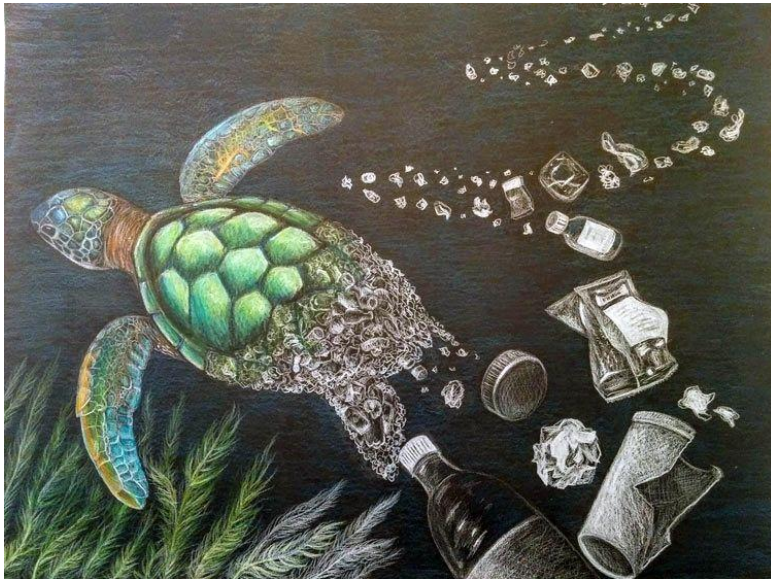


CAMBIAMENTI CLIMATICI E INQUINAMENTO

GLI EFFETTI SULL'ECOSISTEMA MARINO

Tomaso Fortibuoni

Istituto Superiore per la Protezione e la Ricerca Ambientale





SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

#SDGsketch

is a project by @Club17Africa <http://club17africa.org> in collaboration with @xLontrax and @DrMinaOgbanga

GOAL 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development



By 2020 sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts.



Minimize and address the impact of ocean acidification, including through scientific cooperation at all levels

By 2025 Prevent and significantly reduce marine pollution of all kinds



By 2020 conserve at least 10% of coastal and marine areas

By 2030 increase economic benefits to Small Islands developing States and least developed countries from the sustainable use of marine resources



By 2020 effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing

By 2020 prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing



Provide access for small-scale artisanal fishers to marine resources and markets

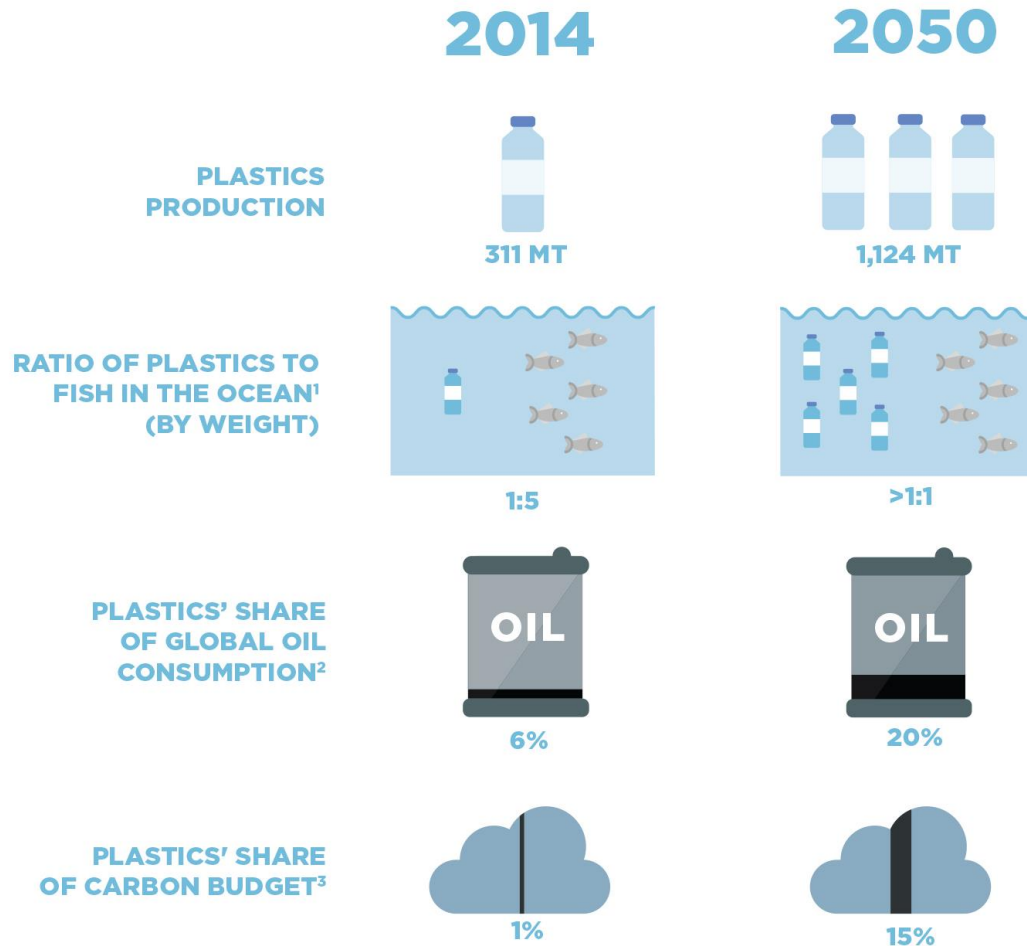


Increase scientific knowledge, develop research capacity and transfer marine technology taking into account

Intergovernmental Oceanographic Commission guidelines



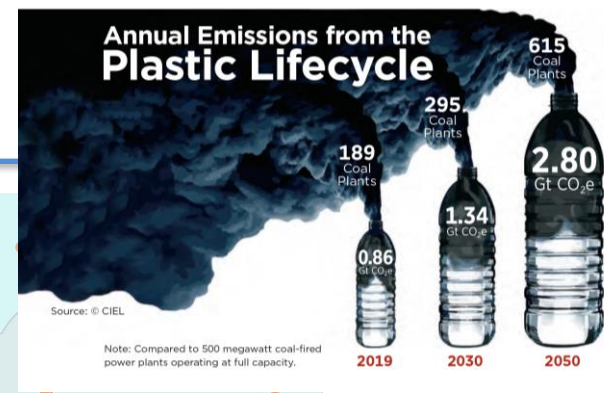
Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS



1 Fish stocks are assumed to be constant (conservative assumption)

2 Total oil consumption expected to grow slower (0.5% p.a.) than plastics production (3.8% until 2030 then 3.5% to 2050)

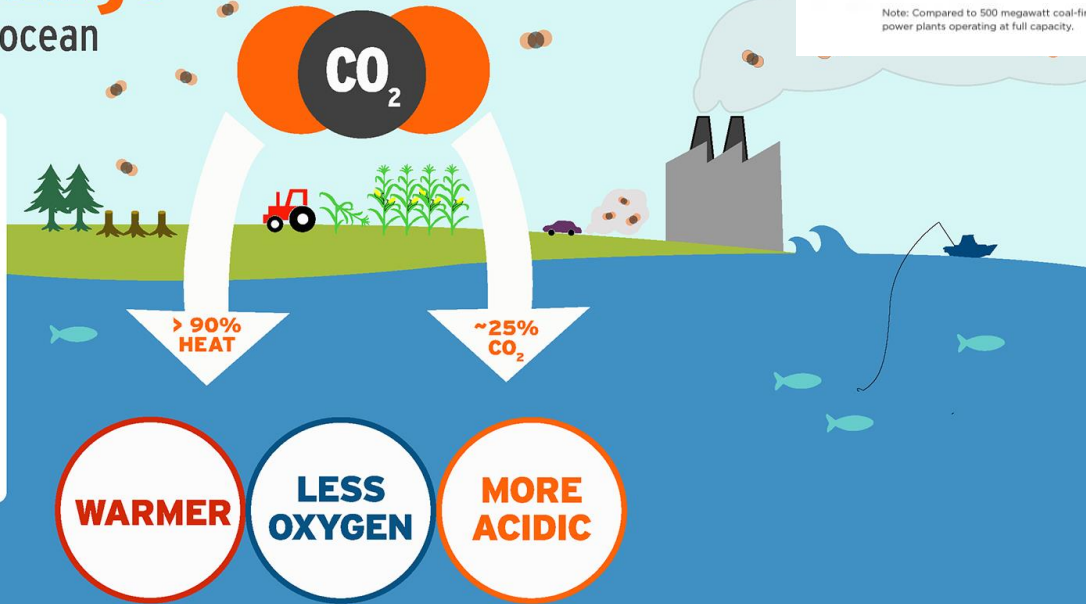
3 Carbon from plastics includes energy used in production and carbon released through incineration and/or energy recovery after-use. The latter is based on 14% incinerated and/or energy recovery in 2014 and 20% in 2050. Carbon budget based on 2 degrees scenario



Climate Change

A triple threat for the ocean

Burning fossil fuels, deforestation and industrial agriculture release carbon dioxide (CO₂) and other heat-trapping gases into our atmosphere, causing our planet to warm. The ocean has buffered us from the worst impacts of climate change by absorbing more than 90 percent of this excess heat and about 25 percent of the CO₂, but at the cost of causing significant harm to marine ecosystems.



SEA LEVEL

Sea level rise is accelerating, flooding coastal communities and drowning wetland habitats.

BLEACHING

Warm-water coral reefs (marine biodiversity hotspots) could be lost if the planet warms by 2°C (3.6°F).

TOXIC ALGAE

Larger and more frequent blooms are making fish, birds, marine mammals and people sick.

HABITATS

Lower oxygen levels are suffocating some marine animals and shrinking their habitats.

ACIDIFICATION

More acidic water harms animals that build shells, such as corals, clams, and oysters.

FISHERIES

Disruptions in fisheries affect the marine food web, local livelihoods, and global food security.

MERIDIONALIZATION

Northward extension and enhancement of native thermophilic species



Lagocephalus sceleratus



Pomatomus saltatrix



Sphyraena viridensis



Pterois volitans

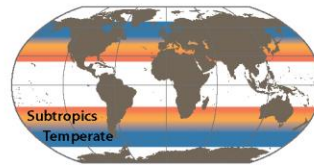
TROPICALIZATION

Increase in the arrival, establishment and range extension of thermophilic Non Indigenous Species

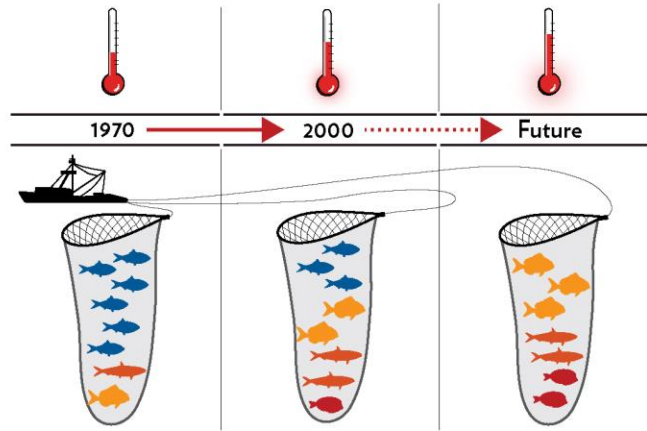
Warming Oceans Are Reshaping Fisheries

Marine species are gradually moving away from the equator into cooler waters, and, as a result, species from warmer waters are replacing those traditionally caught in many fisheries worldwide. Scientific studies show that this change is related to increasing ocean temperatures.

Subtropic and temperate ocean

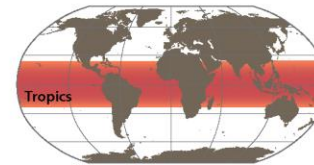


From 1970 to 2006, as open temperatures were rising, catch composition in the subtropical and temperate areas slowly changed to include more warm-water species and fewer cool-water species.

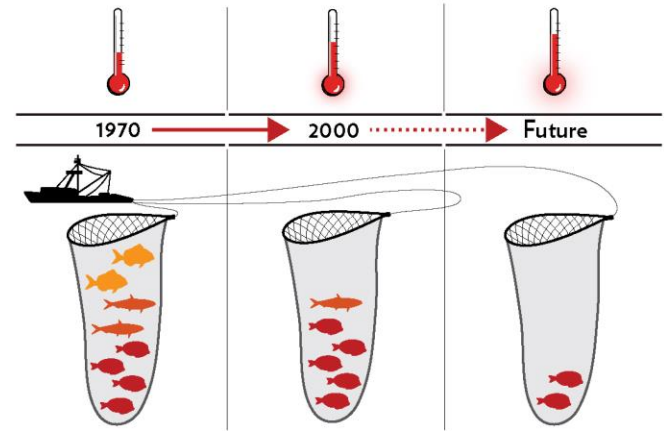


 Temperate/cool-water fish
  Subtropical fish
  Tropical/warm-water fish

Tropics



In the tropics, the catch composition changed from 1970 to 1980 and then stabilized, likely because there are no species with high enough temperature preferences to replace those that declined.



These shifts could have negative effects including loss of traditional fisheries, decreases in profits and jobs, conflicts over new fisheries that emerge because of distribution shifts, food security concerns, and a large decrease in catch in the tropics.

This graphic presents concepts from: Cheung, WWL., R. Watson and D. Pauly. 2013. Signature of ocean warming in global fisheries catch. *Nature*. DOI:10.1038/nature12156. The thermometers are representative of trends in ocean temperature over time and the fish are representative of trends in catch composition over time. They do not represent specific values. Please consult the results section of Cheung et al. (2013) for exact data points. Graphic by The Pew Charitable Trusts' ocean science division, www.pewenvironment.org/research-programs

Interreg 
Mediterranean



MPA-ADAPT

DENSELY POPULATED AREA
WITH **INTENSE HUMAN ACTIVITY**

208-760kg/year of solid urban waste
produced by 150 million people

+

OVER 200 MILLION TOURISTS

+40% marine litter
during summer

INADEQUATE
WASTE POLICIES

Out of the 27 million tonnes/year
of plastic waste produced
only a third is recycled

THE MEDITERRANEAN
"PLASTIC TRAP"

DEBRIS CARRIED TO SEA
BY **POLLUTED RIVERS**



Impact of Plastic Pollution on Marine Life in the Mediterranean Sea

Anastasopoulou & Fortibuoni 2019

Ingestion

Entanglement



71



6

12



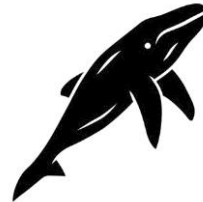
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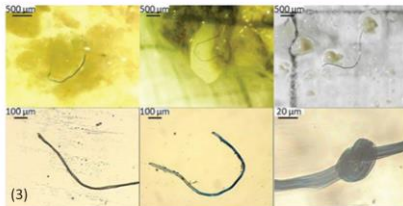
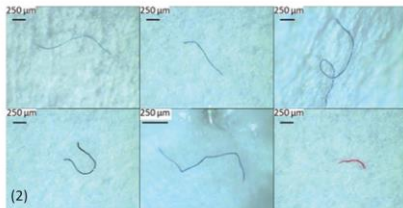


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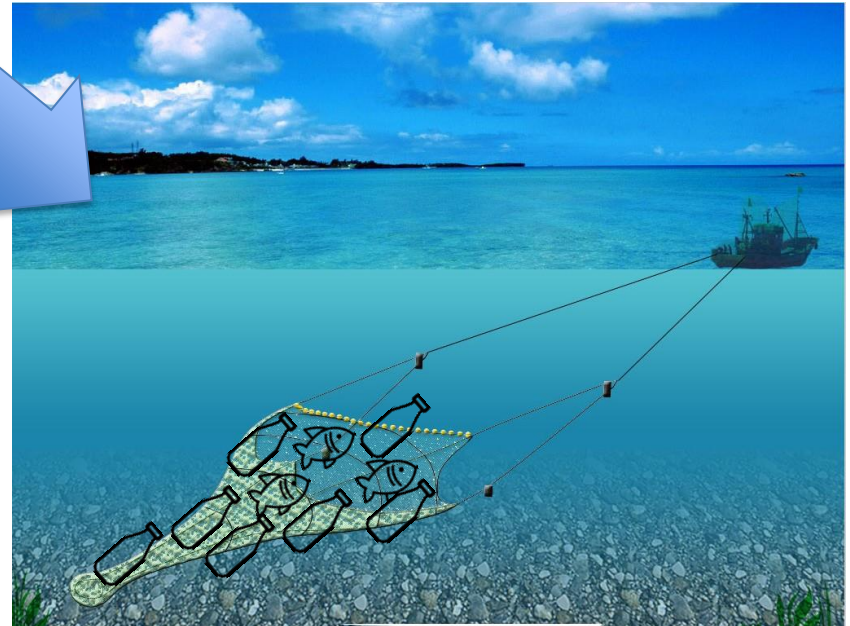
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34



Just because you can't see it, it doesn't mean it isn't there





ANDREA TOSI

sul fondo purtroppo sono depositate tante cose

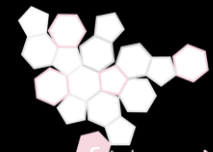


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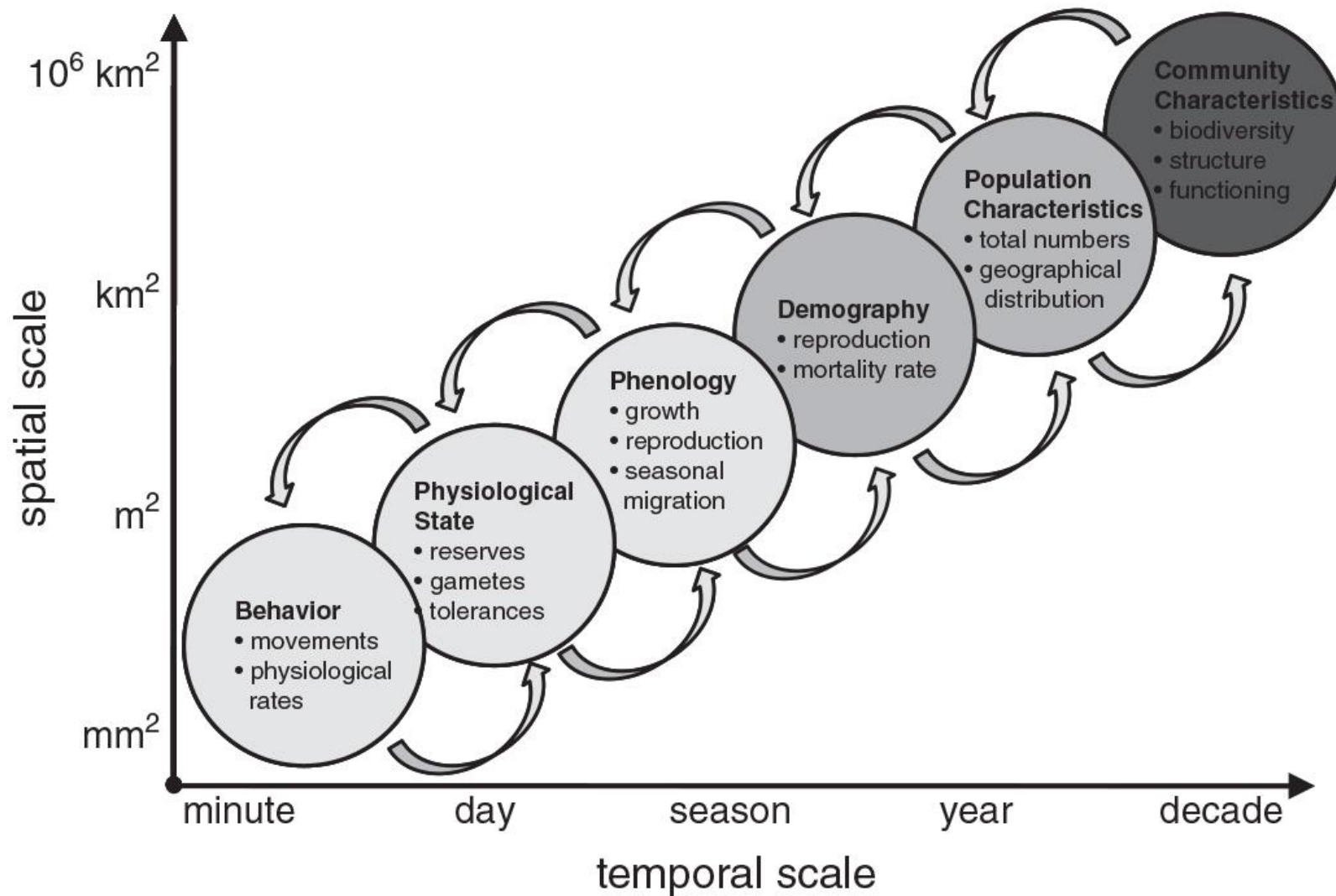


ISPRA

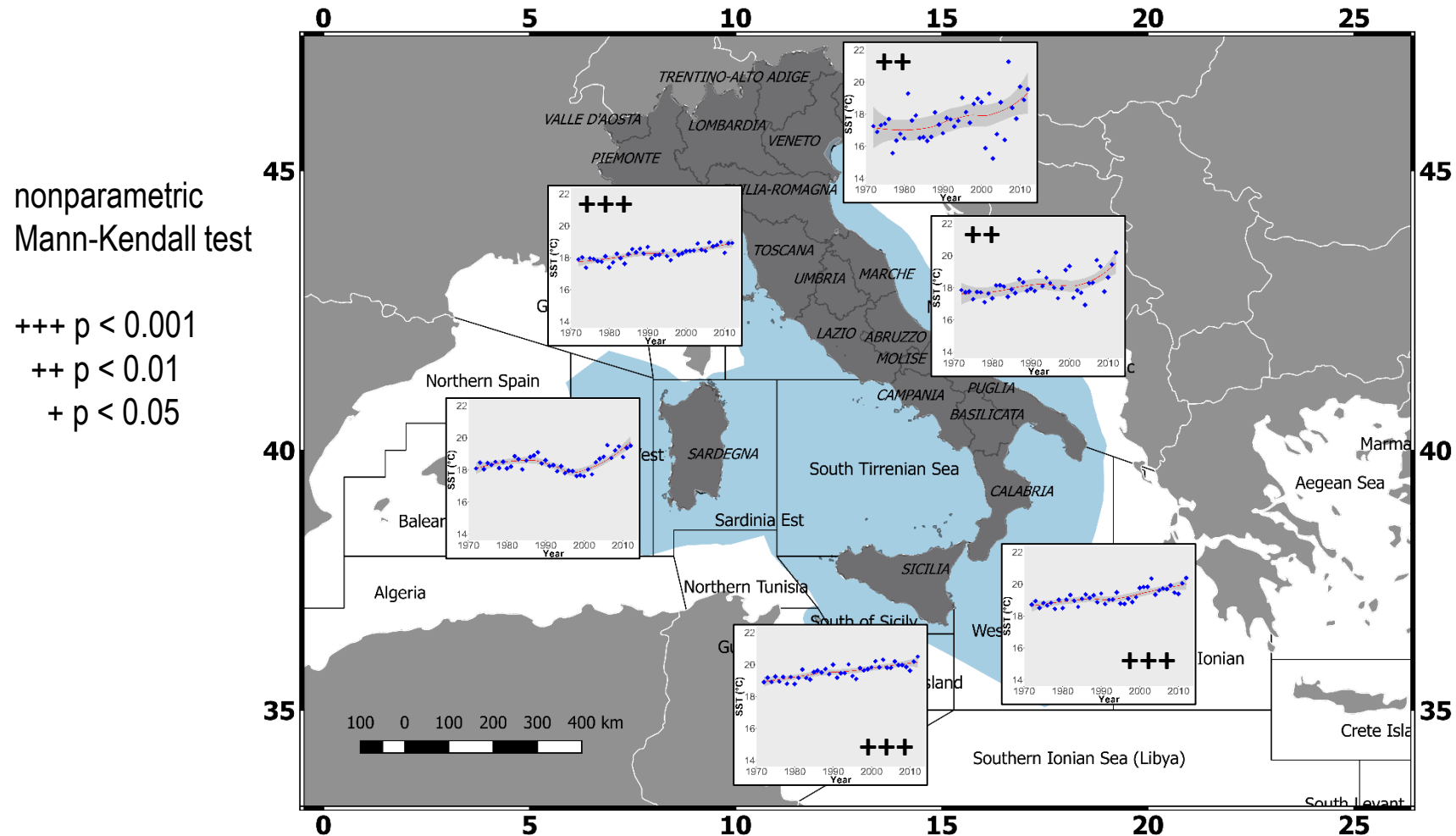
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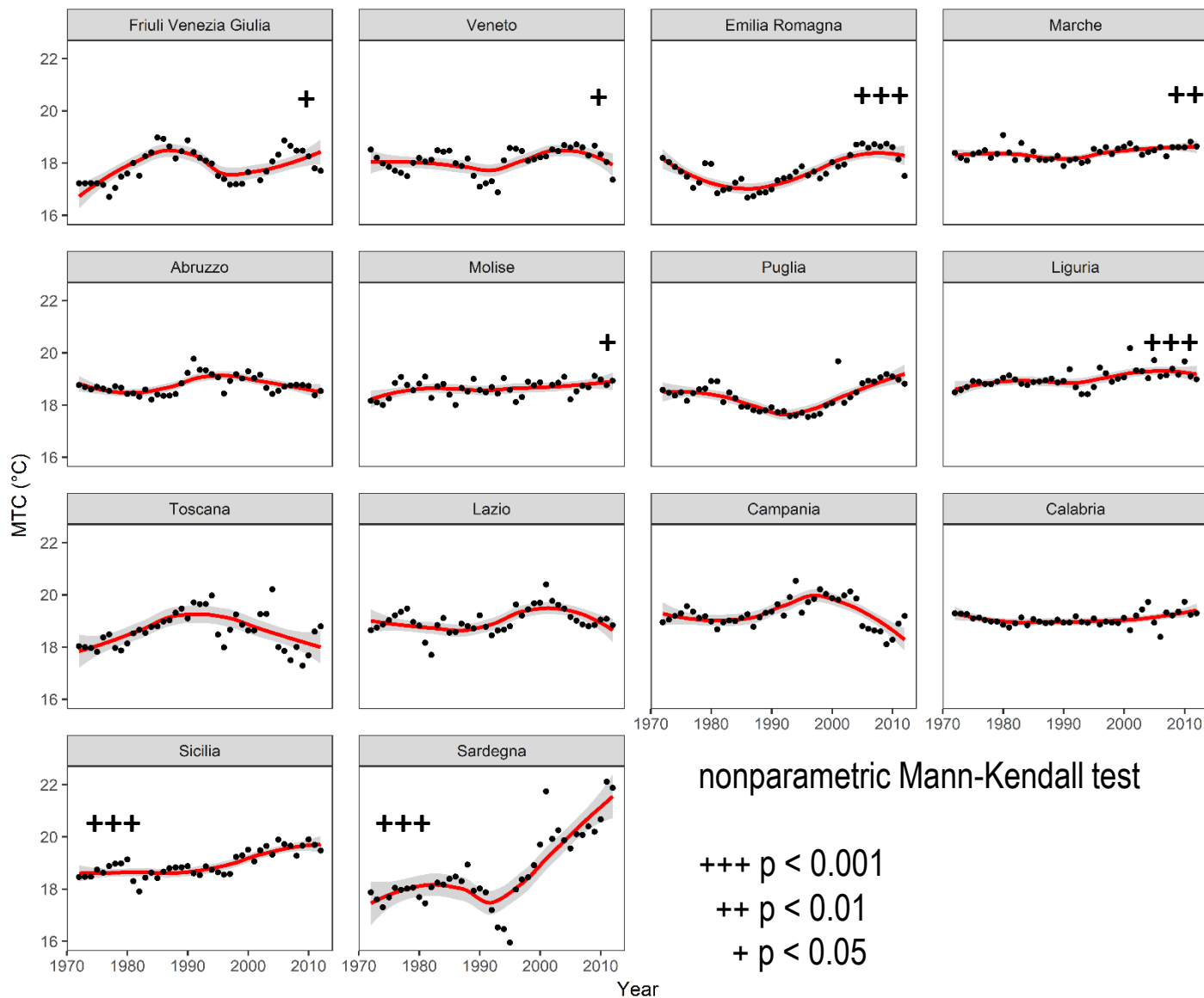


Sistema Nazionale
per la Protezione
dell'Ambiente

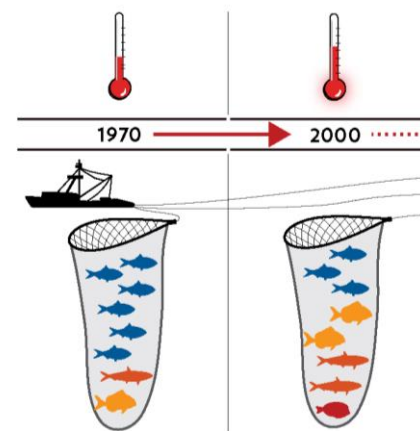


I mari italiani si stanno scaldando





Mean Temperature of the Catch (MTC)



nonparametric Mann-Kendall test

+++ $p < 0.001$

++ $p < 0.01$

+ $p < 0.05$