Food and Agriculture Organization of the United Nations

General Fisheries Commission for the Mediterranean

FISHFORUM 2024 ANTALYA

Forum on fisheries science in the Mediterranean and the Black Sea

19 - 23 FEBRUARY 2024 • TÜRKİYE

FISHING IMPACT ASSESSMENT INDICATES AN ECOSYSTEM APPROACH TO FISHERIES

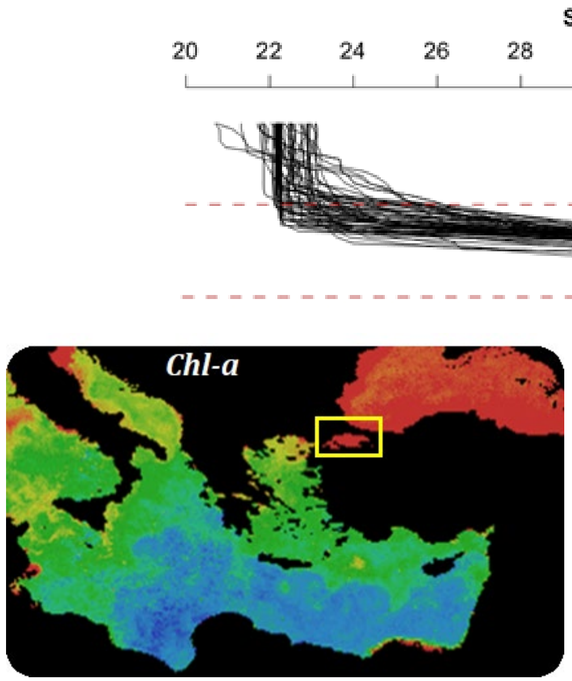
NAZLI DEMIREL

T.C. İSTANBUL ÜNİVERSİTESİ 1453

İ.Ü. DENİZ BİLİMLERİ & İŞLETMECİLİĞİ ENSTİTÜSÜ

The Sea of Marmara (SoM)

- A marginal sea, semi-enclosed
- Surrounded by the megalopolis of Istanbul
- 25 million people officially
- Lots of industry related pollution
- Naturally vulnerable
- Eutrophic water character
- Permanently layered system



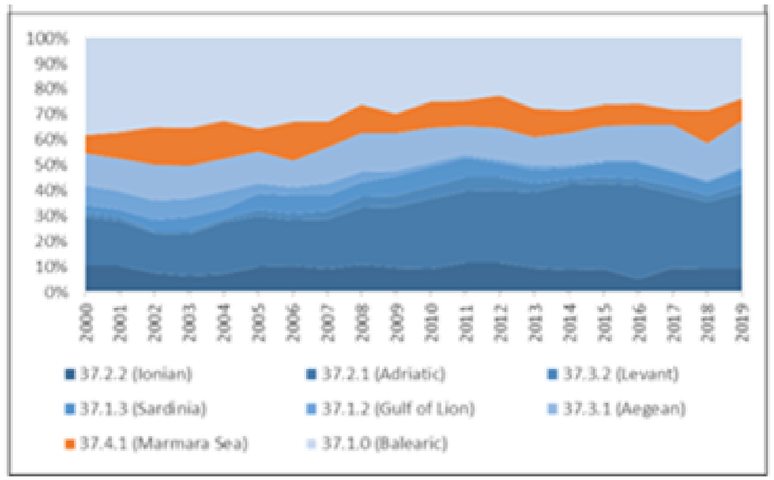
SoM Biodiversity and Fisheries

- Connects Black Sea and Mediterranean via Dardanelles ve Bosphorus
- Bosphorus as ecological corridor
- ~ 800 identified macro species
- 260 Fish species
- Migration route of schooling pelagic fishes





Contribution to fish production in Mediterranean Sea: Average 10% in total catch

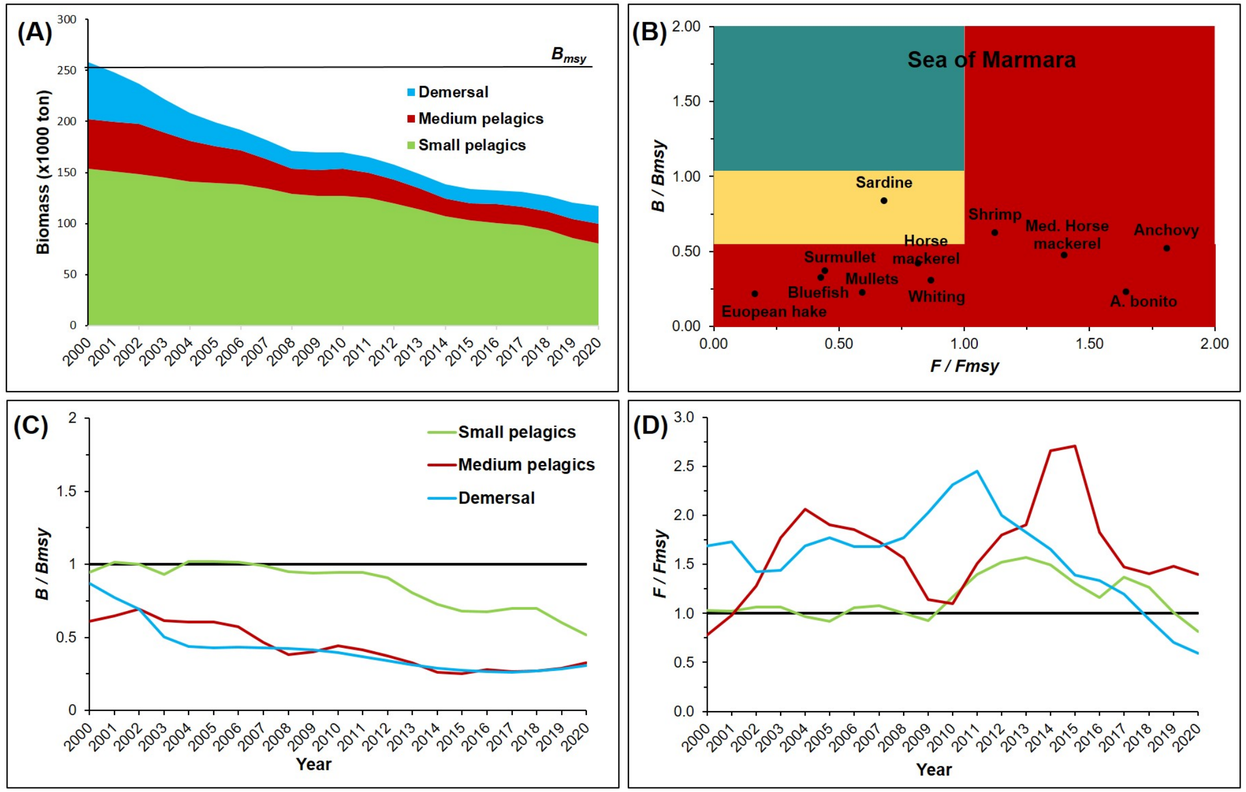


State of the SoM Fishery

Biological reference points for sustainable stock:

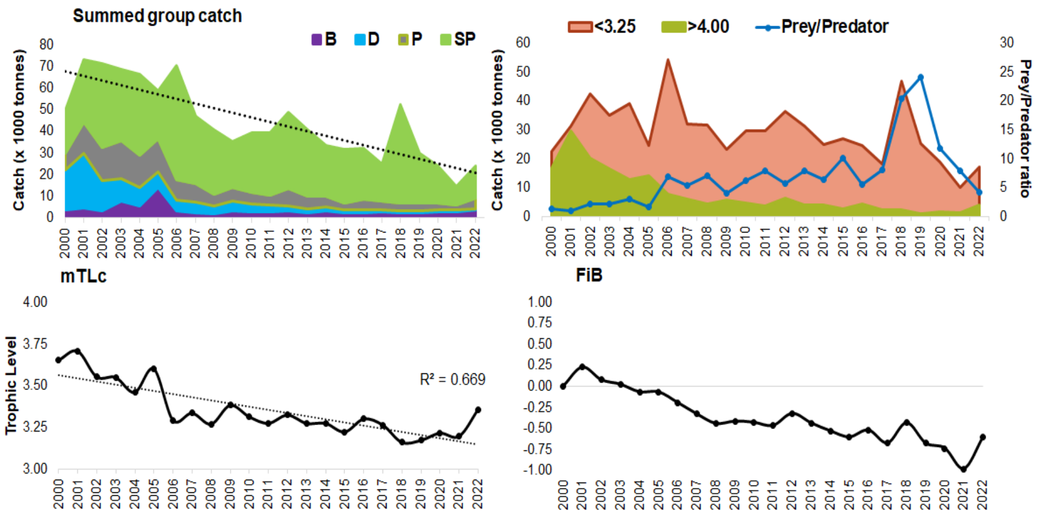
B/Bmsy ≥ 1 and F/Fmsy ≤ 1

- Total biomass < Bmsy
- B/Bmsy < 1 since 2007
- F/Fmsy > 1 for medium pelagic and demersal
- 4 stocks: B/Bmsy ≤ 0.5
- 3 stocks: B/Bmsy ≤ 0.2

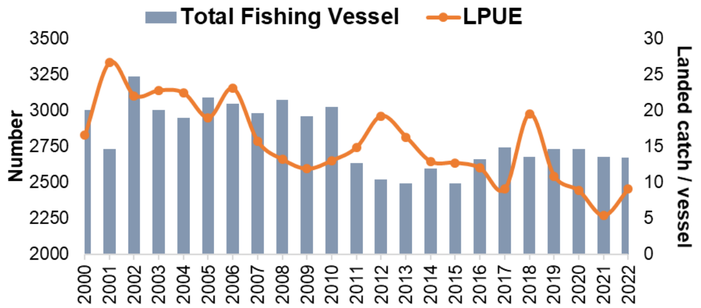


Common Ecological Fishery Indices

- Small pelagics are dominant 80% of total catch
- Collapse of medium pelagic and demersal catch
- Relative increase for benthic invertebrate



- Decrease in vessel number after 2010s
- Continuous decrease in LPUE



Decrease ↘ mTL, Lmax, FiB / Increase ⇗ Prey/Predator ratio

- withdrawal of predators,
- relative increase in small pelagic
- fishing effort are no longer sustainable

Collapse of SoM Ecosystem

Significant shifts in all biotic and abiotic compartments

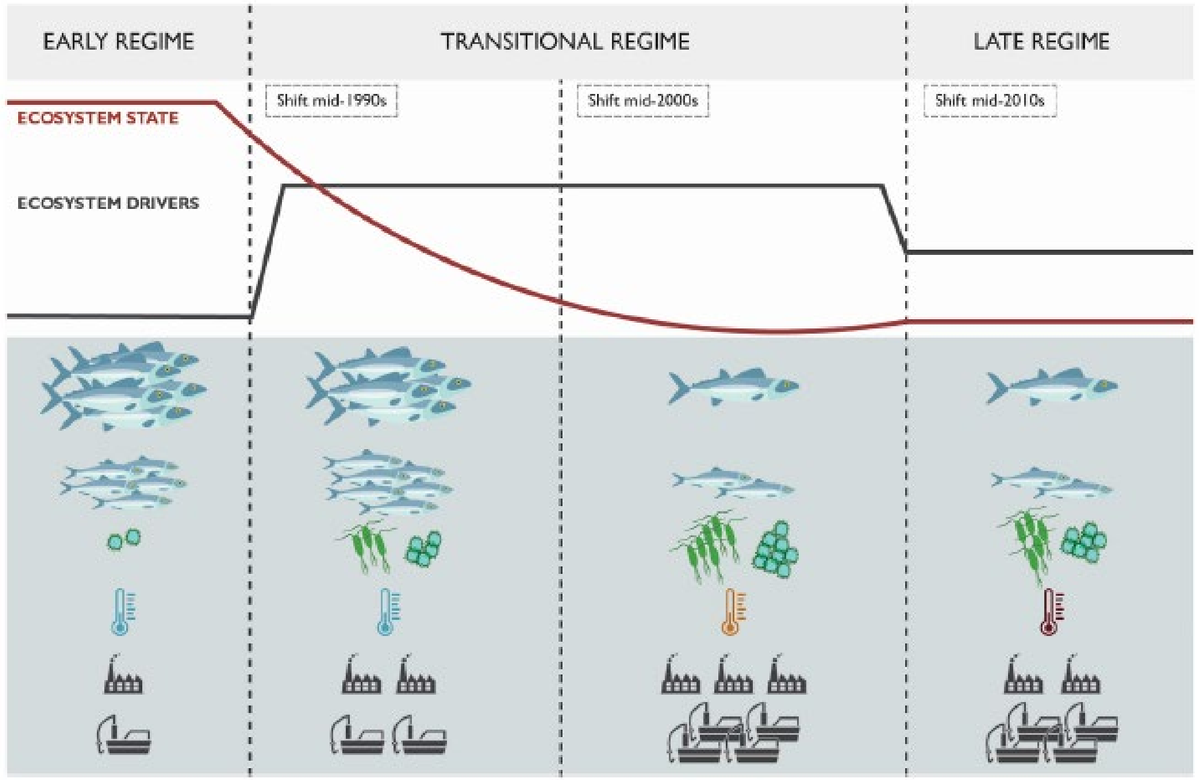
Three periods

Early regime: Top-down control

Transitional regime: Reorganization

Late regime: Far from initial state

Non-linear regime shift is identified



Final remarks

Ecosystem state

- Ecosystem → fragile to disturbances

Food web

- The energetic capacity decreased significantly
- Two control dynamics, bottom-up and wasp-waist
- PP cannot reach upper trophic levels efficiently

Natural hydrography – Permanent stratification

- Depth-limited primary productivity (PP)
- Weak benthic-pelagic coupling
- Shift in the seasonality of pelagic fish dynamics

Human-induced pressures

Overfishing

- decrease in landings and mean trophic level
- withdrawal of predatory species,
- relative increase in small pelagics and shrimps

Pollution

- mainly nutrient loads
- very high total primary production
- greatly exceeds total respiration

Climate change

- increasing sea water temperatures

Ecosystem Approach (EcAp)

A holistic strategy to manage marine ecosystems

- sustainability for present and future
- connections between organisms and environment
- complex web of interactions within an ecosystem



<u>Challenges</u>

Organizing and facilitating collaboration among various compartments with a multitude of values

- Complexity, Lack of Data,
- Political and Economic Pressures
- Global Coordination, Limited Public Awareness

Mucilage Episode in 2021

Proliferation of phytoplankton

- warming seas, pollution
- biodiversity loss

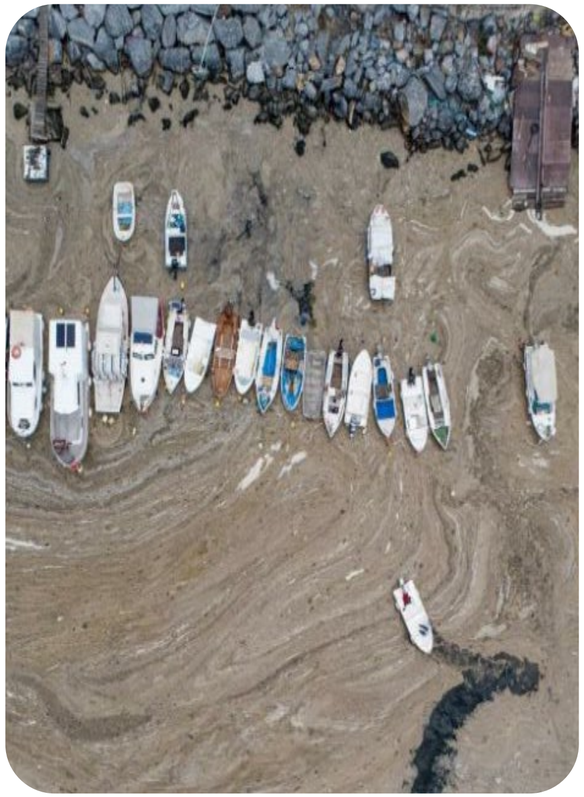
Formation of the mucilage process

- deterioration of food web balance
- weakening of ecosystem resilience

Devastate fisheries

- a true foul-smelling calamity
- smothering marine life
- clogging nets, high economic loss





Lesson from the Sea of Marmara

The Sea of Marmara can be a remarkable example with its naturally layered system for understanding human-induced pressures under climate change impact on the world seas.

Ecosystem approach is the only way to protect our seas!

Thanks for your attention!