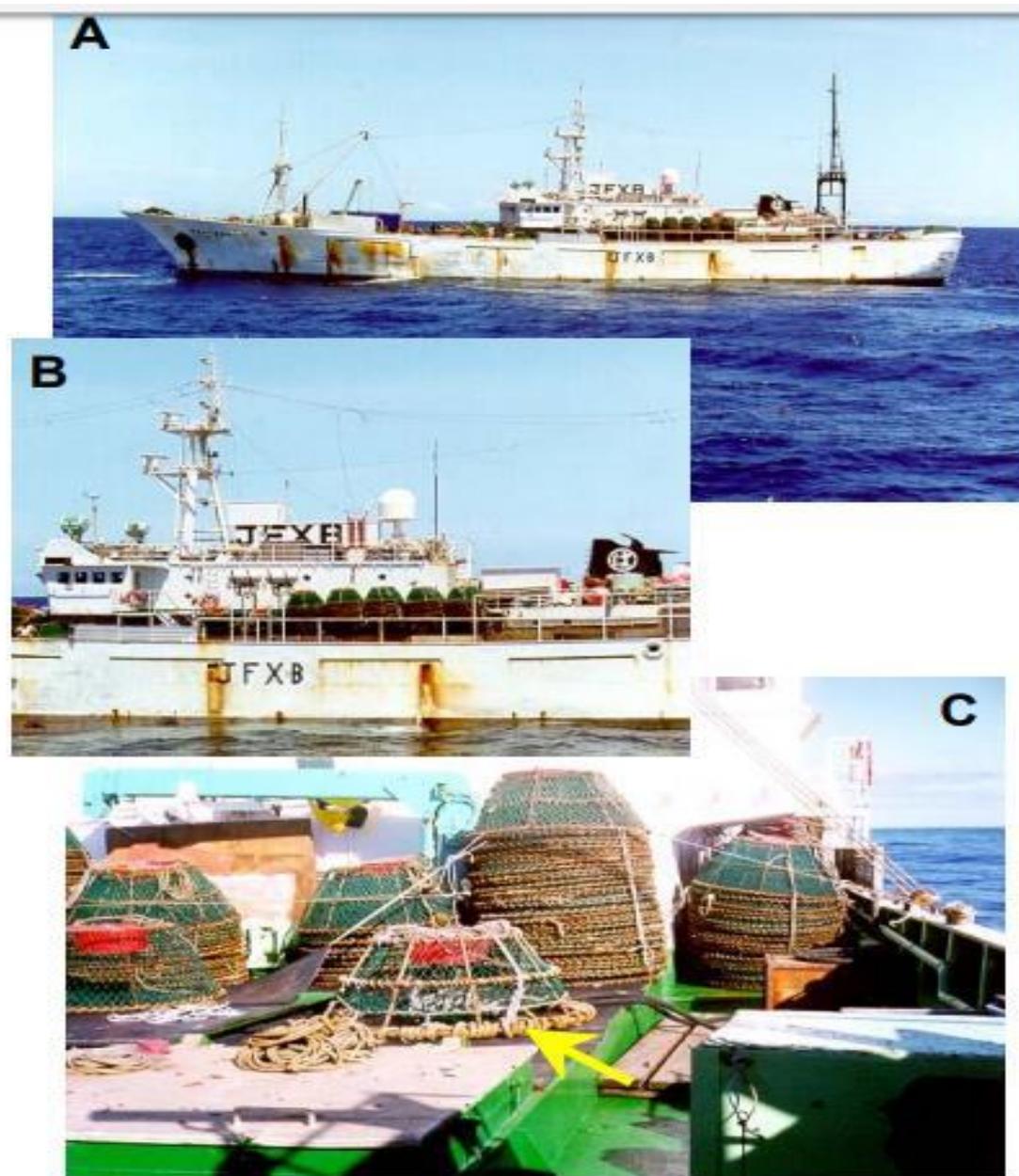


Figura 3 - Visão geral do Navio de Pesca "Kimpo Maru n° 58" (A), com detalhe do local, a bombordo (B), onde são acondicionadas as armadilhas. Em (C) podem ser vistas as armadilhas com dois tipos diferentes de malha e a "anca", assinalada com uma seta.

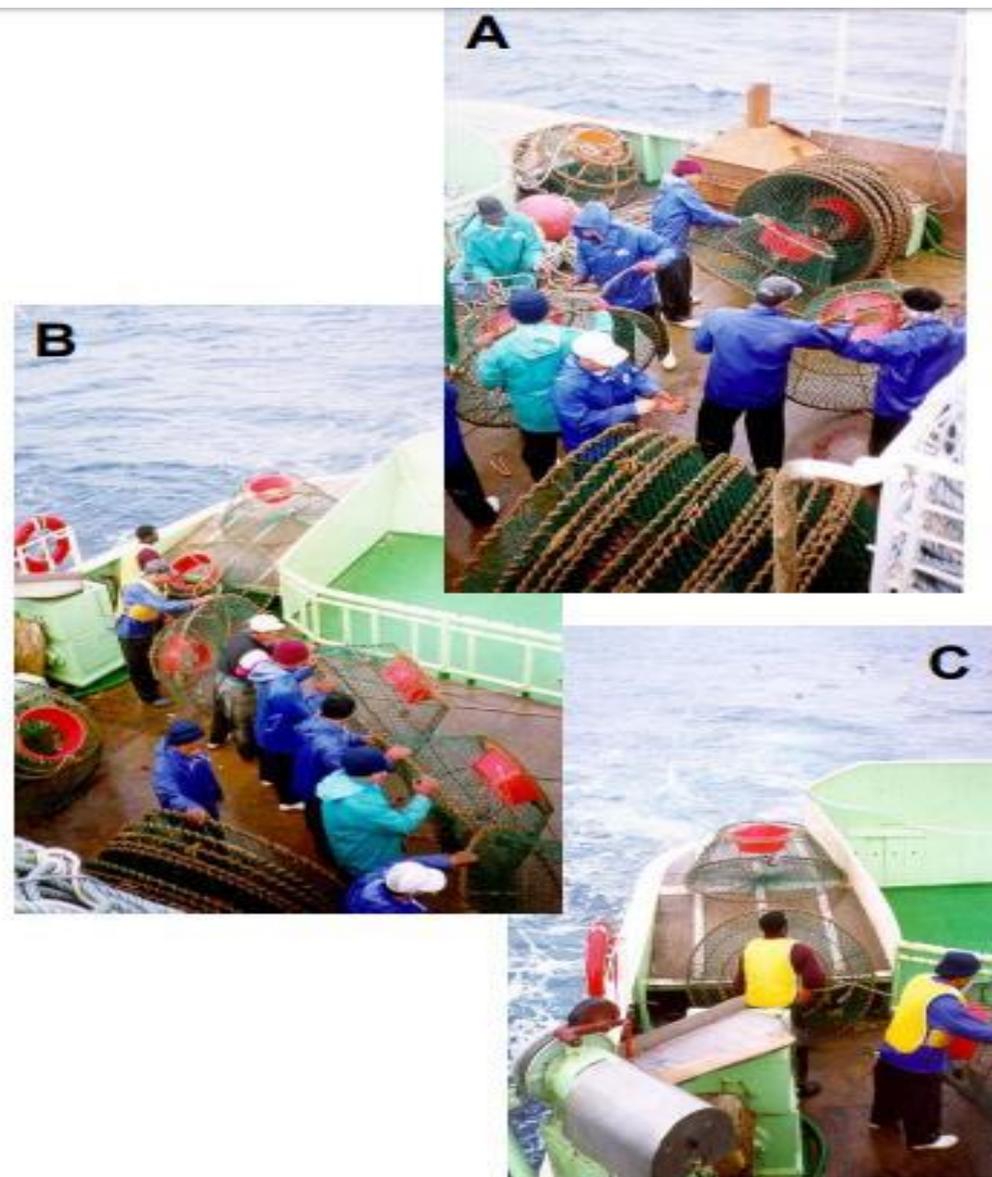


Figura 7 - Três etapas de lançamento das armadilhas ao mar: (A) as armadilhas, iscadas, são fechadas e presas no cabo madre por um tripulante; (B) em fila, os marinheiros passam as armadilhas para estibordo; (C) as armadilhas são colocadas na rampa da popa e, devido ao próprio peso do cabo que as antecede e ao movimento do navio, são arremessadas na água.

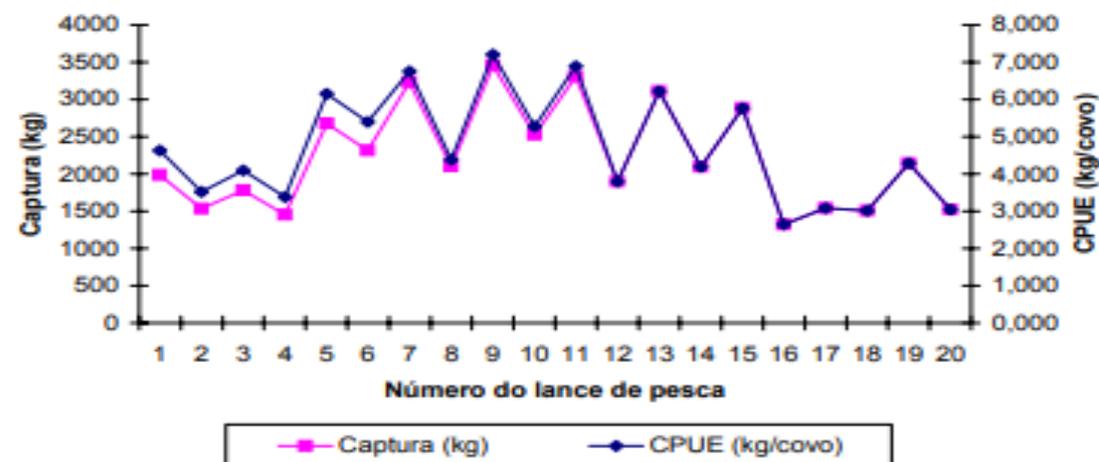


Figura 17 - Variação por lance da captura e da captura por unidade de esforço (CPUE), nas operações de pesca do navio "Kinpo Maru nº 58"

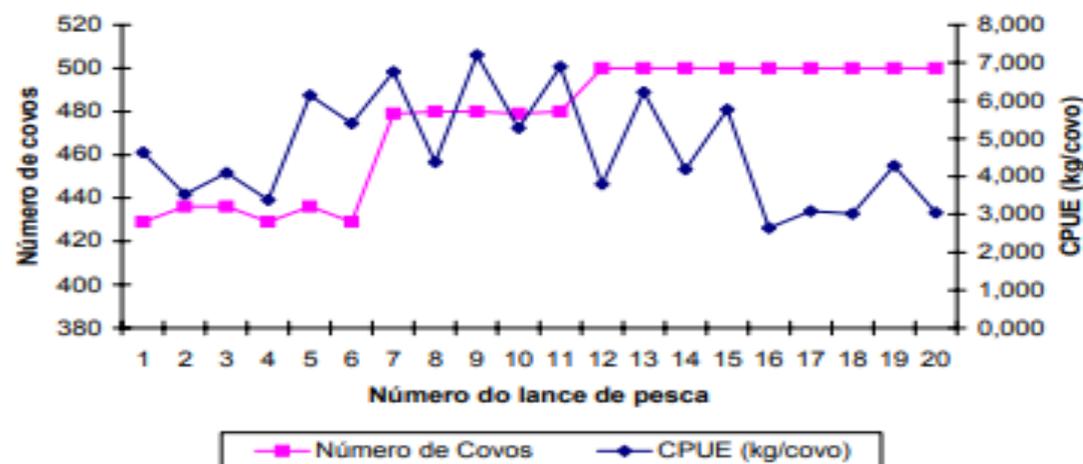
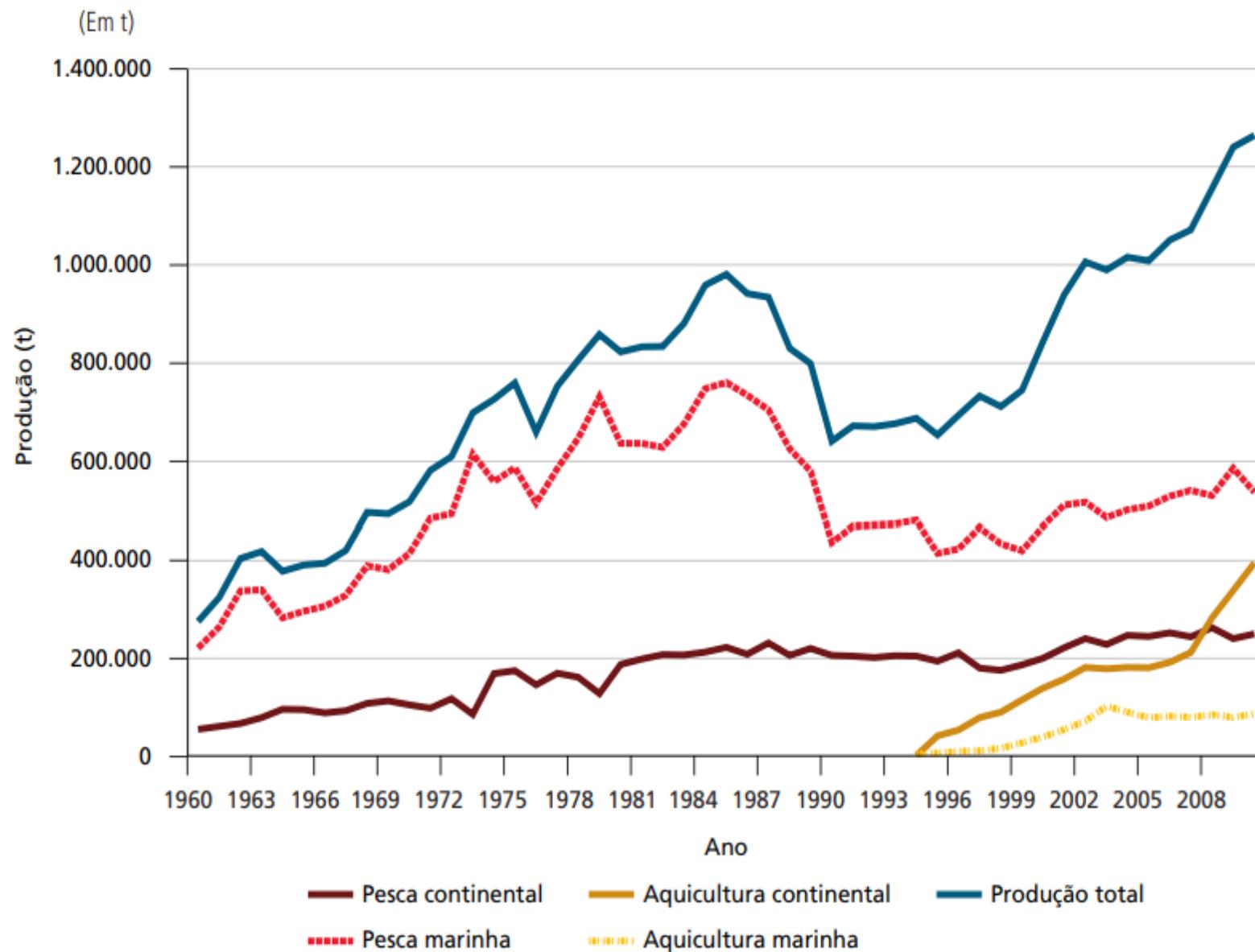


Figura 18 - Variação do número de covos no lance de pesca e captura por unidade de esforço (CPUE), nas operações de pesca do navio "Kinpo Maru nº 58"

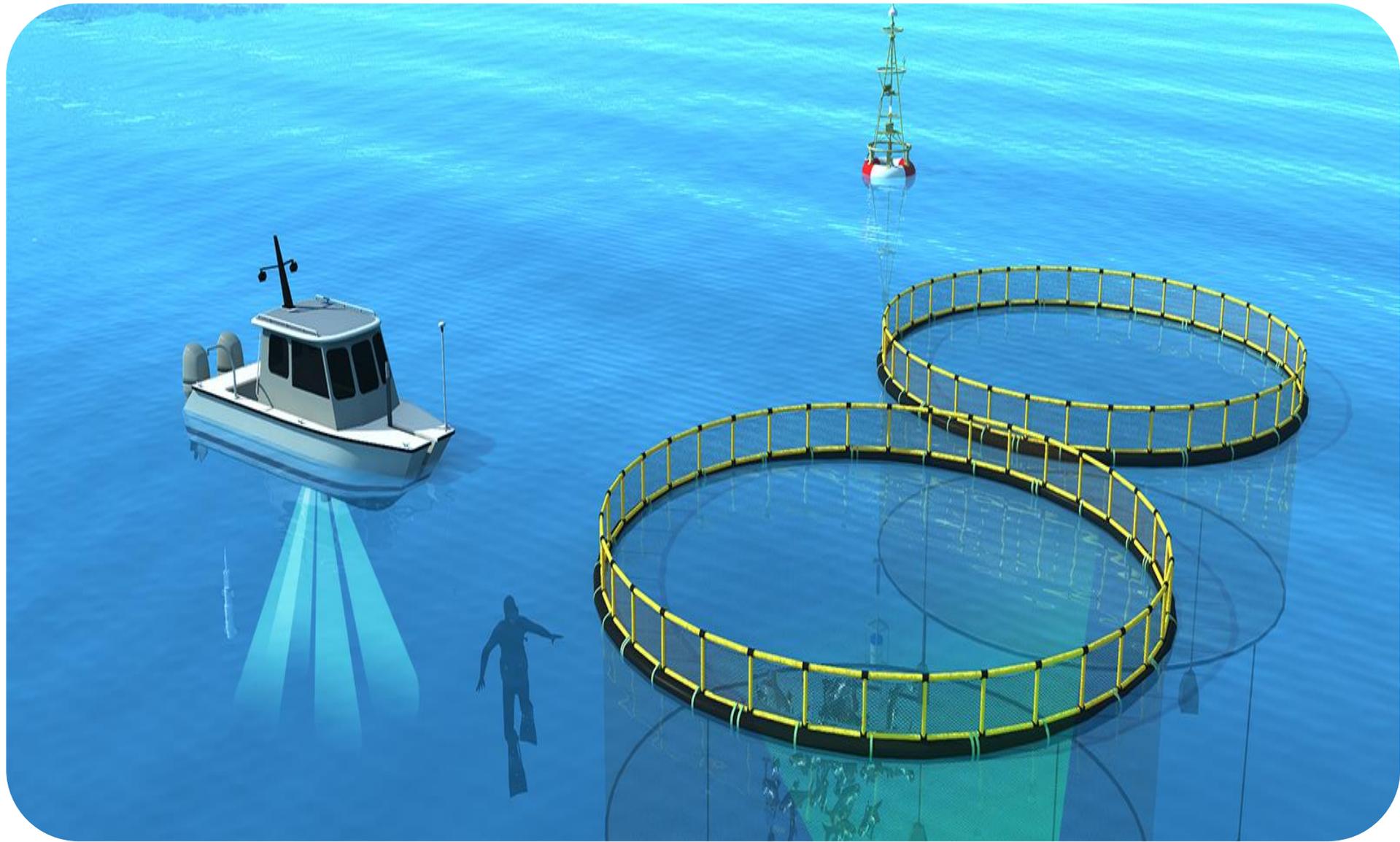
# Aquicultura



## Produção da pesca extrativa e da aquicultura, em ambientes marinhos e nas águas continentais (1960-2010)



**Estudos populacionais fornecem informações para a criação de estruturas de acordo com a espécie a ser produzida**





A large mangrove tree with its roots extending into the water, illustrating an aquatic ecosystem. The tree has a thick, gnarled trunk and a dense canopy of green leaves. The water is clear, showing the intricate root system below the surface. The sky is blue with scattered white clouds. The overall scene is a vibrant and healthy mangrove environment.

# ECOSSISTEMAS AQUÁTICOS

**Prof. Dr. Régis A. Pescinelli**