

The Fisheries of the Indo-Pacific and (Food) Security

Daniel Pauly

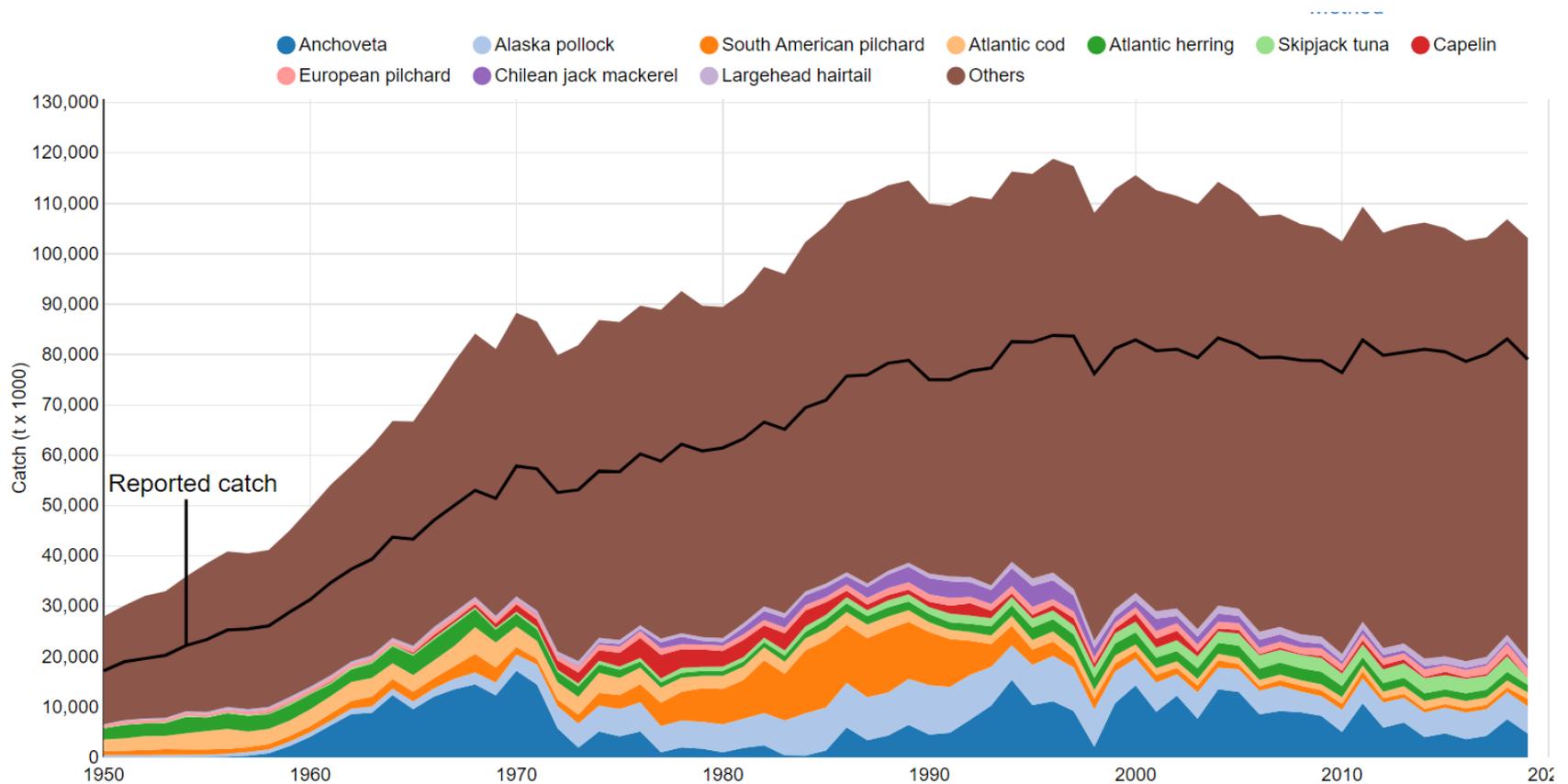
Sea Around Us, The University of British
Columbia, Vancouver, B.C., Canada



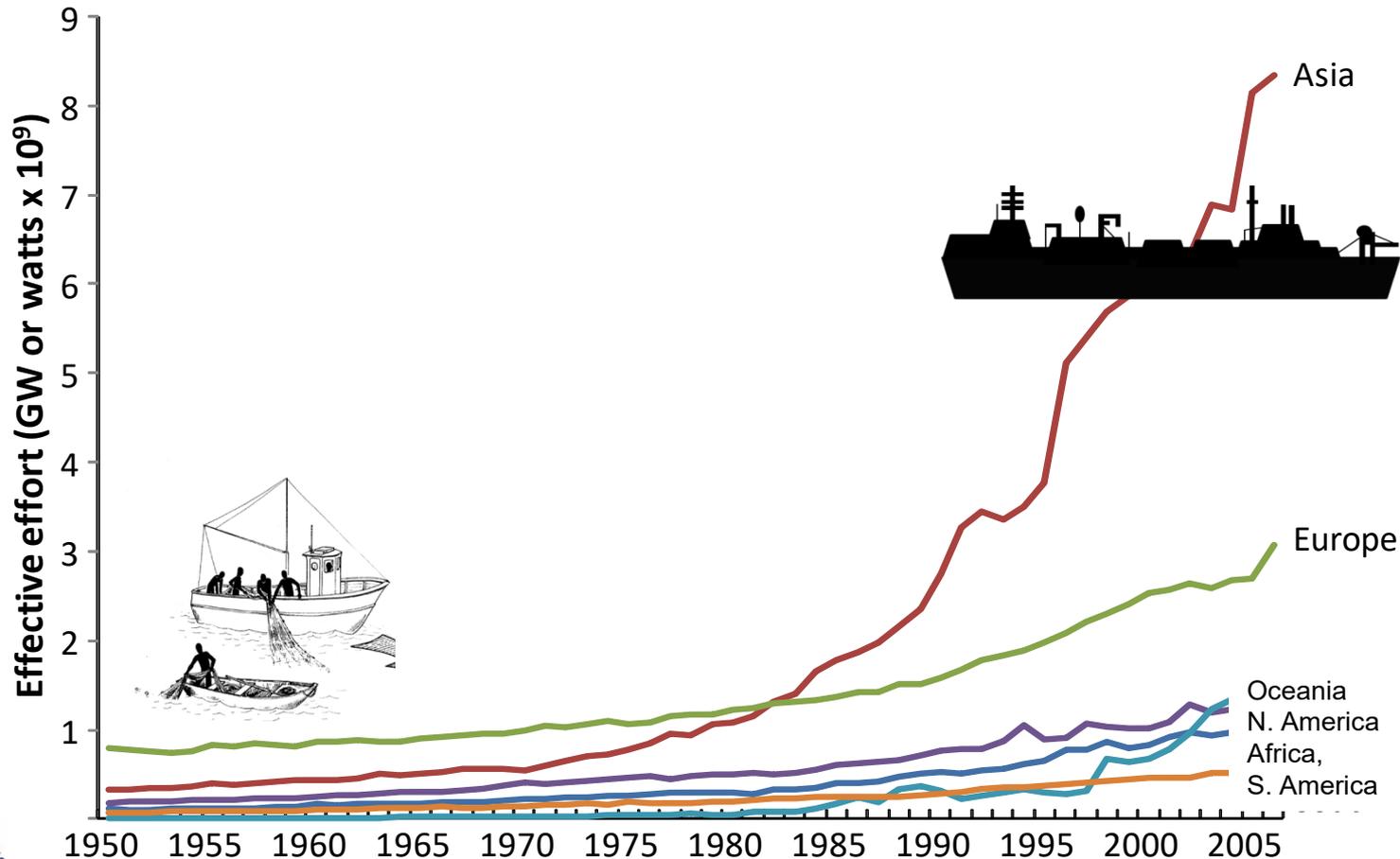
Maritime Security Challenges 2022
Victoria, November 16, 2022



Before talking about Indo-Pacific fisheries, we need to look at the world's marine fisheries, if only for context

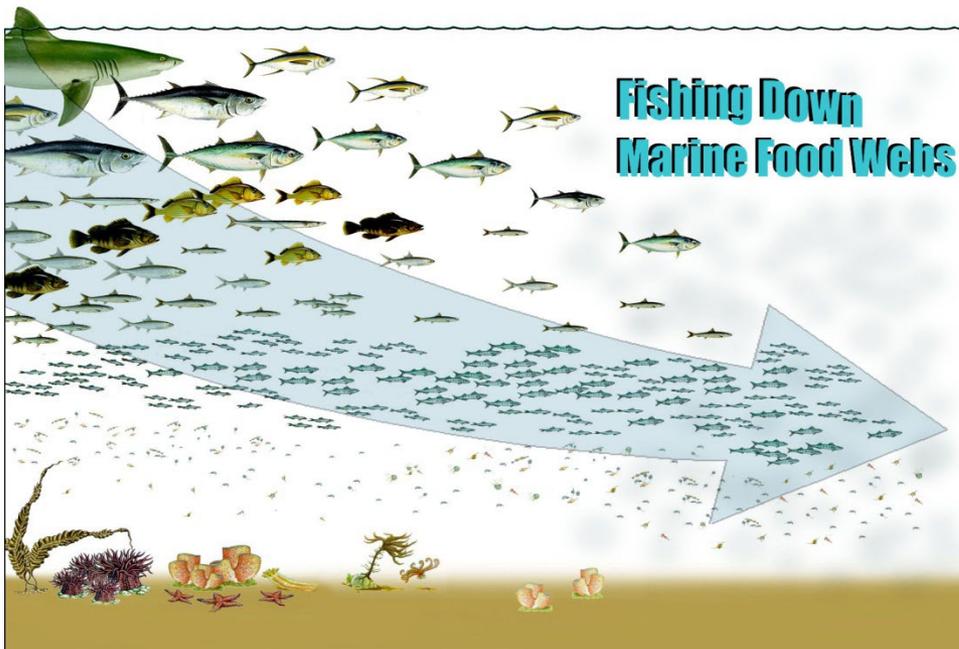


The pressure on the world's fish stocks is increasing relentlessly, notably by the distant-water fleets of a few countries...



The results of all this: fishing down marine food webs

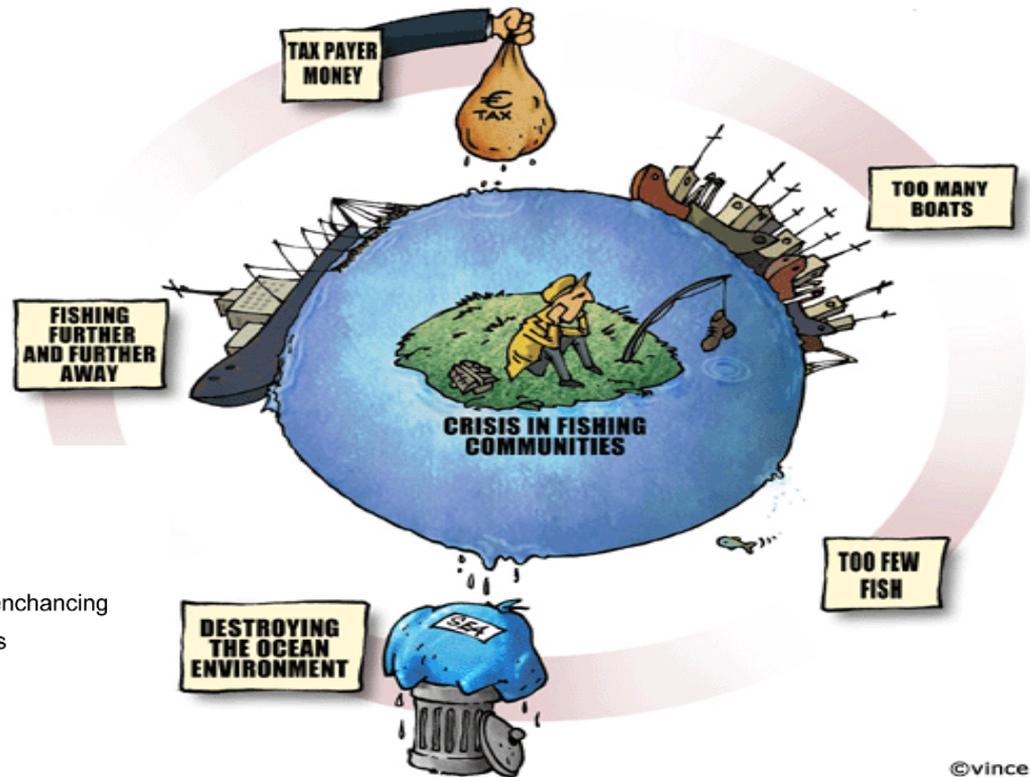
- ‘Fishing Down’ occurs throughout the world.



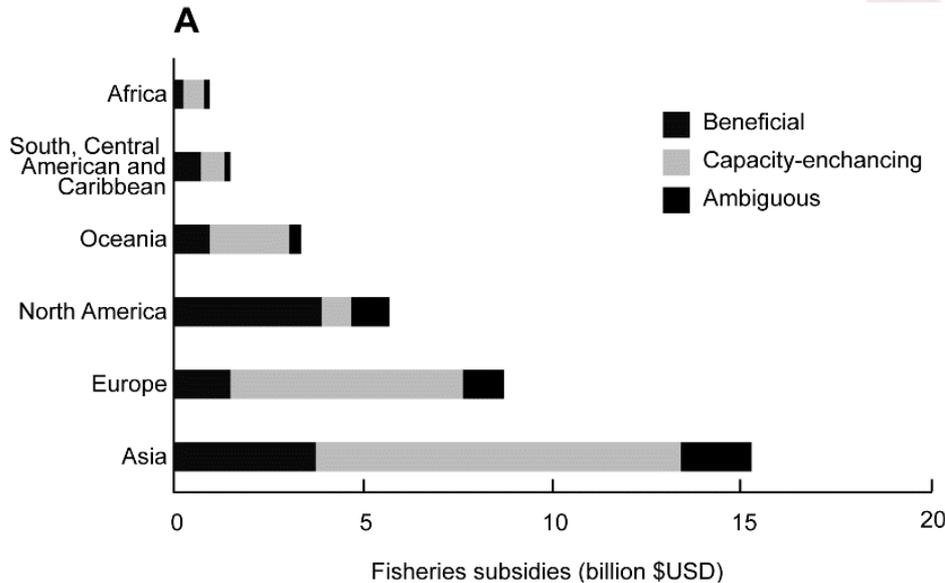
- Catch data can be used to demonstrate the existence of this phenomenon, though it occurs at the level of ecosystems.

Pauly *et al.* (1998, *Science*)

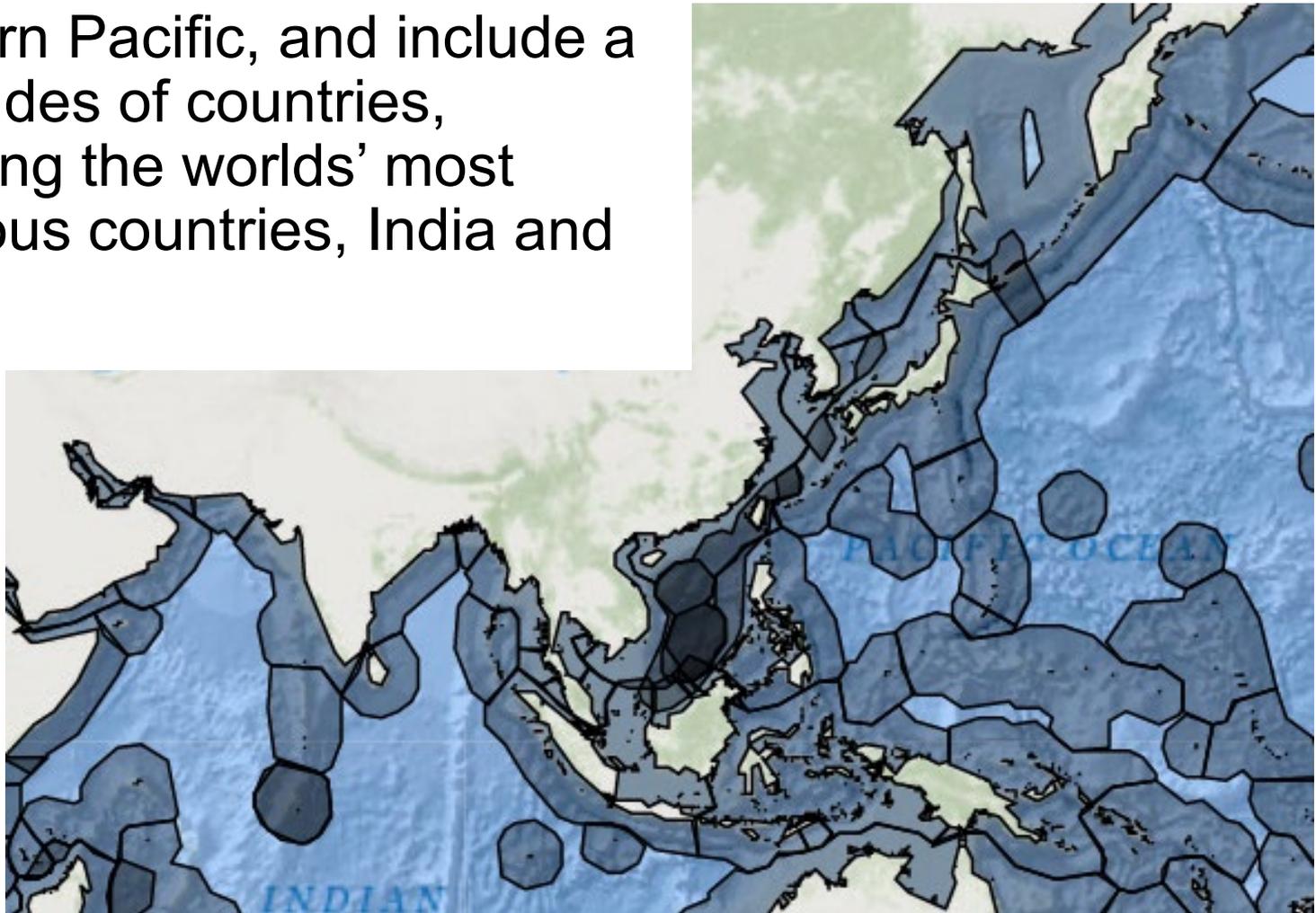
Subsidies are currently the major driver for fisheries expansion and overfishing...



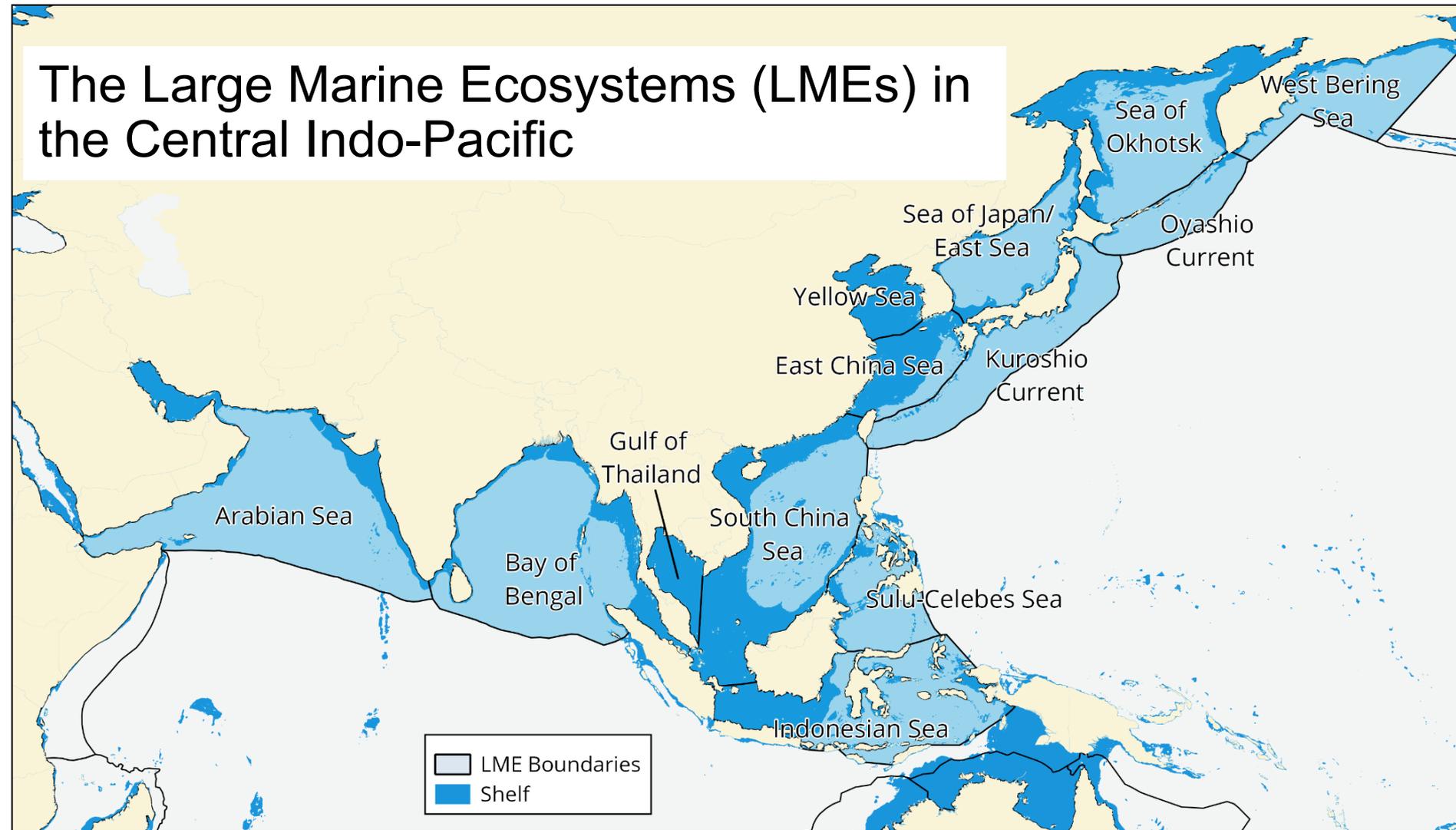
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The Central Indo-Pacific ranges from South Asia to Northeast Asia and the Central Western Pacific, and include a multitudes of countries, including the worlds' most populous countries, India and China

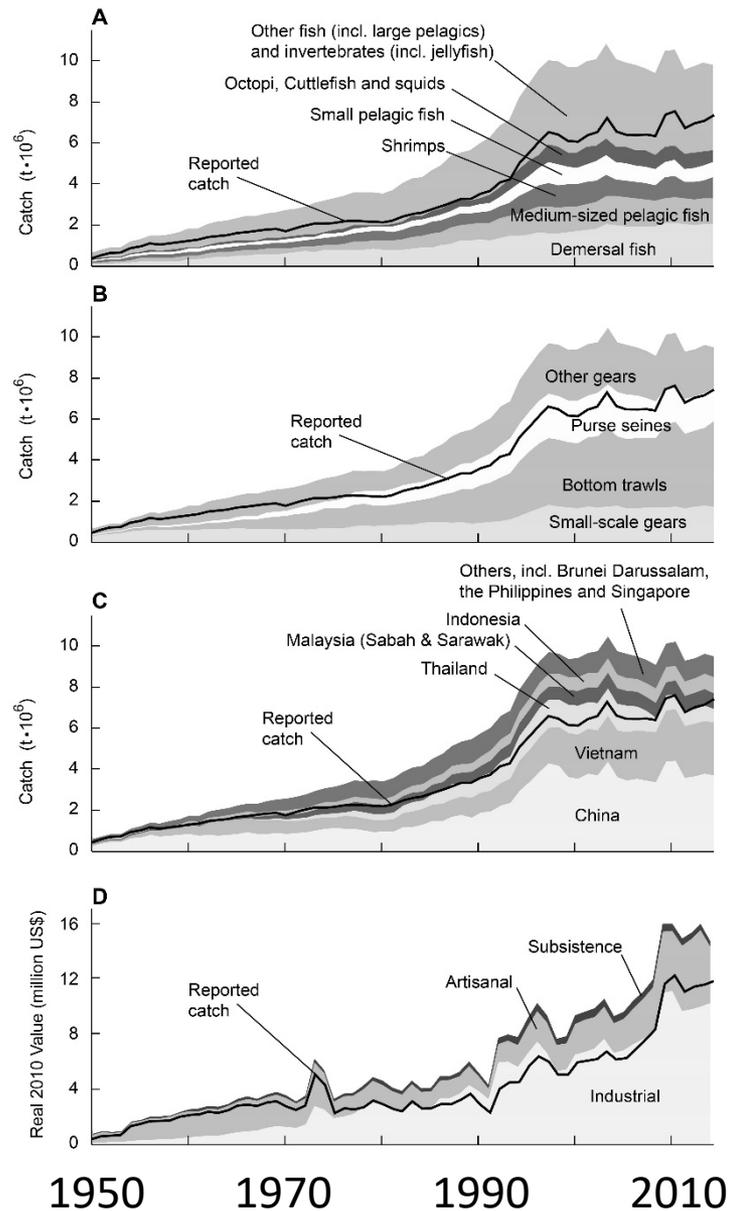


The Large Marine Ecosystems (LMEs) in the Central Indo-Pacific

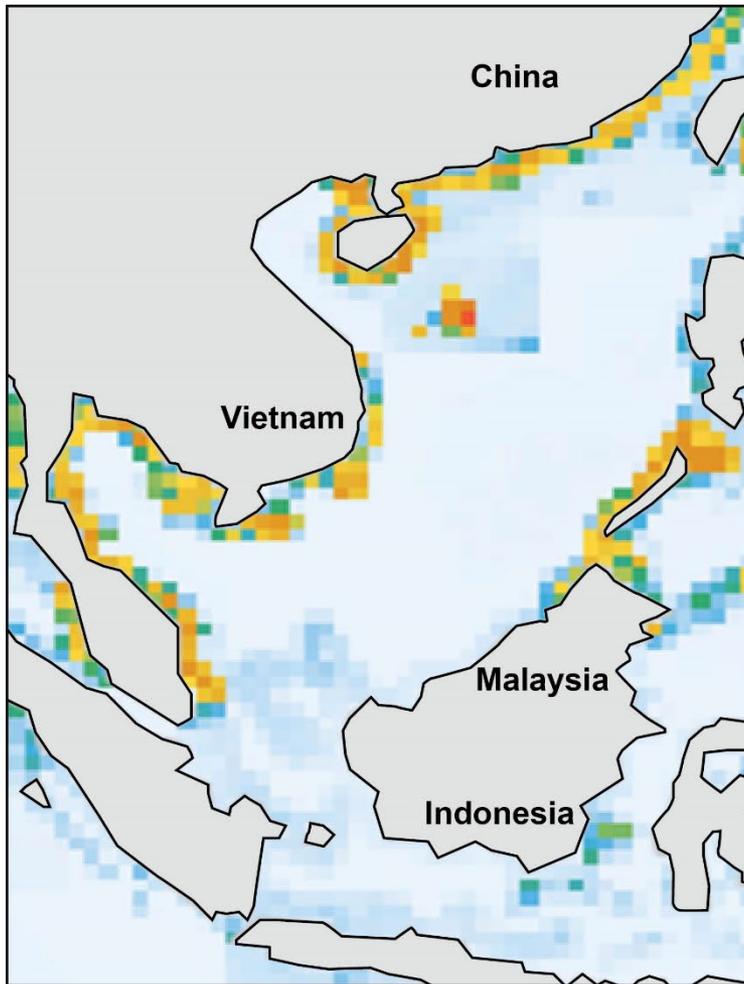


The South China Sea (SCS) is at the very center of the Indo-Pacific, and it is used here as representative of the entire region.

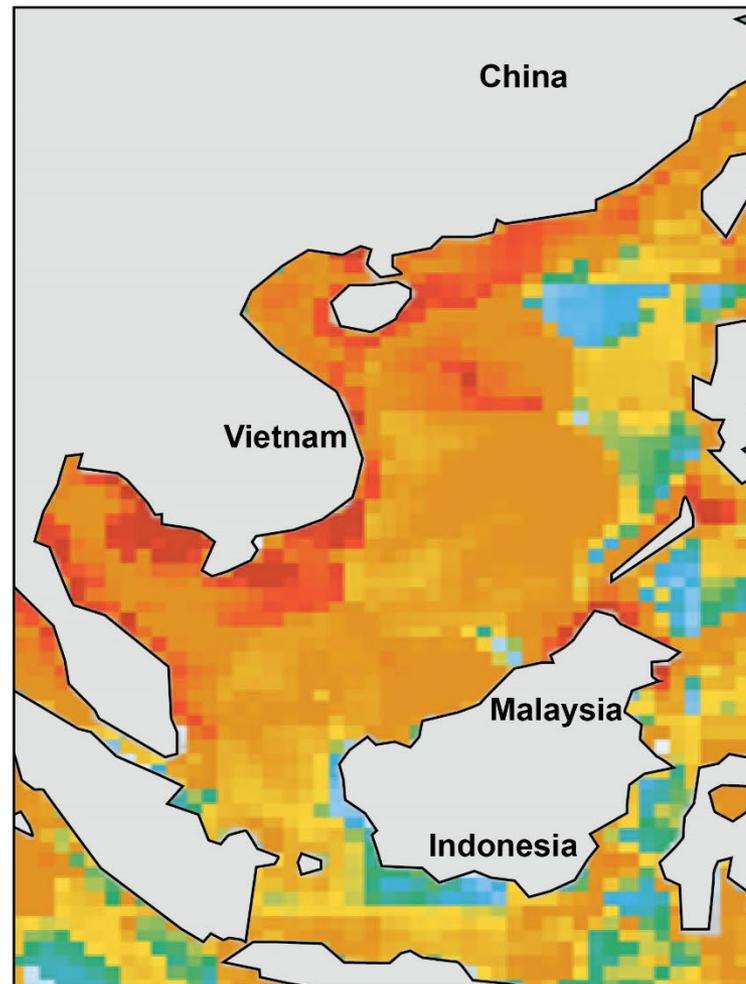
The SCS has an immense variety of fish, exploited by a multiplicity of fleets from various countries, deploying different types of fishing gears, notably trawls.



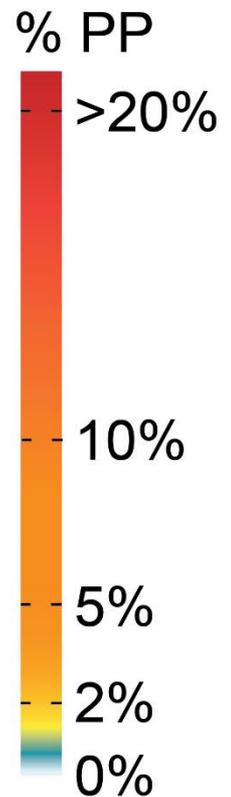
Fraction of the primary production (i.e., the 'grass of the sea') that is consumed by fisheries



Early 1950s

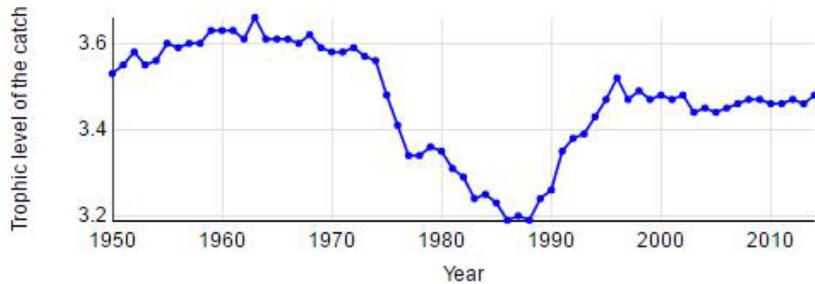


2010s

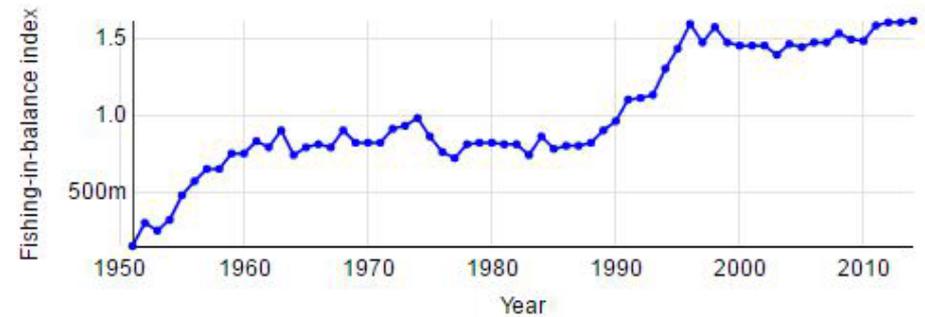


Fishing down in the East China Sea LME

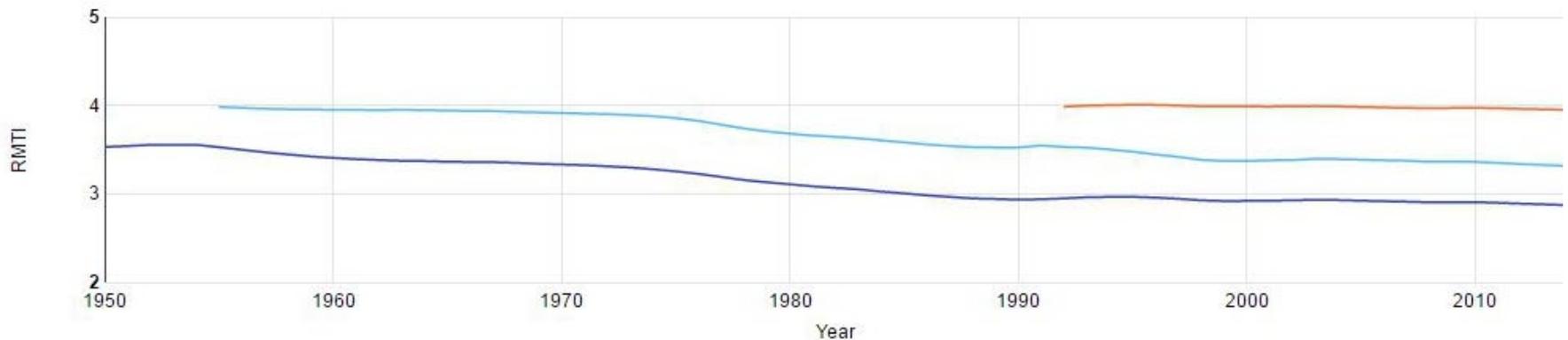
Marine Trophic Index (MTI)



Fishing-in-Balance Index (FiB)



Region-based Marine Trophic Index (RMTI) of the catch in the waters of East China Sea



- Nearshore region
- Offshore region
- Region away from the coast



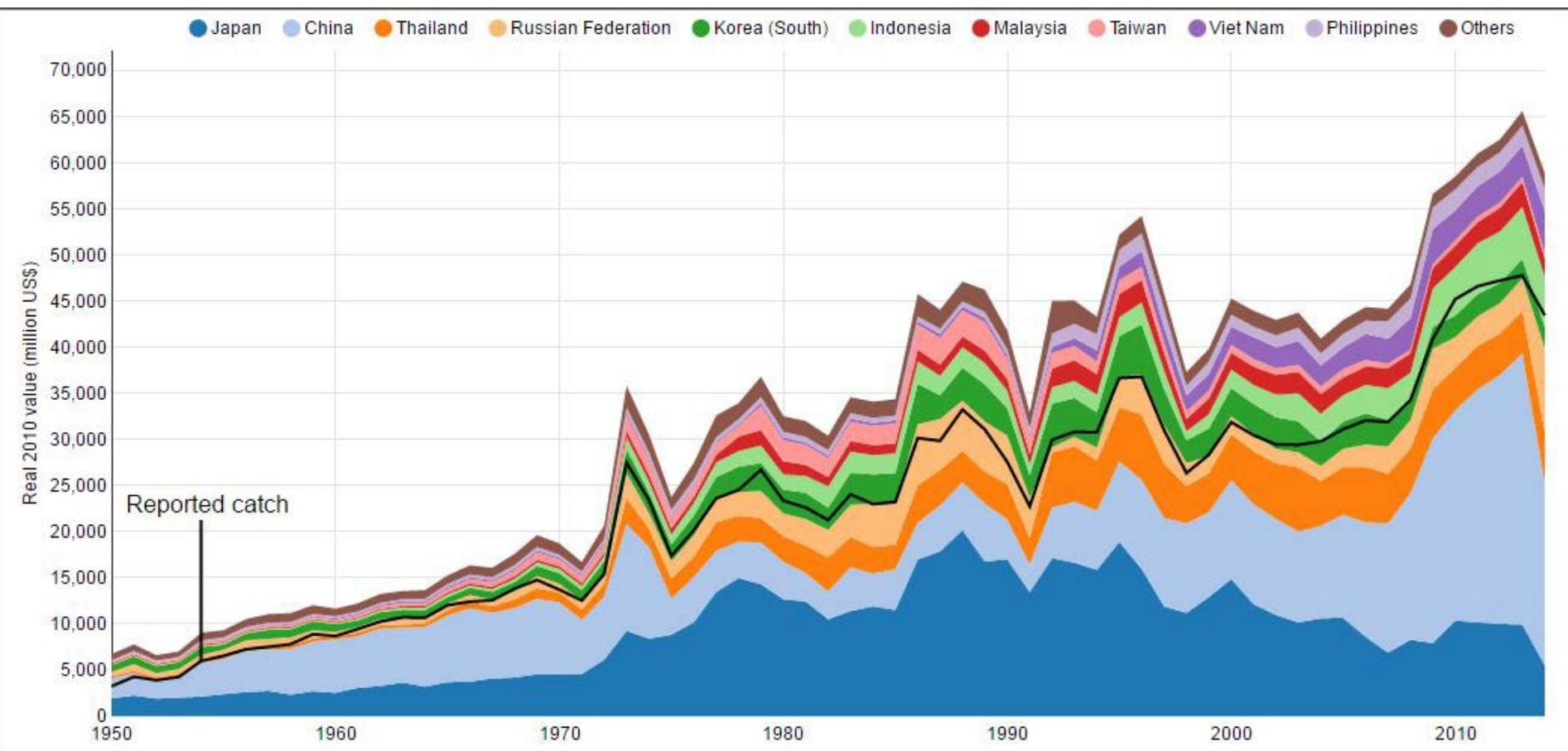
The Chinese coastal fisheries provide a good example of what 'Fishing down' leads to, as do the Thai and Malaysian trawl fisheries...



Two views of the South China Sea: Left as a Large Marine Ecosystem; Right: as a source of trouble because of the 'Nine-Dash Line' and its new 'islands'



Ex-vessel value of the catch from the 10 Asian LMEs in the Pacific Ocean



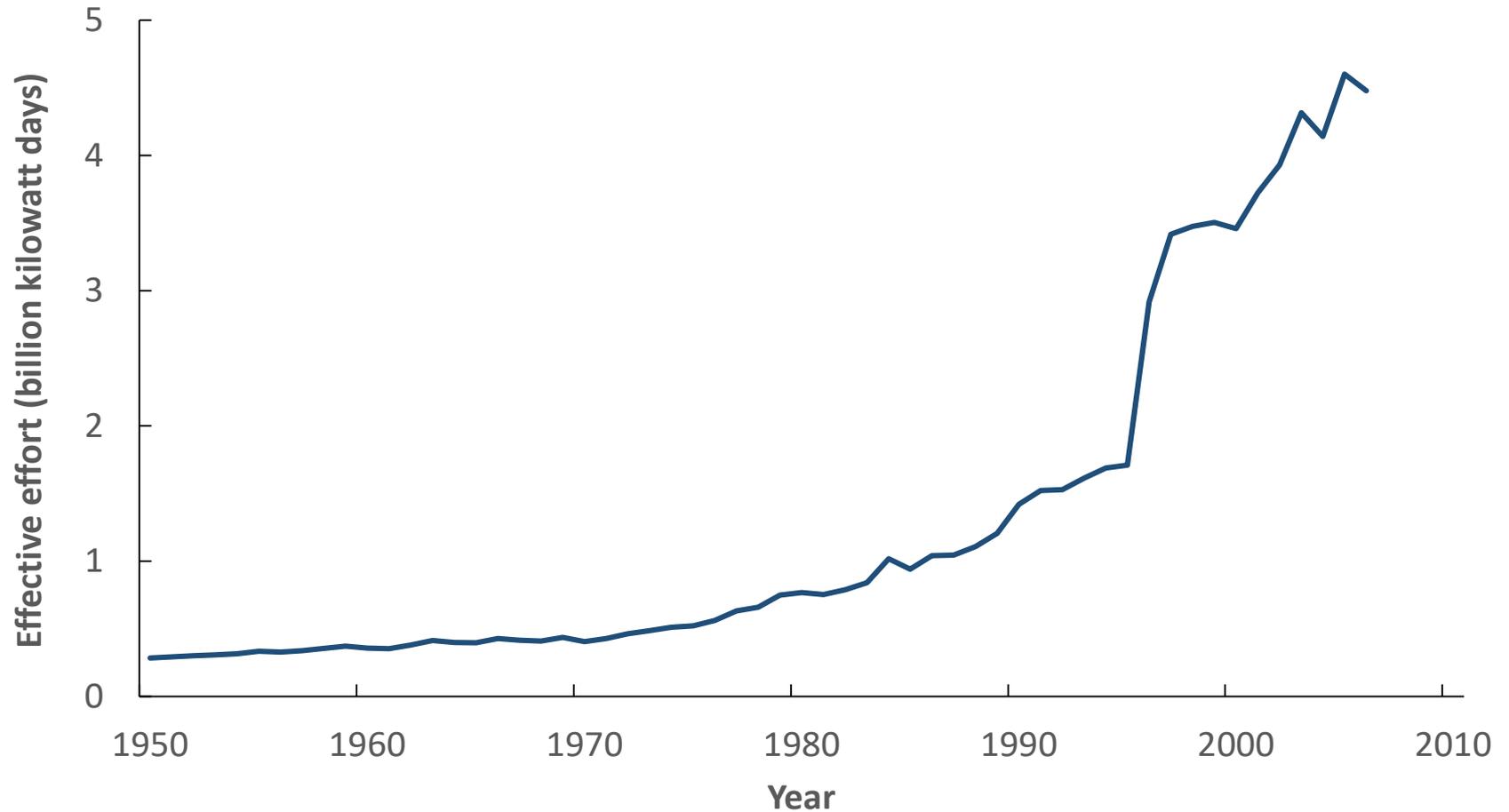
Ratio of subsidy to landed value in each LME

| LME Number | LME Name | Subsidy to landed value |
|------------|------------------|-------------------------|
| 32 | Arabian Sea | 0.31 |
| 34 | Bay of Bengal | 0.14 |
| 35 | Gulf of Thailand | 0.17 |
| 36 | South China Sea | 0.22 |
| 37 | Sulu-Celebes Sea | 0.31 |
| 38 | Indonesian Sea | 0.18 |
| 47 | East China Sea | 0.31 |
| 48 | Yellow Sea | 0.26 |
| 49 | Kuroshio Current | 0.48 |
| 50 | Sea of Japan | 0.38 |
| 51 | Oyashio Current | 0.42 |
| 52 | Sea of Okhotsk | 0.42 |
| 53 | West Bering Sea | 0.38 |





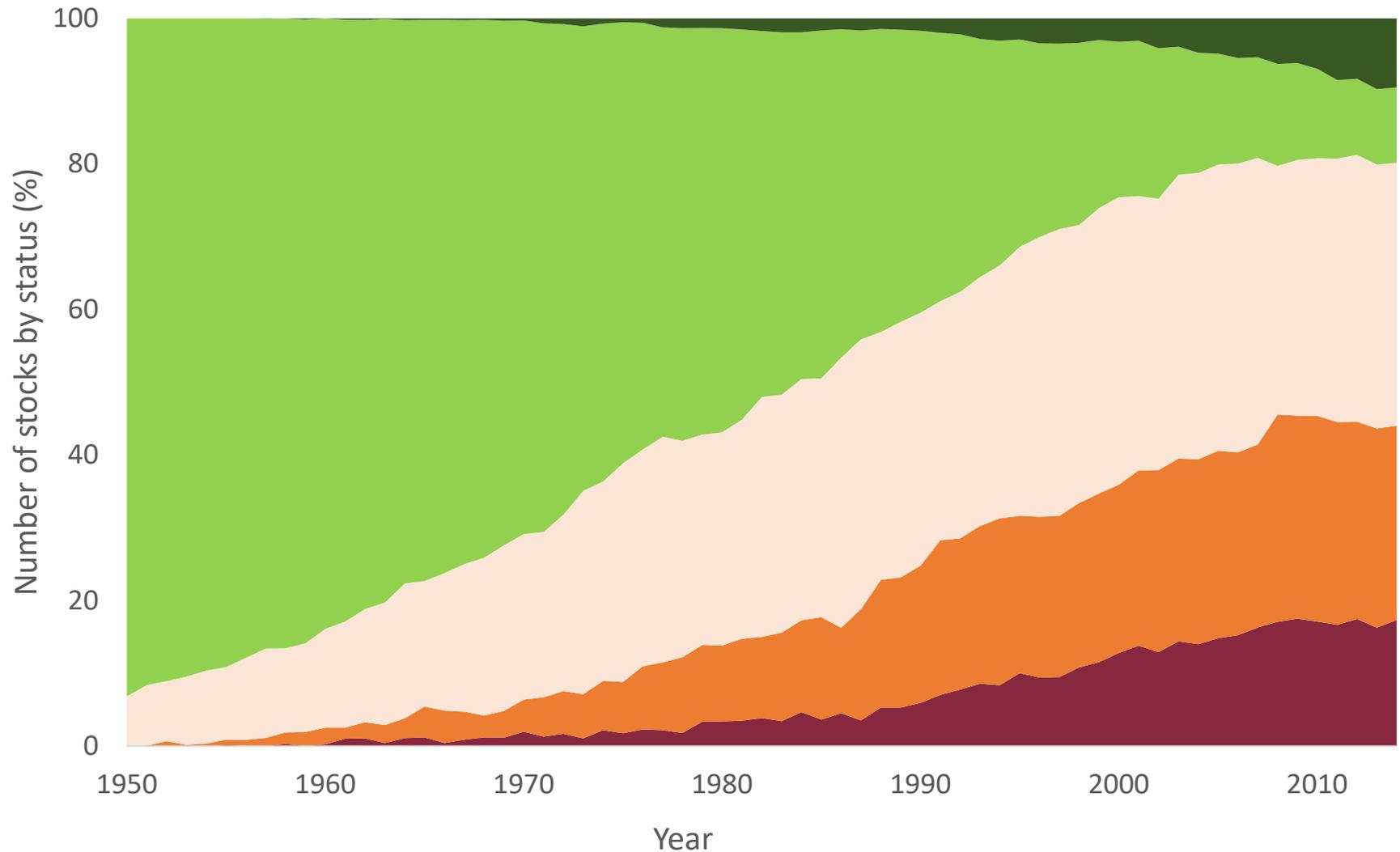
Aggregate effective fishing effort in the 13 Asian LMEs, 1950 – 2006



Anticamara et al. (2011), Watson et al. (2013), Pauly & Lam (2016)

Stock status in the waters of Indo-Pacific LMEs (percentage of stocks of a given status)

■ Collapsed ■ Over-exploited ■ Exploited ■ Developing ■ Rebuilding



Source: www.searoundus.org

Primary production required (PPR) to sustain fisheries in Indo-Pacific LMEs

| LME Number | LME Name | Ecological footprint(PPR/PP) |
|------------|------------------|------------------------------|
| 32 | Arabian Sea | 0.17 |
| 34 | Bay of Bengal | 0.25 |
| 35 | Gulf of Thailand | 0.46 |
| 36 | South China Sea | 0.69 |
| 37 | Sulu-Celebes Sea | 0.44 |
| 38 | Indonesian Sea | 0.23 |
| 47 | East China Sea | 1.24 |
| 48 | Yellow Sea | 0.95 |
| 49 | Kuroshio Current | 0.23 |
| 50 | Sea of Japan | 0.35 |
| 51 | Oyashio Current | 0.23 |
| 52 | Sea of Okhotsk | 0.30 |
| 53 | West Bering Sea | 0.10 |



Level of risk/degradation Lowest Low Medium High Highest

Take home messages

- I gave a similar presentation at an earlier version at this conference about 10 years ago, and the Indo-Pacific fisheries are not better managed than they were then. However, the demand for fish has increased, due to rising incomes and population growth;
- Climate change (not presented here, but an increasingly important factor) will lead to changes in the productivity of the marine resources of Indo-Pacific countries and represent a threat to the fishing industries, economies, and people's livelihoods in all countries

Thank you!

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