



Innovative methods and strategies in Vocational Education and
Training for efficient use of resources and environmental protection



Workshop:

“Ecological and efficient use of the resources and incidence of utilization of resources for ecosystems”

Friday 31st of January

Prof. Stefano Cannicci
Prof. Rita Cervo
Prof. Felicità Scapini
Dr. Elena Tricarico
Dr. Irene Ortolani



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DIPARTIMENTO
DI BIOLOGIA


THE BROCHURE

PARTNER INSTITUTIONS:

 TRAINING CONS 2005 srl –
coordinator, Romania


 National Agircultural
Advisory Centre in Brwinow,
Poland


 IMPULSA IDEAS, S.L, Spain

 Bolu Provincial Directorate
of Environment and
Urbanization, Turkey

 Asociacion USIT, Spain

 Department of Biology,
University of Florence, Italy

 District Governorship of
Sultanhisar, Turkey

 Vocational High School of
Mechanical Techniques, Bulgaria

 Association "European Values
Institute", Bulgaria



WORKSHOP:

Threats to European
ecosystems and
management of
ecological resources

The workshop is part of the
project INOVES:

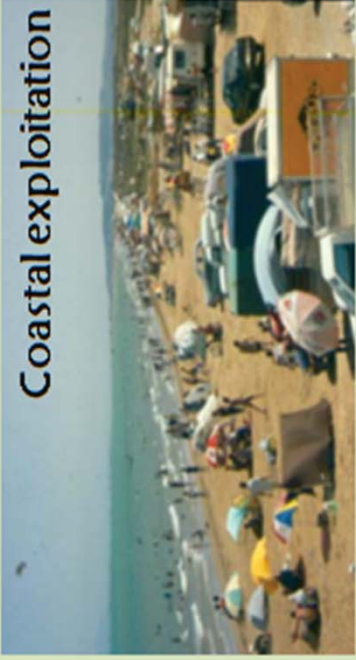
“Innovative methods and
strategies in Vocational
Education and Training
for efficient use of
resources and
environmental
protection”

The project addresses to the
teachers, trainers, tutors
working in the field of
resource usage and
environmental protection and
in similar professions in
training centers / institutions
or schools.

Friday 31 January

Dipartimento di Biologia
Via del Proconsolo 12

THE BROCHURE



The workshop will be focused on important issues of the use and exploitation of resources, on their ecological implication and on their possible sustainable solutions.

THE PROGRAMME - MORNING



09:00 - Prof. Stefano Cannicci: “Marine resources exploitation in a changing world”



09:45 - Prof. Felicita Scapini: “Use and exploitation of coastal environments: beaches, saltmarshes and harbours”



10:30 - Prof. Rita Cervo: “Bees are disappearing: biological defence strategies to ensure their survival”

11:15 – coffee break



11:30 - Dr. Elena Tricarico: “Invasive alien species: a threat to ecosystem services”



12:15 - Dr. Irene Ortolani: “Coastal defences around the world and in the Mediterranean Sea: ecological impact and management”



Coastal defences around the world and in the Mediterranean Sea: ecological impact and management



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DIPARTIMENTO
DI BIOLOGIA

Irene Ortolani

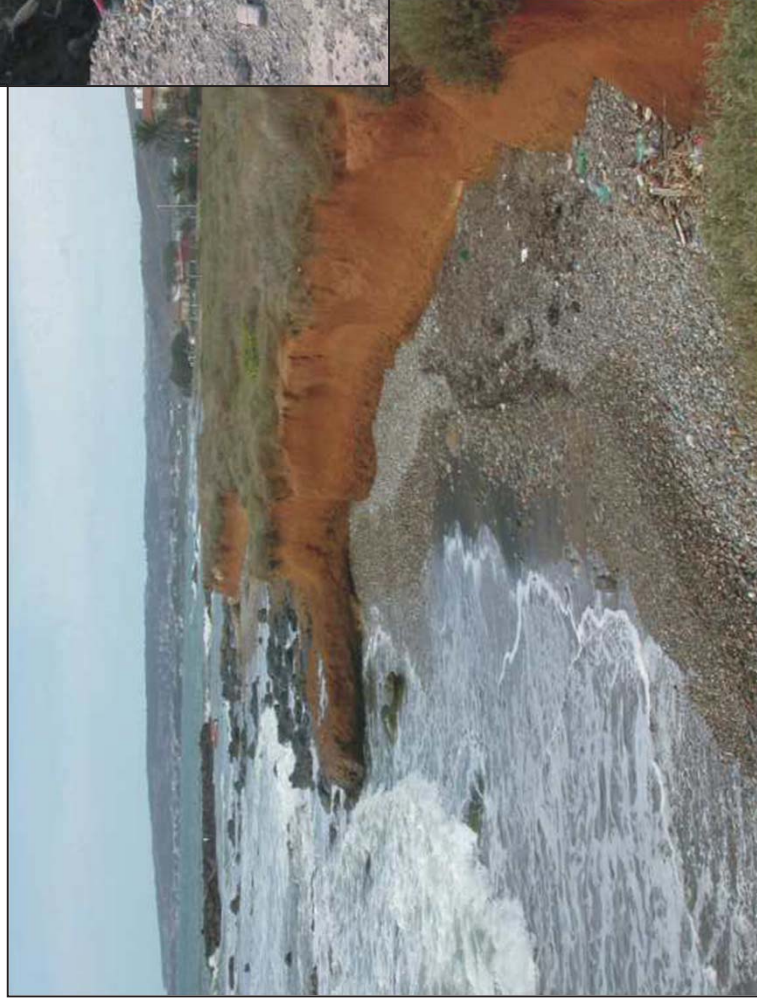
Dipartimento di Biologia – Università degli Studi di Firenze

irene.ortolani@unifi.it

EROSION



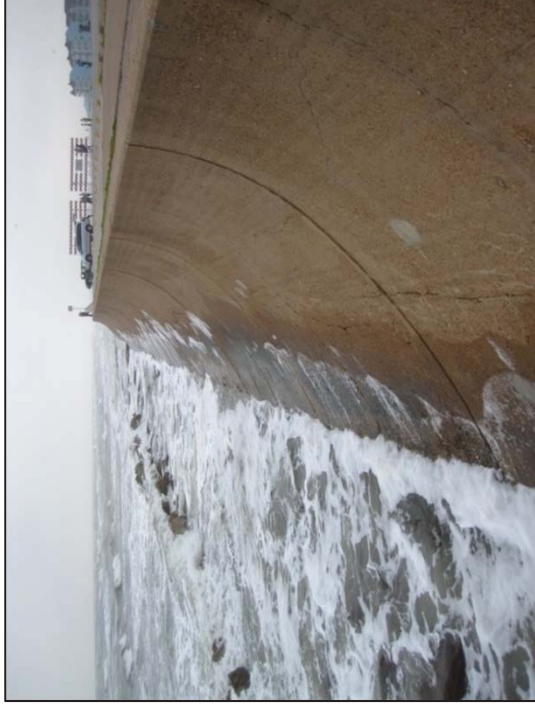
EROSION... ...A PROBLEM AT EUROPEAN LEVEL



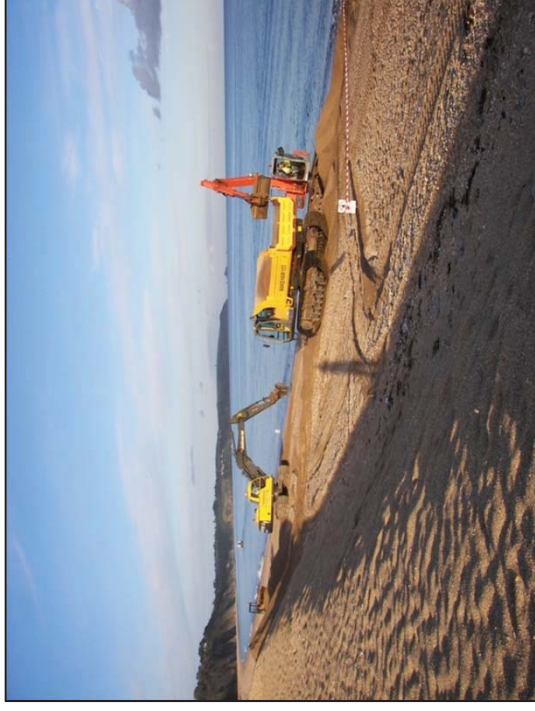
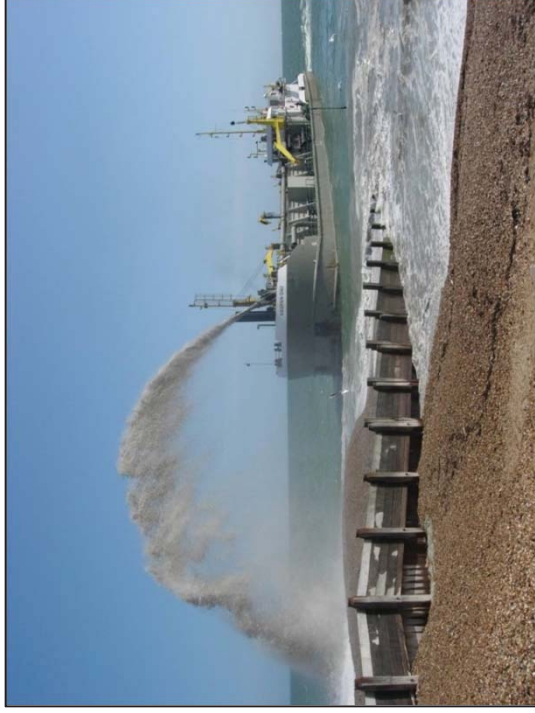
www.euroasion.org

Defence interventions

HARD: coastal defences



SOFT: beach nourishments

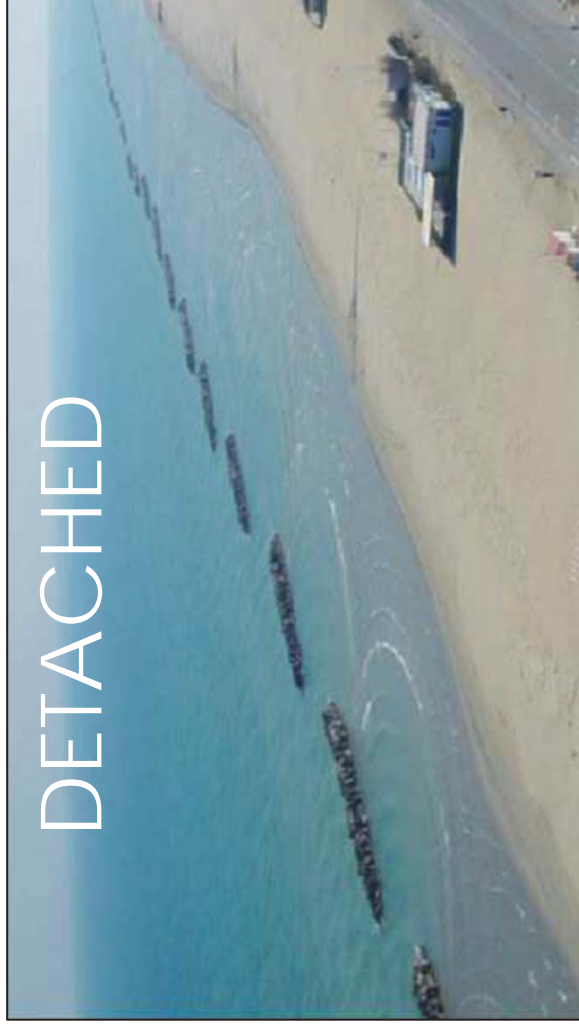


Coastal defences

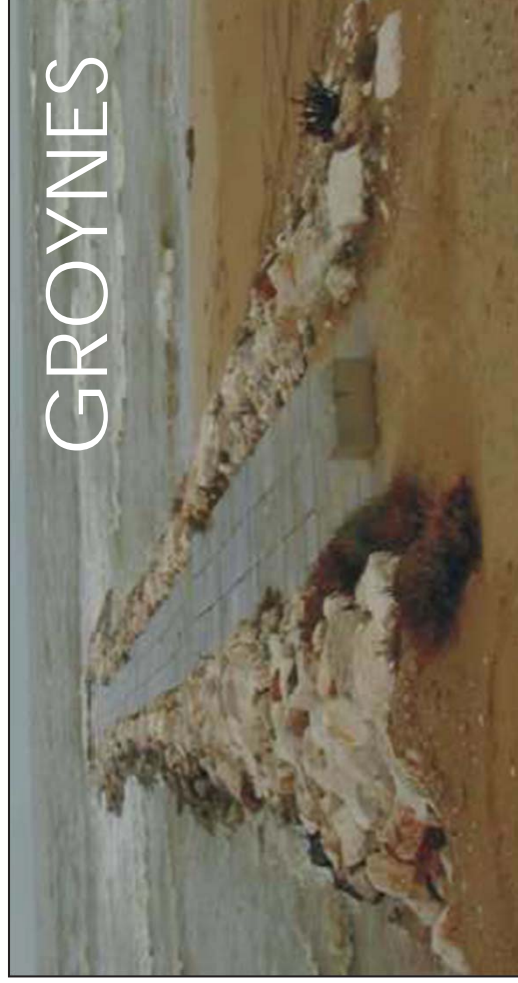
HARD DEFENCES

- materials
- orientation
- distance

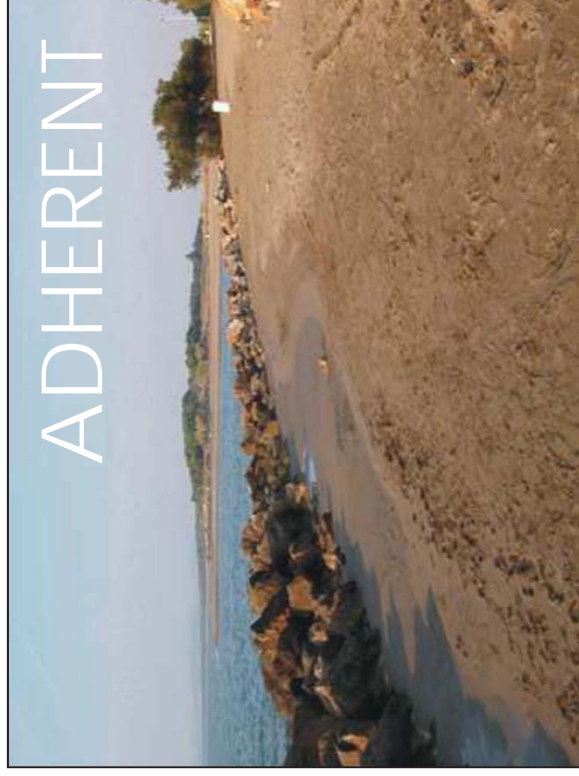
DETACHED



GROYNES



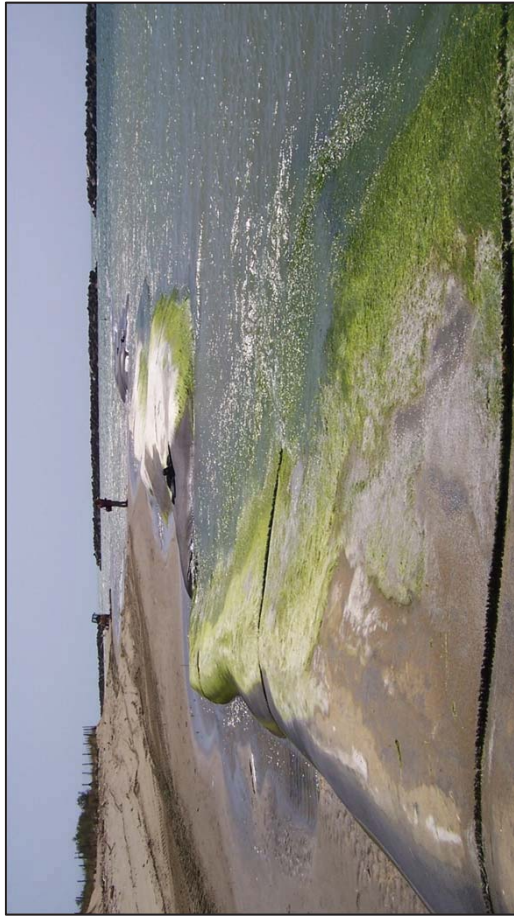
ADHERENT



Coastal defences

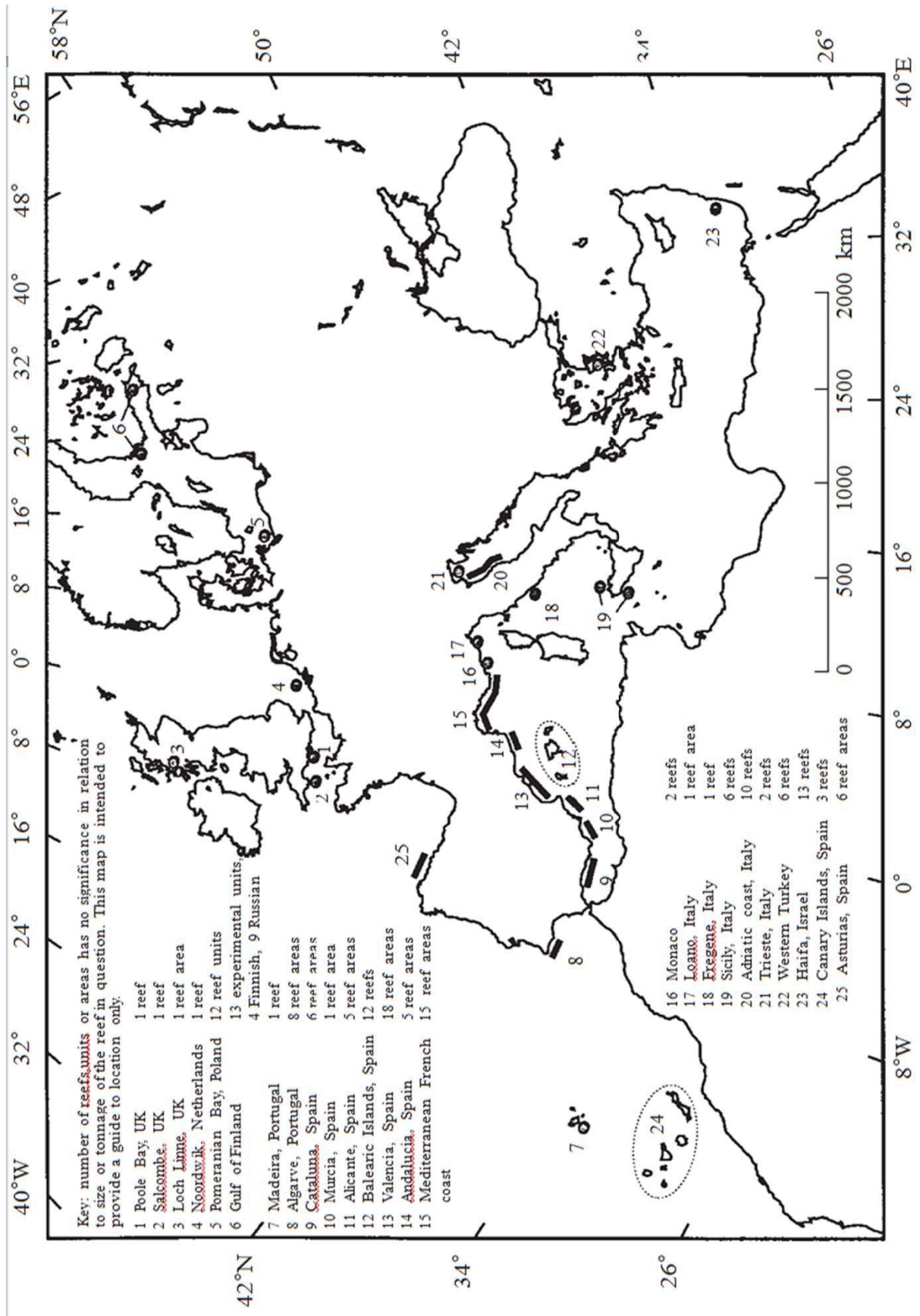


GEOTEXTILES



Coastal defences

Europe diffusion (Jensen, 2002)



Morphological effects

Recovery or creation of beaches



Morphological effects



Combined effect: groyne and nourishment



... BUT A ECOLOGICAL LEVEL?

On the structures:

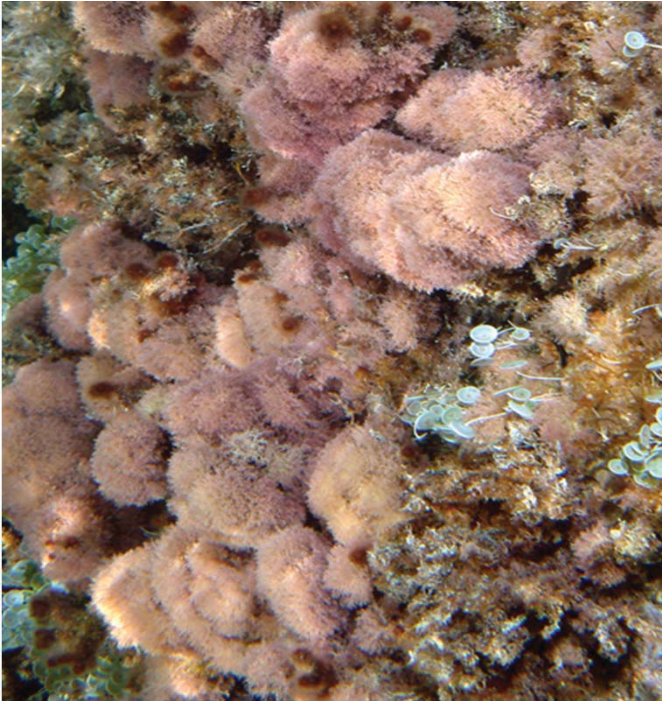
- Surface colonization
- Recruitment of hard substrate species
- Fish attraction
- Spread of invasive alien species

→ they act as "NOVEL HABITATS"

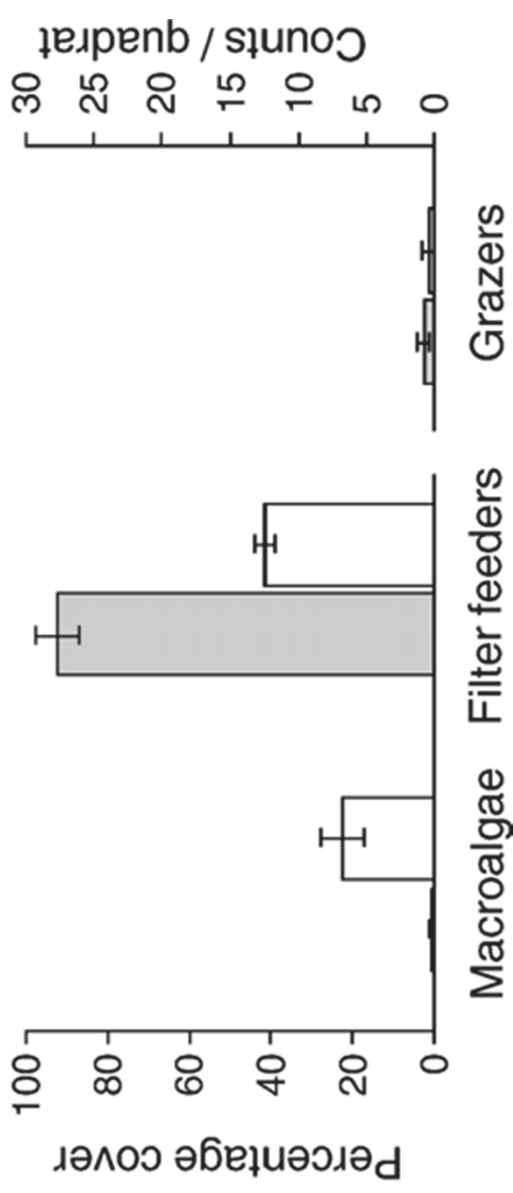
On surrounding environments:

- Loss or alteration of previous habitats
- Alteration of soft bottom infauna
- Alteration of near rocky shores
- Stepping-stones effect

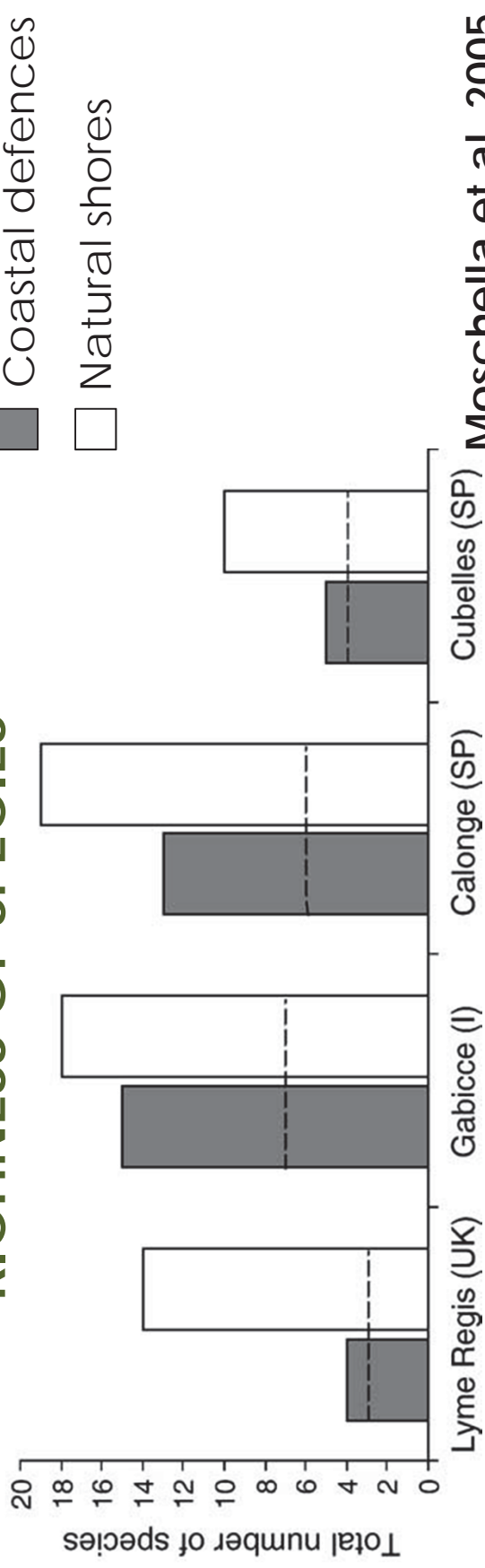
Effects: epibiontos



ABUNDANCE



RICHNESS OF SPECIES



Effects: epibentos



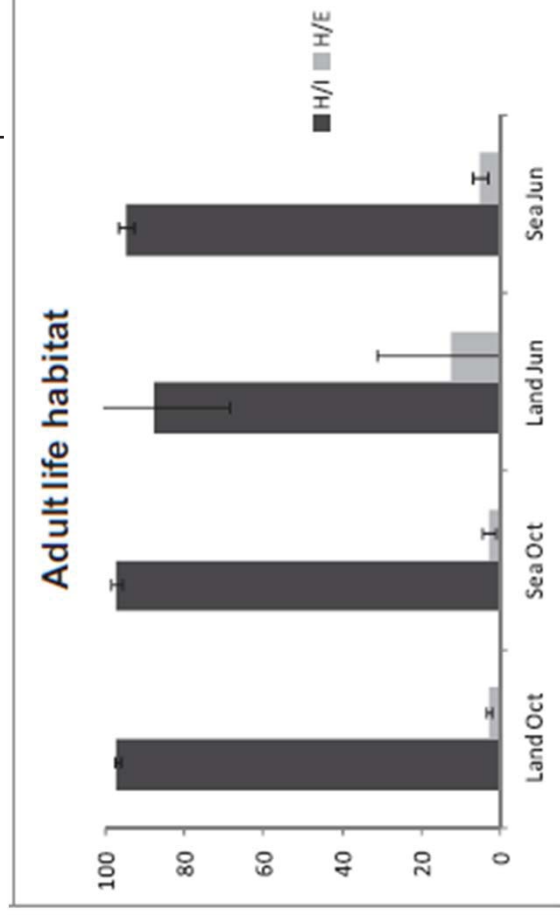
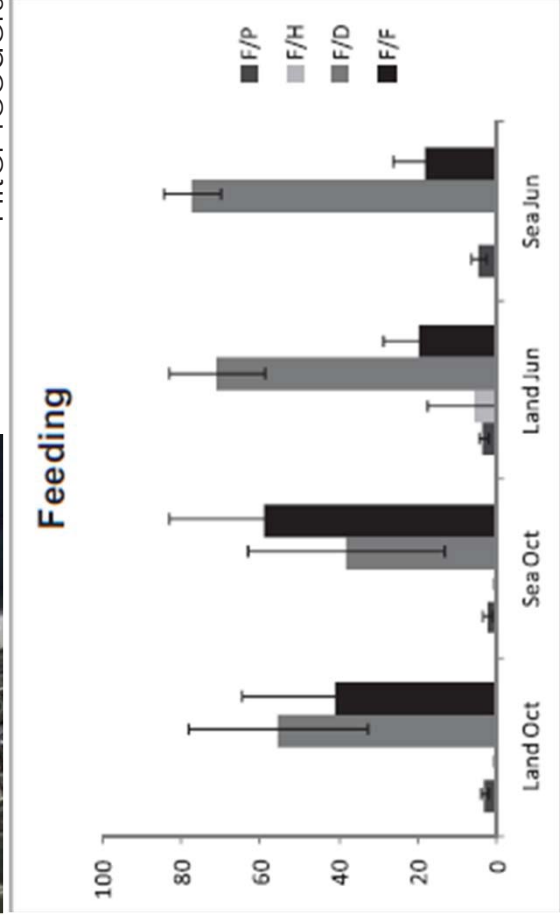
Composition on artificial structures



Non-homogenic composition
(sheltered effect)

Predators
Herbivorous
Detritivores
Filter feeders

Infauna
Epifauna



(mobilità, dimensioni, vita, tecniche e frequenza riproduttive, tipo larva)

Lido di Dante (Adriatico)

Munari et al., 2013

Effects: ichthyofauna

Ichthyofauna

→ Tygmotropic effect

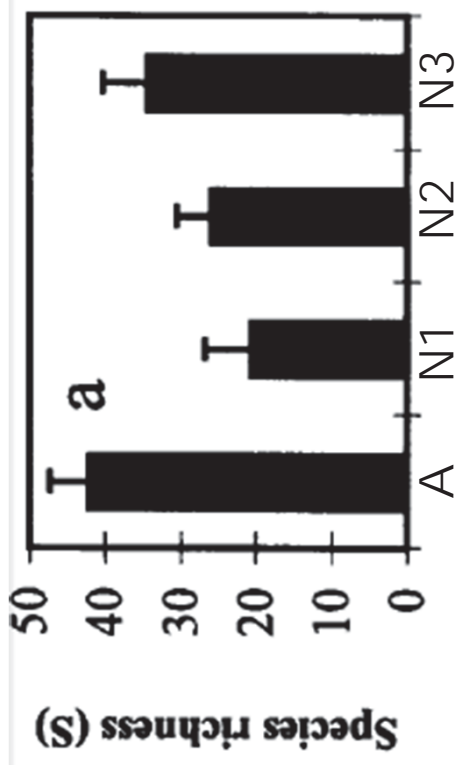
Barriers are attractant or
productive?



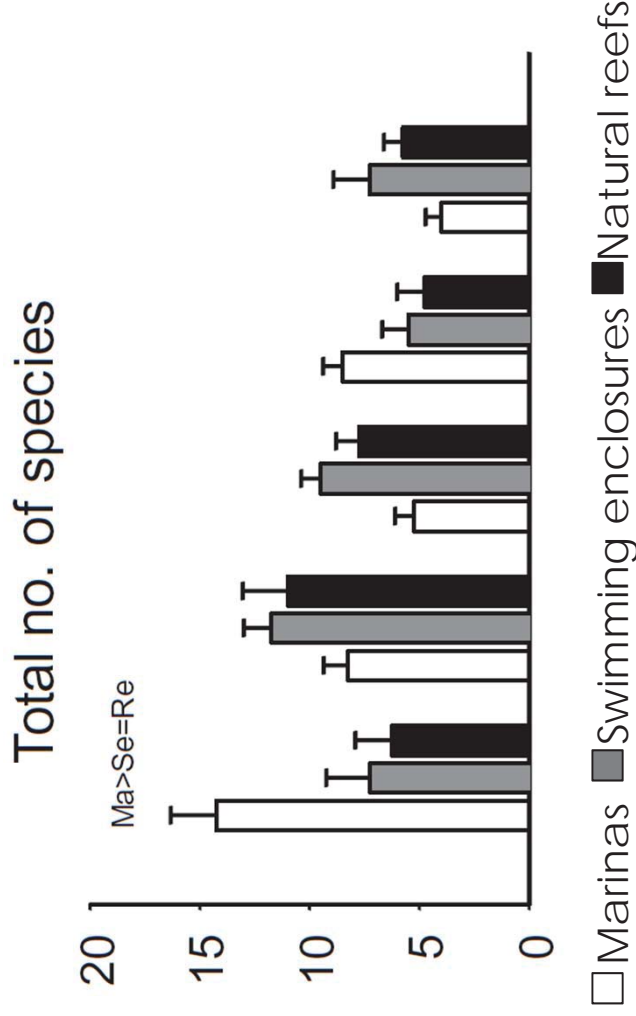
Effects: ichthyofauna

Ichthyofauna

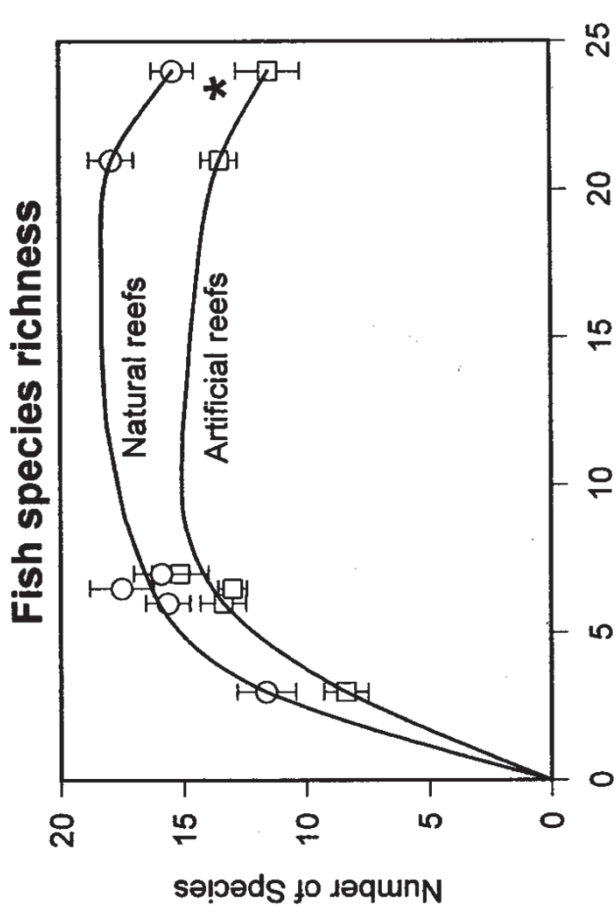
Different trends depending on the local context



Rilov&Benayahu, 2002



Clynick, 2008

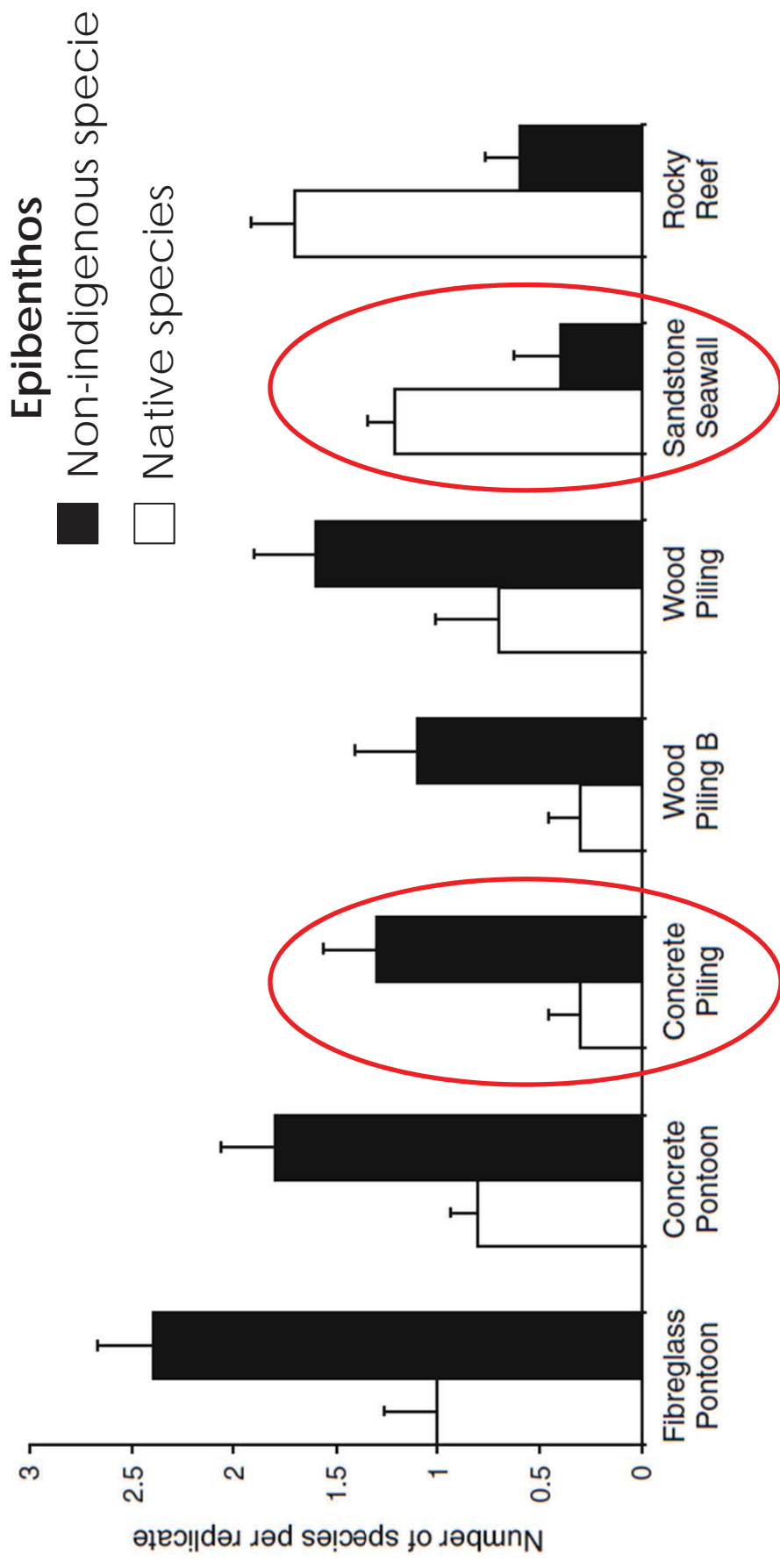


Carr&Hixon, 1987

Effects: invasive species

Spread of alien species

Substrate suitable by non-indigenous species

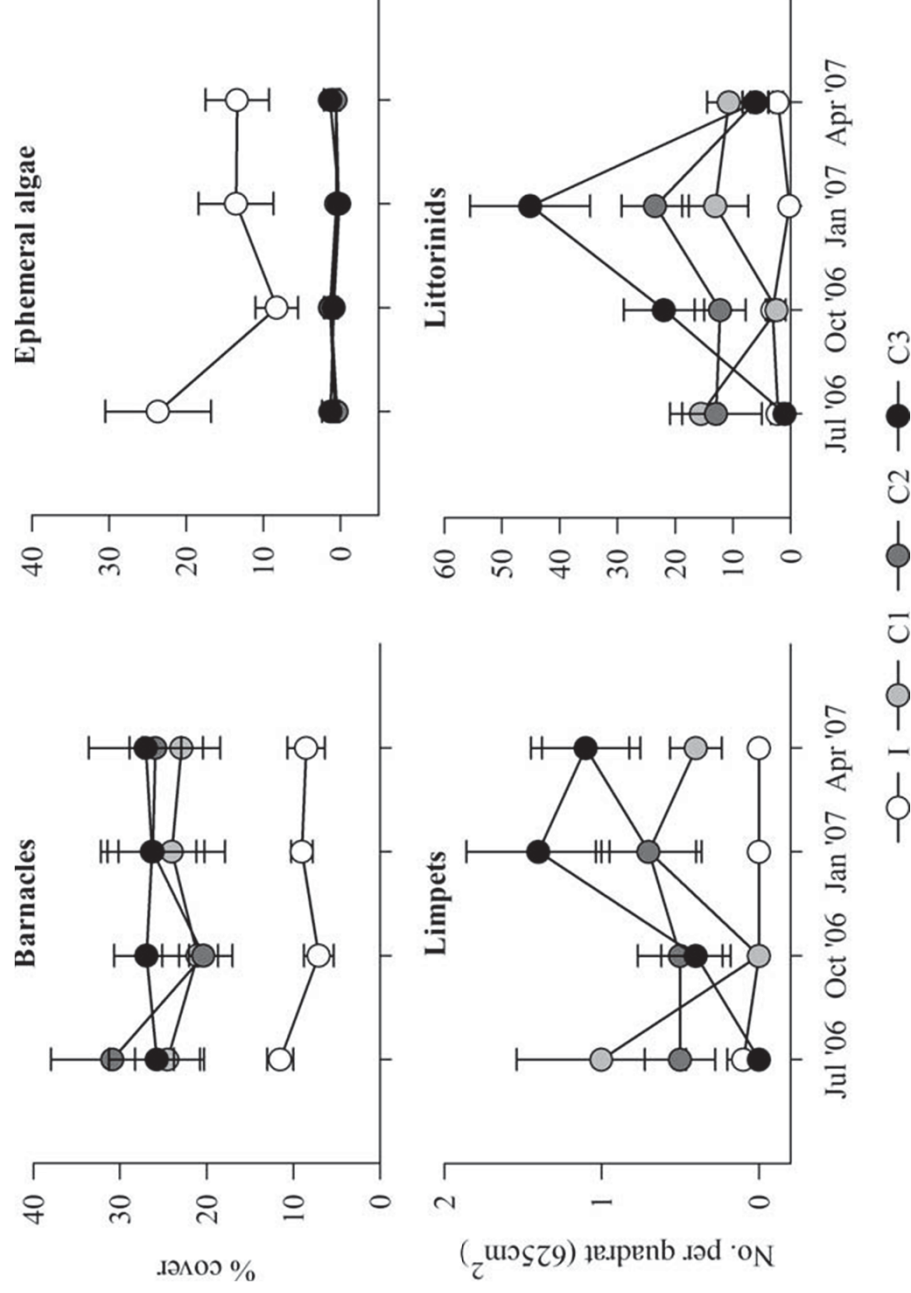


Glasby et al. 2007

Effects: nearby rocky shores

Epibenthos on natural rocks

Changes in composition due to the changes in hydrodynamic regimen (sheltered effect)

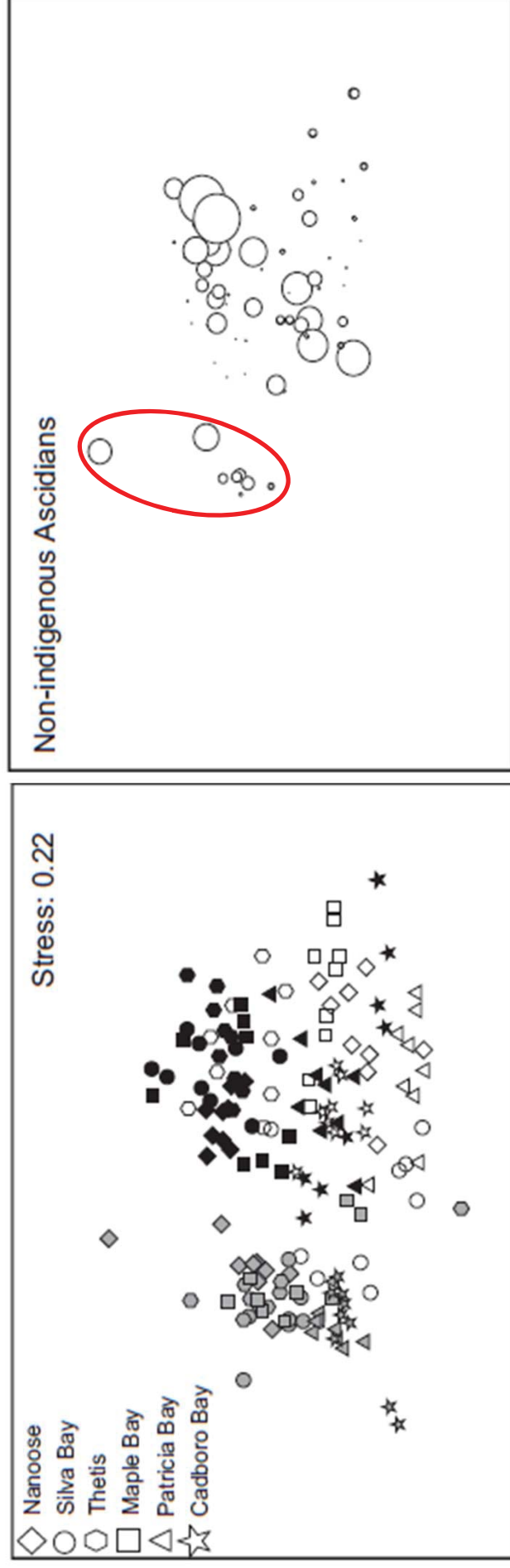


Effects: nearby rocky shores

Epibenthos on natural rocks

Infiltration of non-indigenous species present on artificial structures

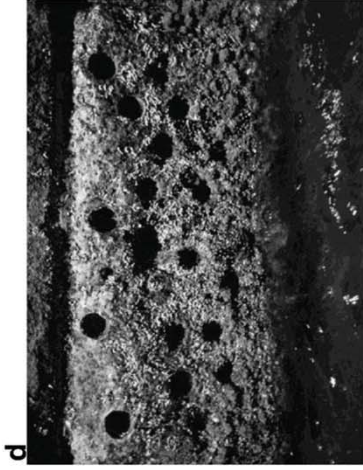
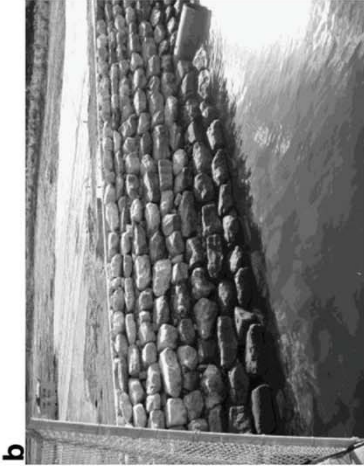
→ **STEPPING-STONES EFFECT**



IMPACT: MITIGATION STRATEGIES



INCREASING OF COMPLEXITY

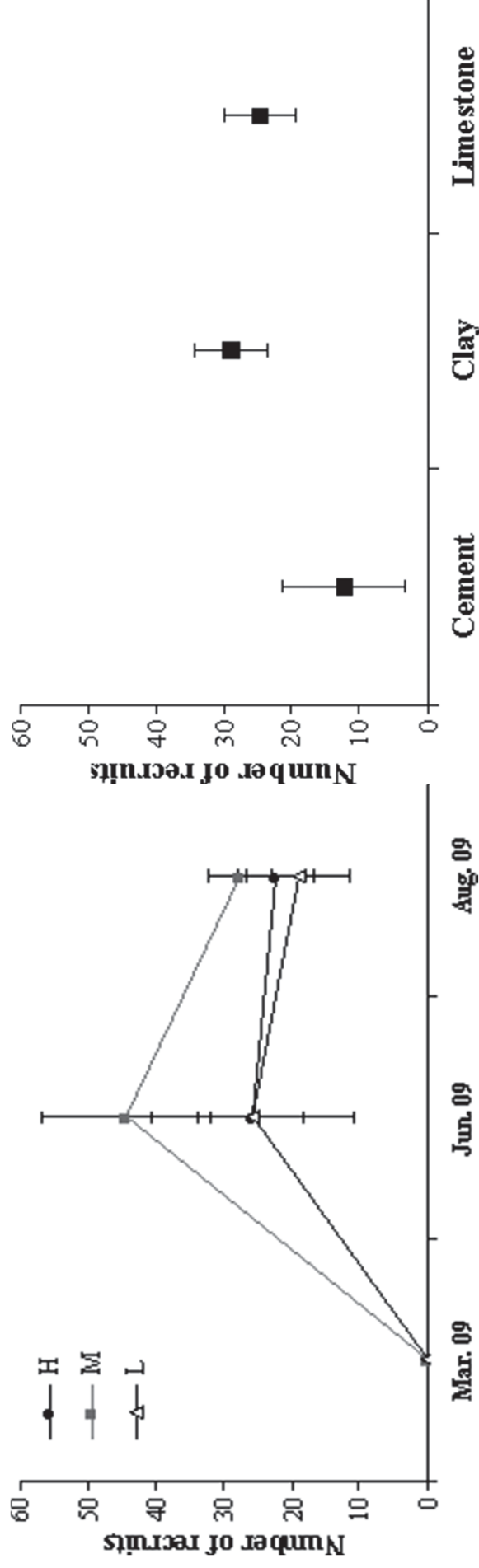


slope, roughness,
crevices, holes,
addition of available
habitats



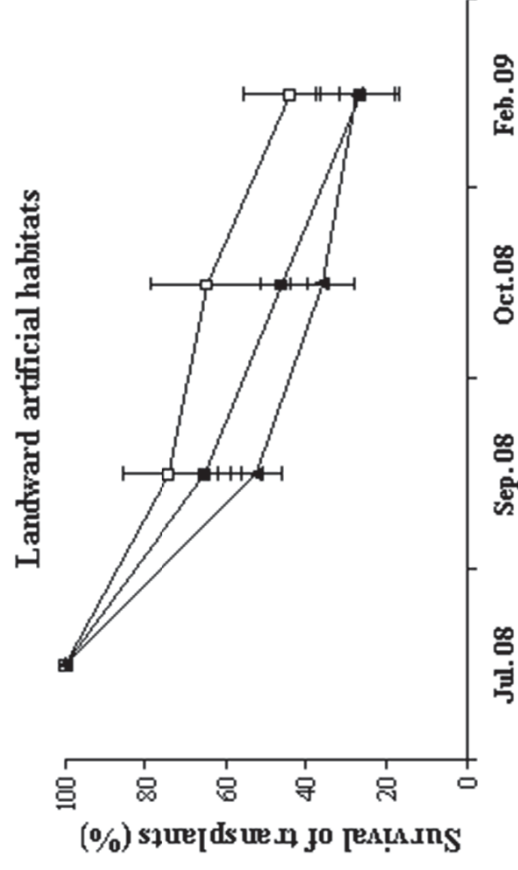
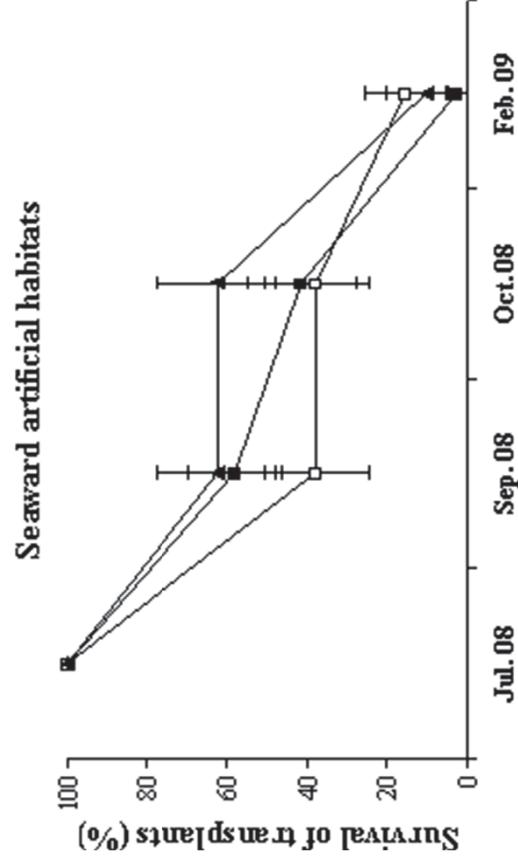
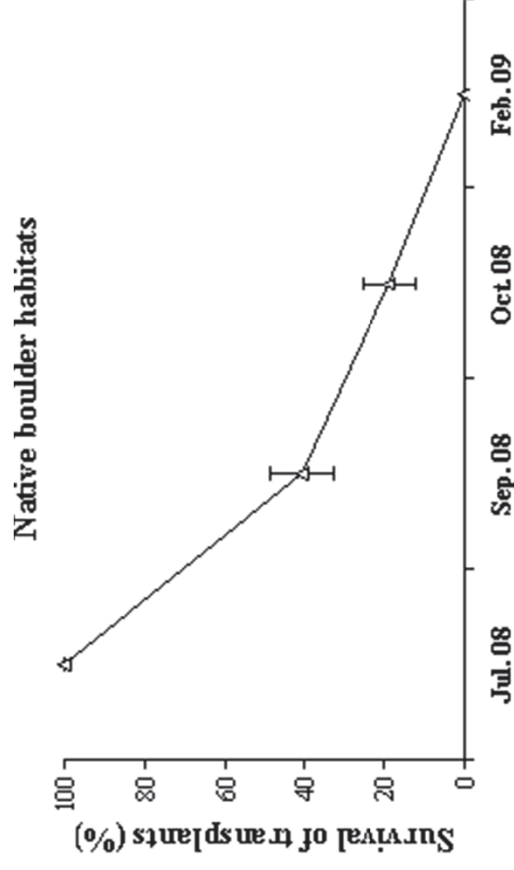
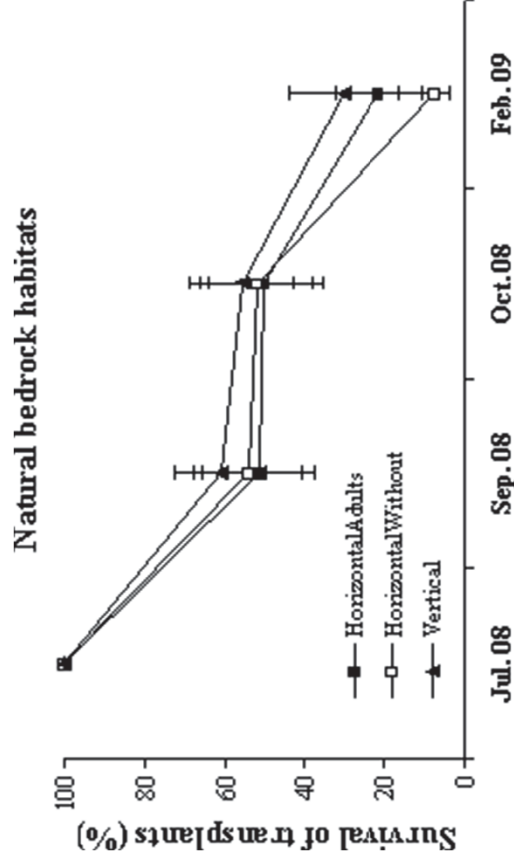
IMPLANTATION OF SPECIES «HABITAT FORMING»

Double goal: they promote biodiversity (habitat-forming), and prevent the spread of non-indigenous and/or invasive species (good results from preliminary works)





IMPLANTATION OF SPECIES «HABITAT FORMING»





Marine resources exploitation in a changing world

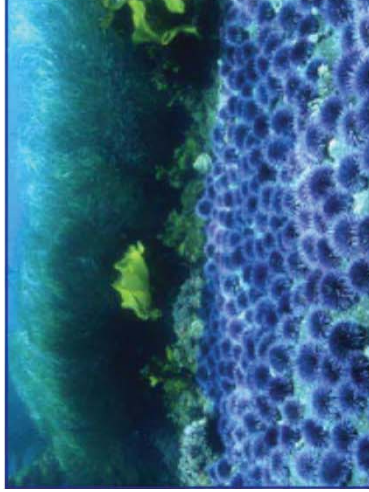


Stefano Cannicci
Dip. di Biologia
Università degli Studi di Firenze
stefano.cannicci@unifi.it



Conference scheme:

1. World fishery trends
2. Italian fishery trends
3. Causes of current trends
4. Possible solutions



Fishery trend's sources:



**NATIONAL
GEOGRAPHIC™**

nature.com
The world's best science and medicine on your desktop

Global trends in world fisheries:

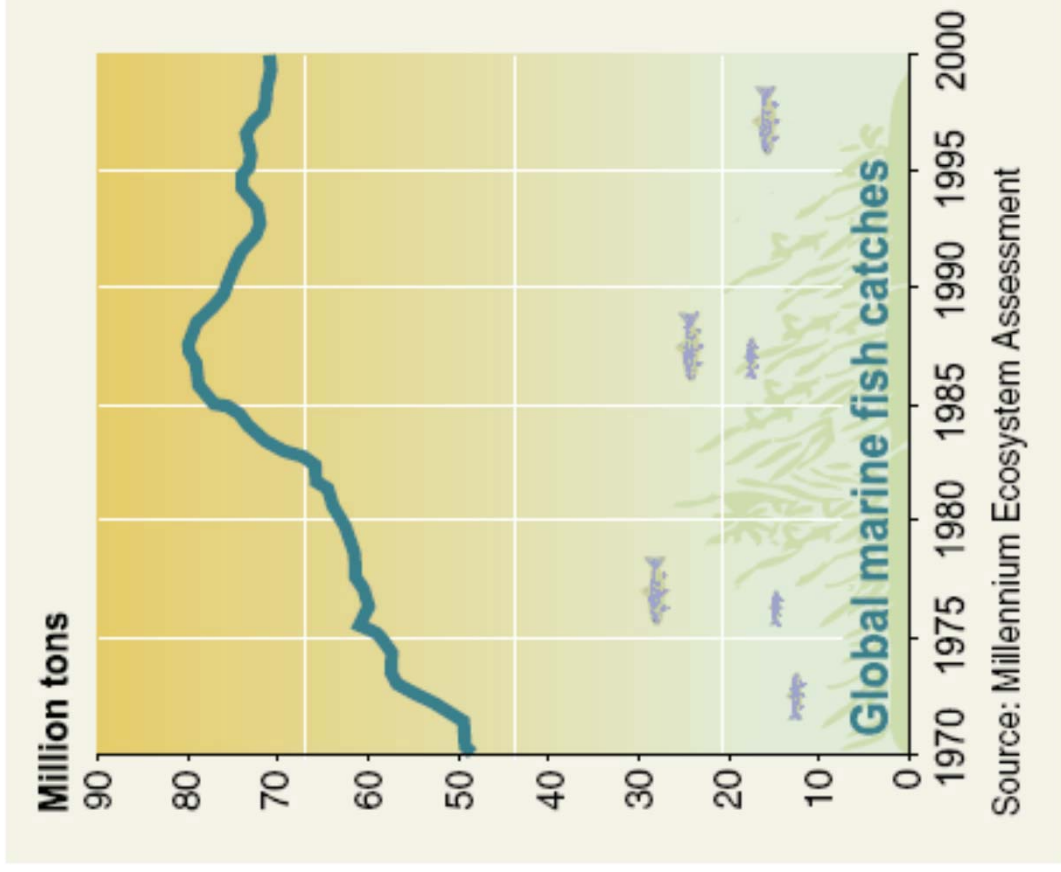
FAO reports:

- increment of the ichthyic stocks
- depleted or overexploited
- the most 10 important stock (30% of world catch) completely or over-exploited



Global trends in world fisheries:

Global fisheries peaked in the 1980s and are now declining, despite a stronger fishing effort



Global trends in world fisheries:

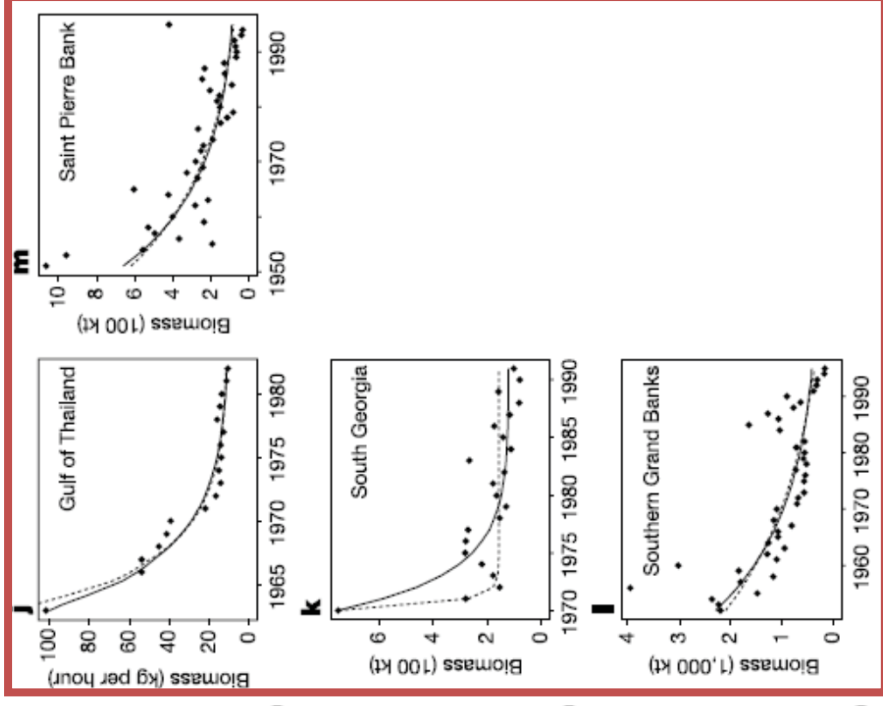
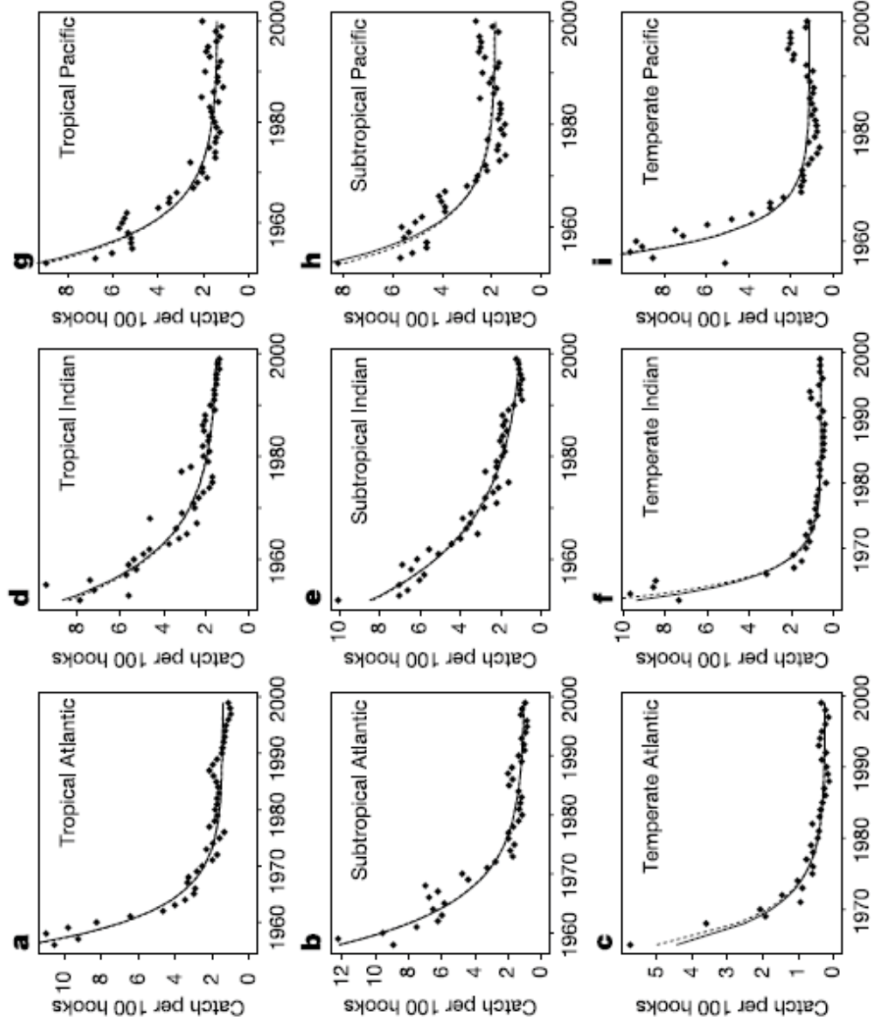


Figure 1 Time trends of community biomass in oceanic (a–i) and shelf (j–m) points) are shown with superimposed fitted curves from individual maximum-likelihood ecosystems. Relative biomass estimates from the beginning of industrialized fishing (solid fits (solid lines) and empirical Bayes predictions from a mixed-model fit (dashed lines).

Global strong decrease in terms of caught biomass

Global trends in world fisheries:

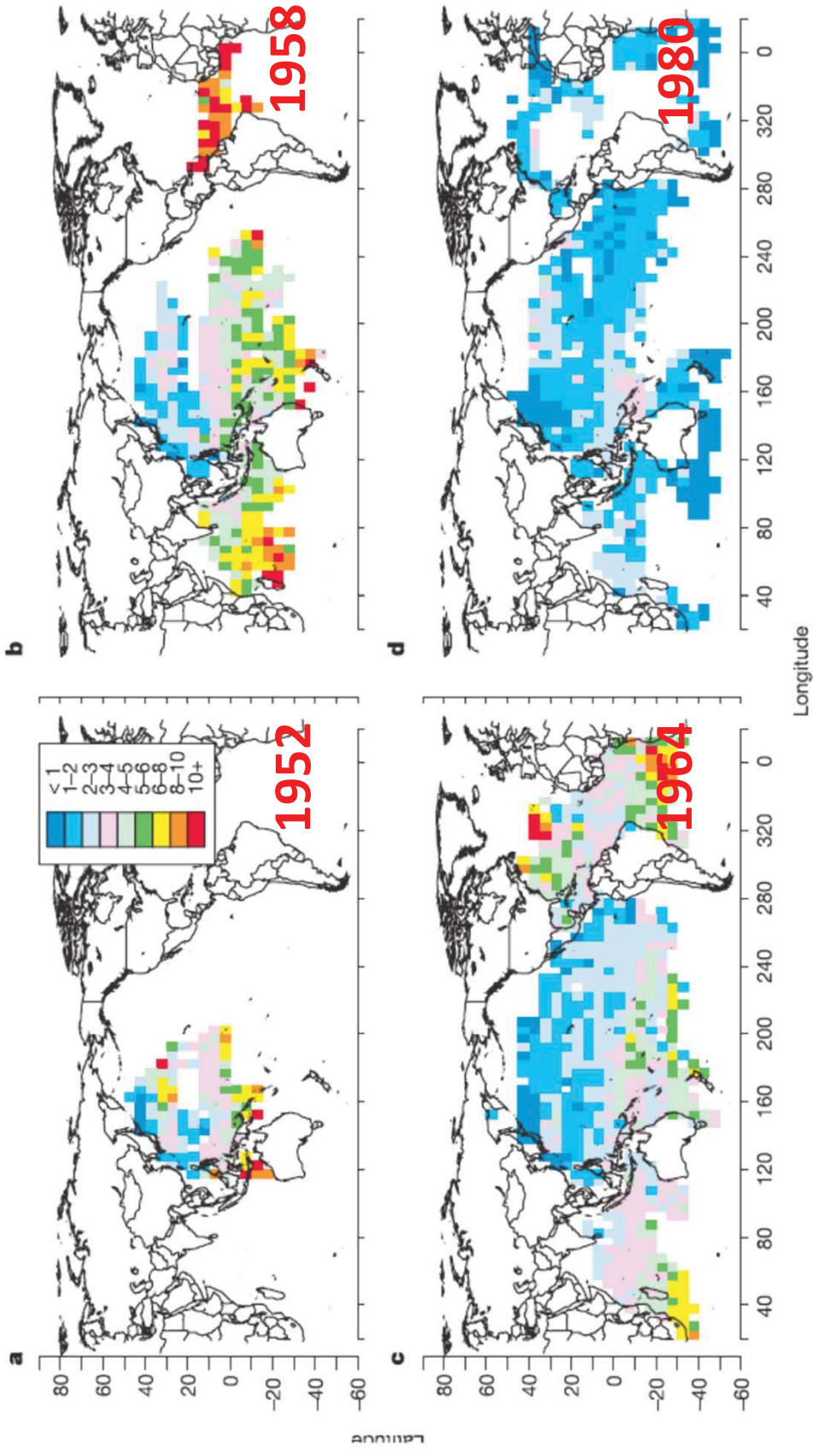


Figure 2 Spatial patterns of relative predator biomass in 1952 (a), 1958 (b), 1964 (c) and 1980 (d). Colour codes depict the number of fish caught per 100 hooks on pelagic longlines set by the Japanese fleet. Data are binned in a global $5^\circ \times 5^\circ$ grid. For complete year-by-year maps, refer to the Supplementary Information.

Big predators (most valuable fishes): 10% of their previous abundance

Global trends in world fisheries:

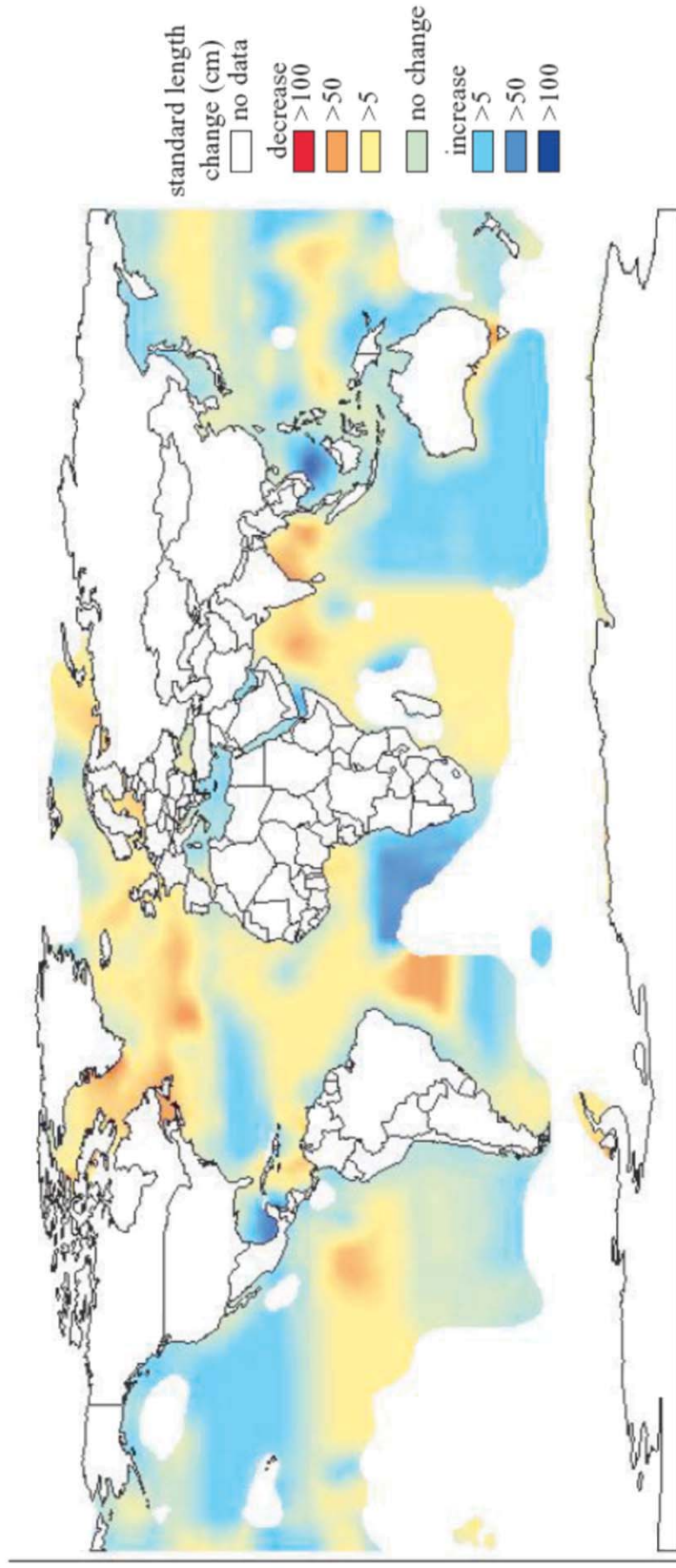
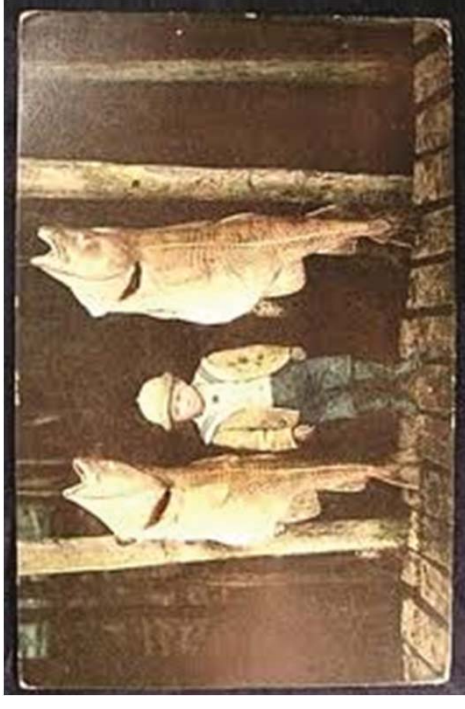
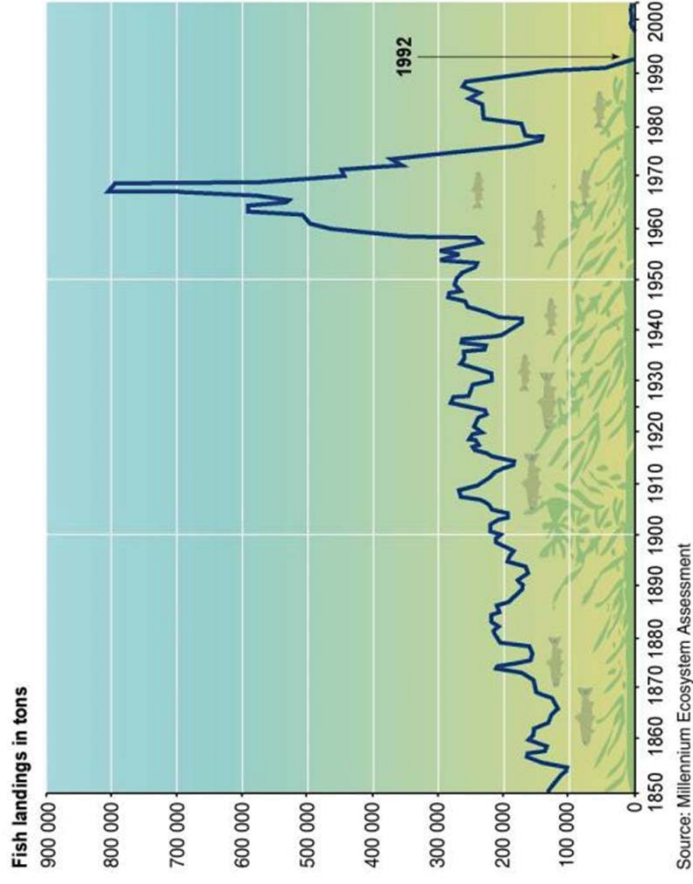


Figure 2. Differences between the mean ML of fish and invertebrate species in fisheries landing in the 1950s, and that in the 1990s, mapped into 180 000 cells of 1/2 latitude/longitude degrees according to the procedure in Watson *et al.* (2004). Note areas of strong decline (greater than 1 m) around the countries bordering the North Atlantic and other industrialized countries. The distribution of the size reductions shown here largely matches those of the TL, as may be expected given the high correlation between TL and body size (Pauly & Watson 2005).

Fish and species getting smaller

Global trends in world fisheries:



The incredible end of the cod of Newfoundland

Global trends: causes

Biological Causes of Decline

- 1. Rate of fishing >> Rate of replenishment**
- 2. Selective catch of big old fecund females fish (BOFFF) undermines replenishment**
- 3. Unintended ecosystem impacts of fishing: habitat destruction and bycatch**
- 4. Cumulative and interactive effects of fishing, pollution, coastal development, upstream activities, climate change**

Rate of fishing > rate of replenishment

Fish Wholesale Market of Chioggia 2006-2007

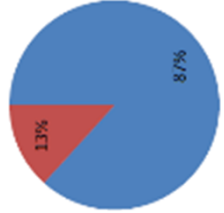
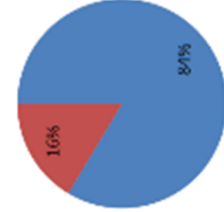
M. mustelus ***M. punctulatus*** ***S. canicula*** ***S. acanthias***

■ Immaturi ■ Maturi

■ Immaturi ■ Maturi

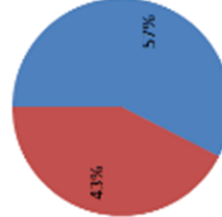
■ Immaturi ■ Maturi

■ Immaturi ■ Maturi



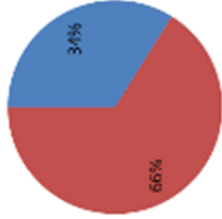
R. asterias

■ Immaturi ■ Maturi



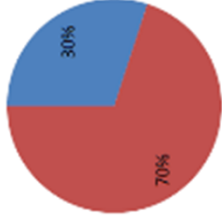
R. clavata

■ Immaturi ■ Maturi



R. miraletus

■ Immaturi ■ Maturi



Causes of current trends

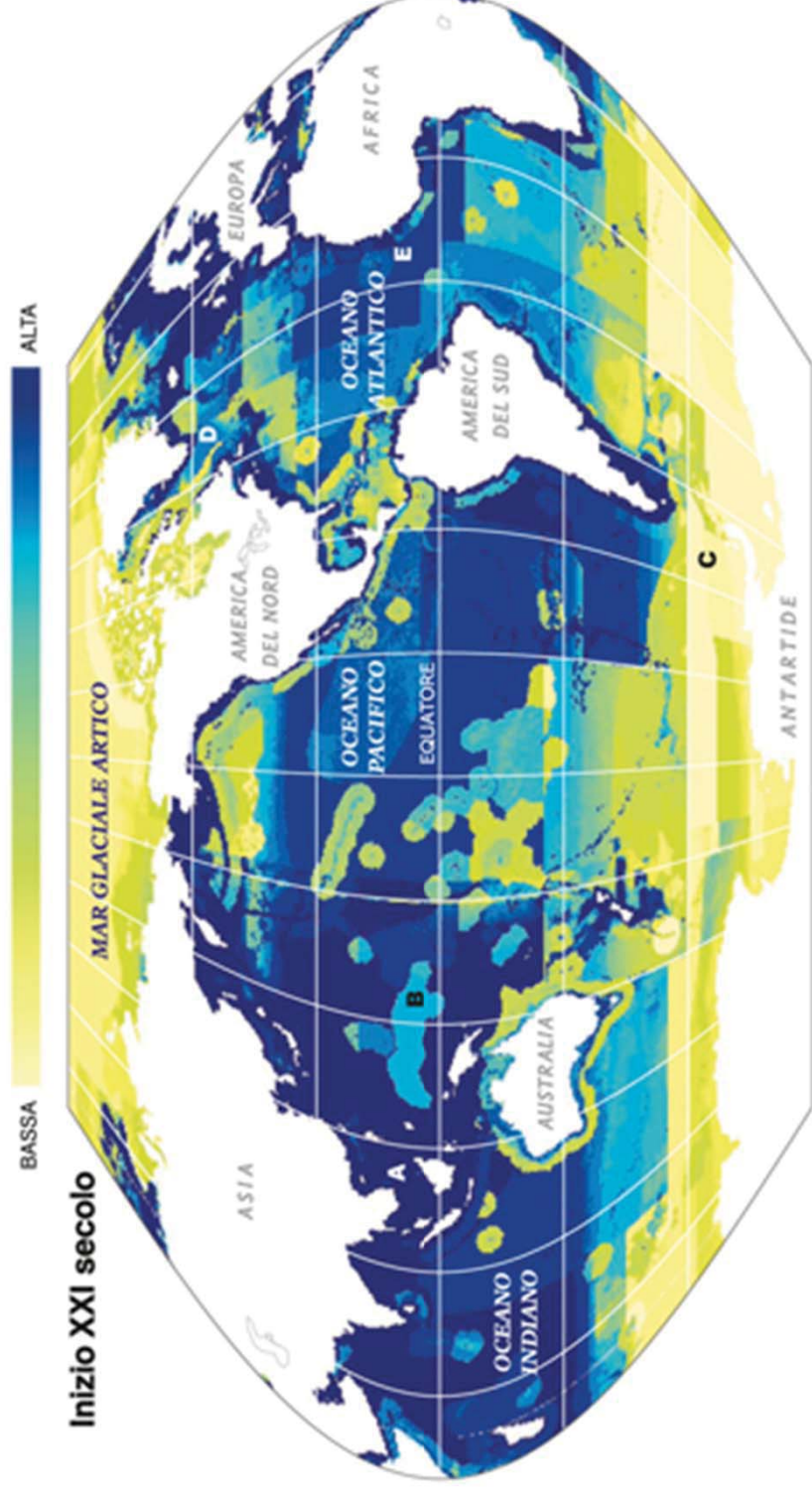
The technology allowed us to fish:

- farther and farther from shore
- deeper and deeper
- more efficiently
- more safely
- in formerly inaccessible places



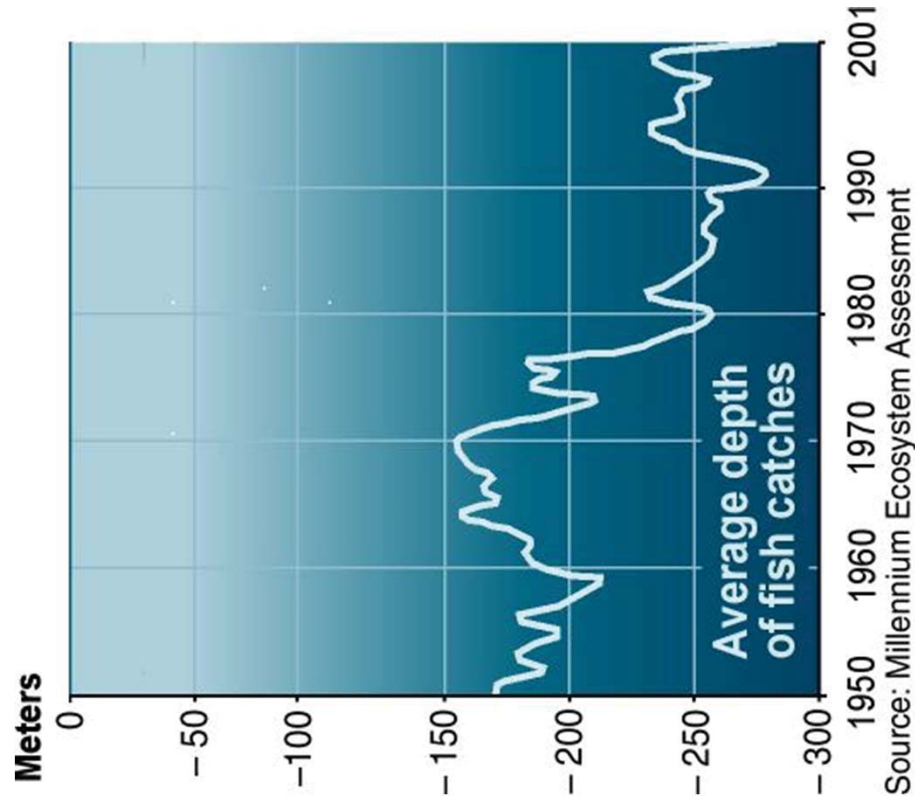
Causes of current trends

- farther and farther from shore



Causes of current trends

- deeper and deeper



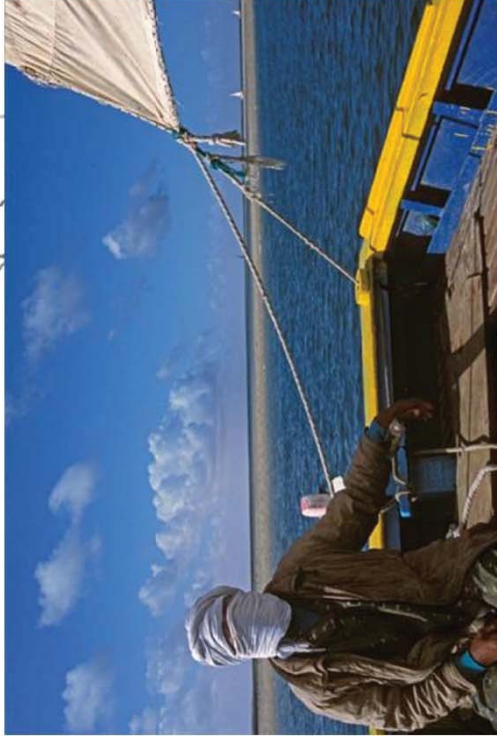
Causes of current trends

- more efficiently



Causes of current trends

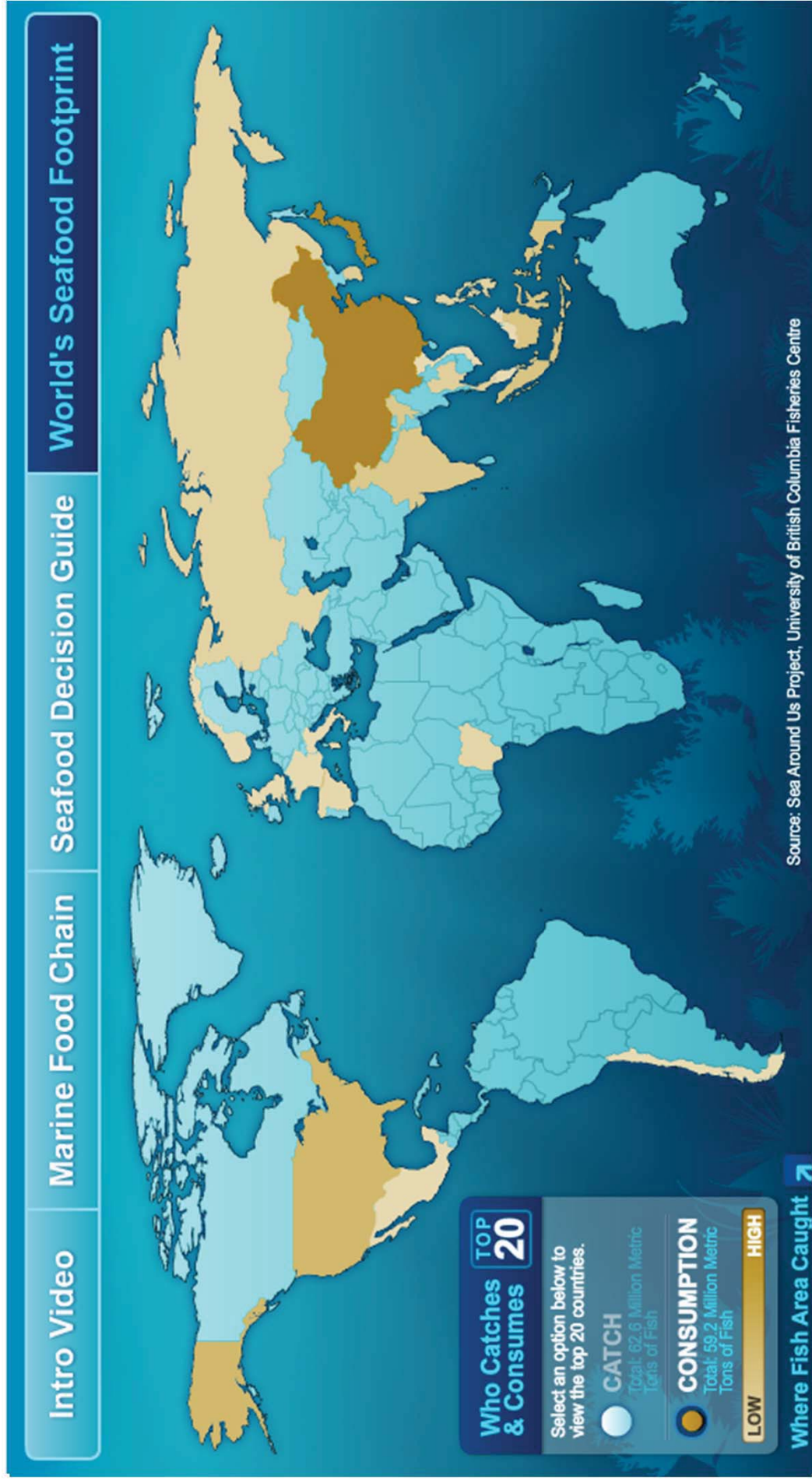
- more efficiently... everywhere!



shes, represent
e consumed. A
increased tend
the EU, Japan
invertebrates (shrimps, squids, etc.), are considered.

Causes of current trends

- responsible countries



Global trends in world fisheries:

What are the solutions?

- species protection
- catching control (allowed quote)
- Control of fishery effort
- technical measures for restriction
 - minimum size (maturity)
 - restriction of time/areas for fishery



Global trends in world fisheries:

What are the solutions?

- 1. Implement better fishery management & enforcement**
- 2. Establish networks of no-take marine reserves and other MPAs**
- 3. Align economic and environmental incentives**
- 4. Adopt ecosystem approaches and connect land-based and ocean-based activities**

What are the possible solutions?

TO CONSUME RESPONSIBLY:

- eating certified fish
- collecting information by associations, internet and journals (i.e. www.wwf.org)