

# Why the International Community Needs to Help Create Marine Reserves

by

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United Nations Open-ended Informal Consultative Process on  
Oceans and the Law of the Sea.

Fourth Meeting, Panel B:

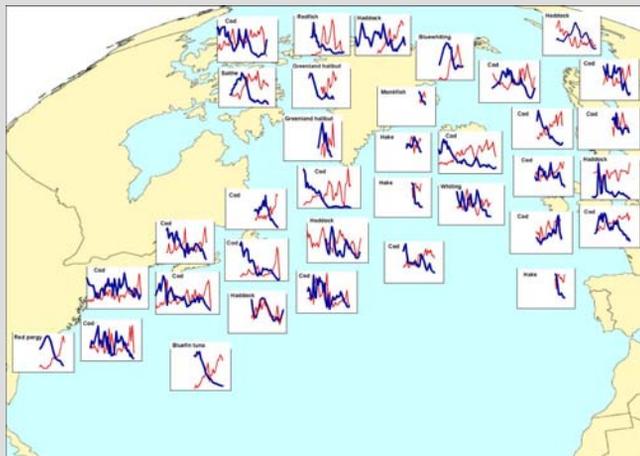
*Protection of Vulnerable Marine Ecosystems,*

New York, 4 June, 2003

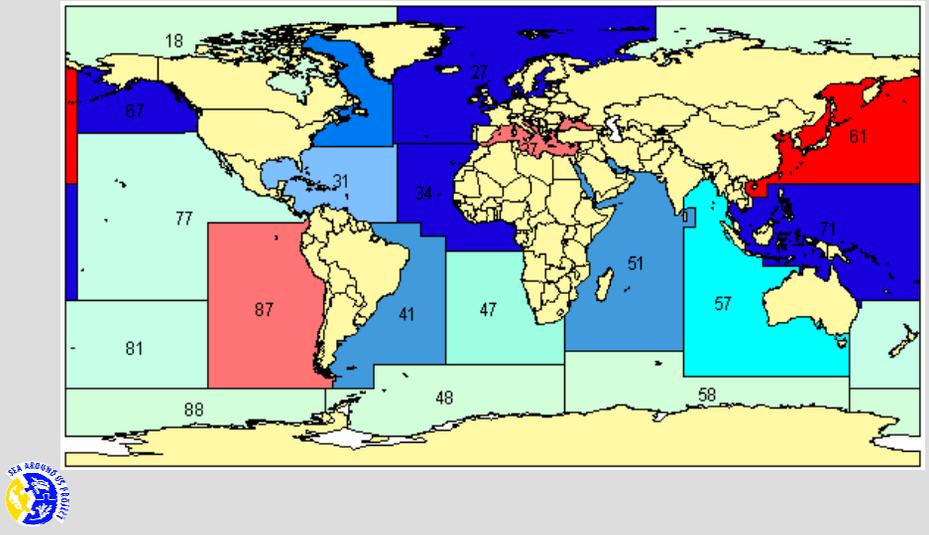


Fisheries, globally, are not doing too well. For example, virtually all species at or near the top of North Atlantic food webs have been depleted by excess fishing, as illustrated here by trends in biomass (blue) and fishing mortality (red) from single-species assessments.

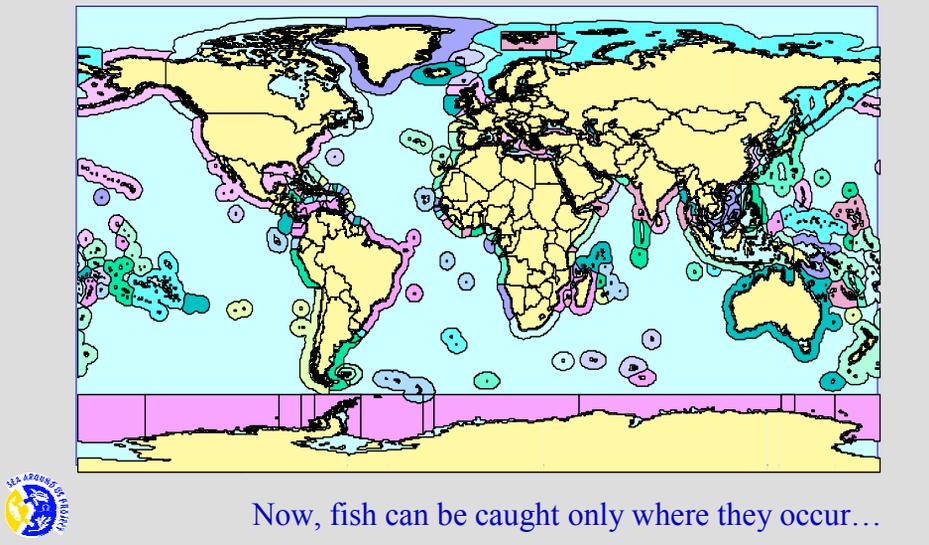
Trends based on data from R.A. Myer, Dalhousie University, Halifax.



This can be generalized using the global FAO dataset. However, it must be transformed, as its original version catches to a grid too coarse for ecological analyses....

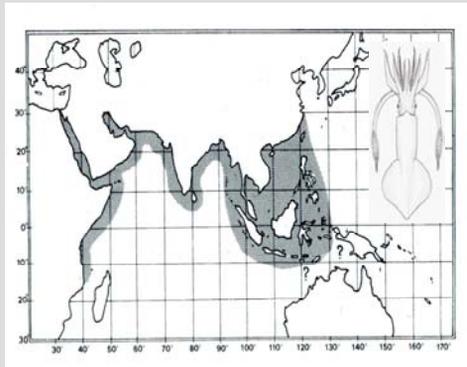


However, most catches are taken from within the Exclusive Economic Zones of maritime countries, and we have a global database of fisheries access agreements....



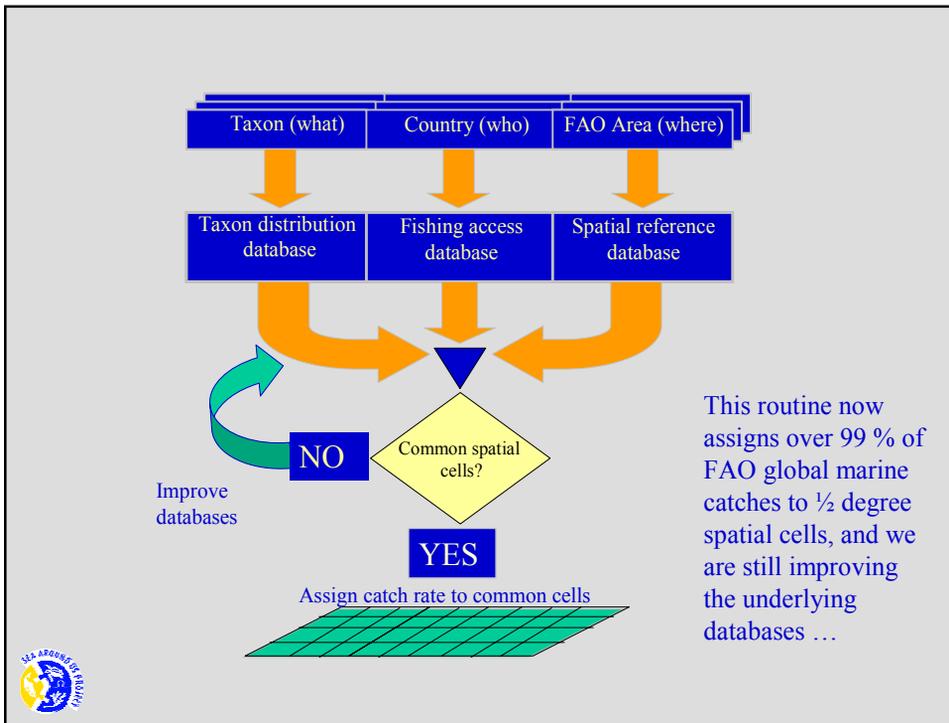
Now, fish can be caught only where they occur...

For each of over 1200 taxa in the FAO database, we created a distribution area (mapped as a GIS object). Combining all this we can...



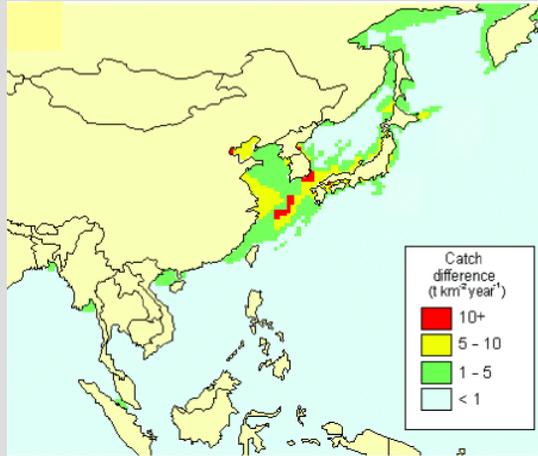
- Assess where the catch of a given taxon can possibly have come from;
- Identify the overlap area between this distribution and the EEZs to which the a given country's fleet have access;
- Assign the catch to the 1/2 degree Lat./Long. cells from which the catch can have originated.

Or put differently...

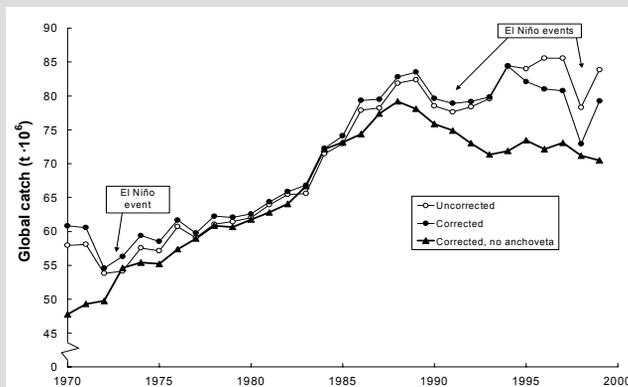


Then, we used a multivariate statistical model to try to reproduce our rule-based catch map, using depth, primary production, etc, to predict catches...

It worked everywhere, except for East Asian waters, where the discrepancies were huge....



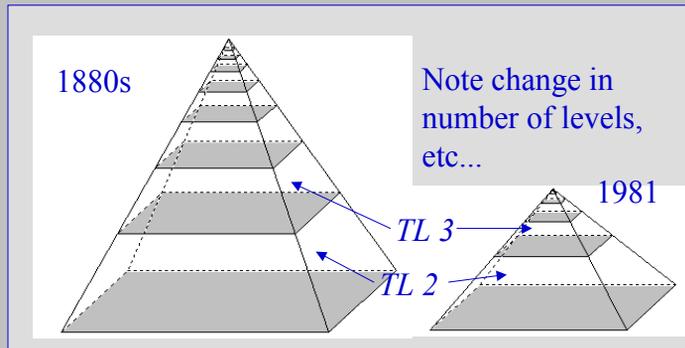
Correcting for this showed that global fisheries catches have been declining since the late 1980s:



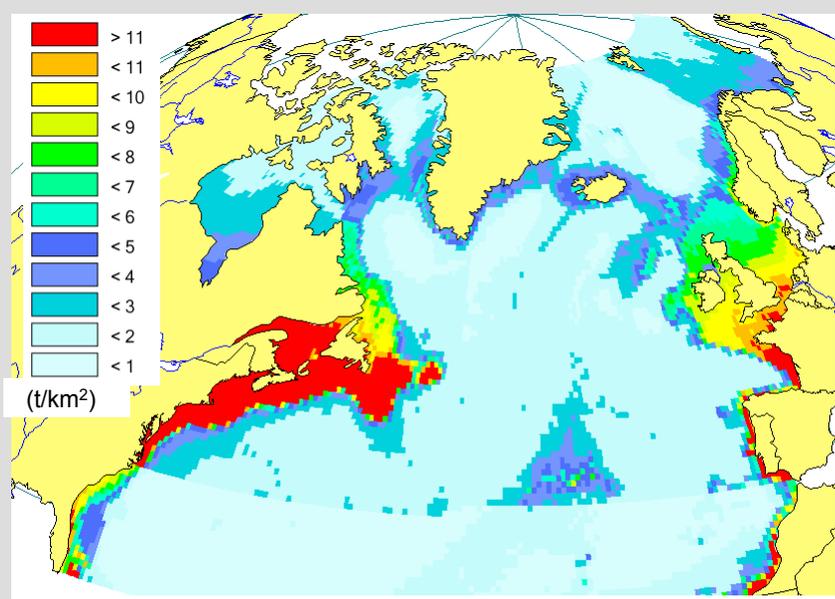
..which contradicted the official reports used in global assessments, notably those generated by the Food and Agriculture Organization of the United Nations (Watson and Pauly, *Nature*, 2001).



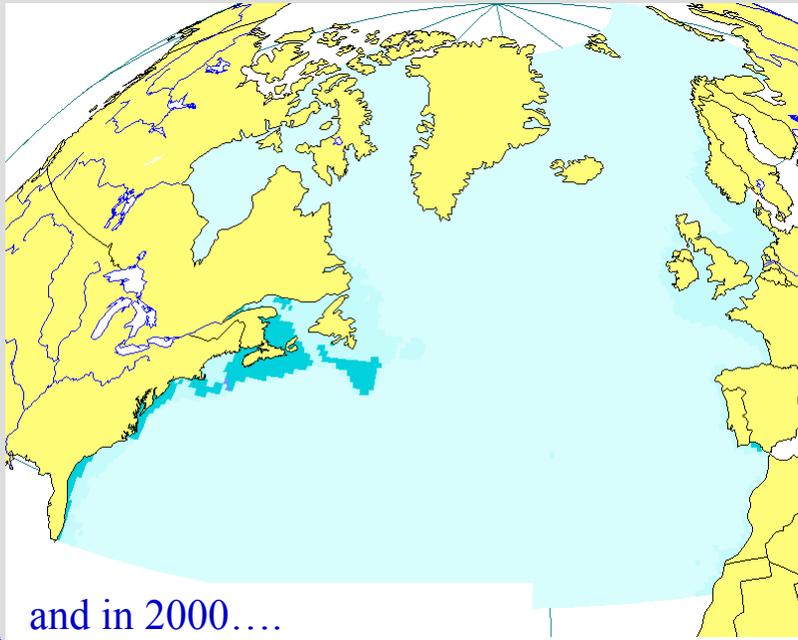
Now, turning to the ecosystems underlying fisheries: they can be represented as pyramids, where the volume at each level indicates the amount of biological production, here for the North Sea....



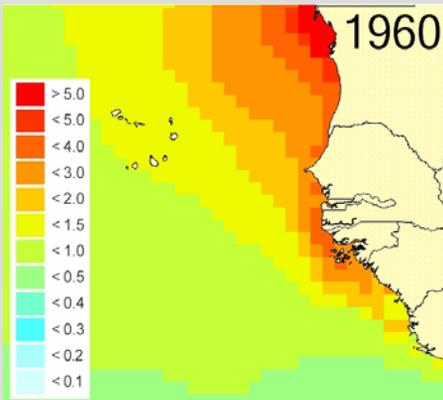
Also note that the corresponding pyramid for the North Sea in 2001 would be about half the size of that for 1981. Generalizing this....



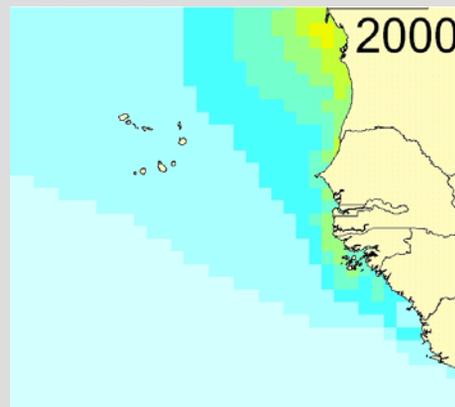
Biomass of table fish in 1900 (Christensen et al. 2003; *Fish and Fisheries*)



and in 2000....

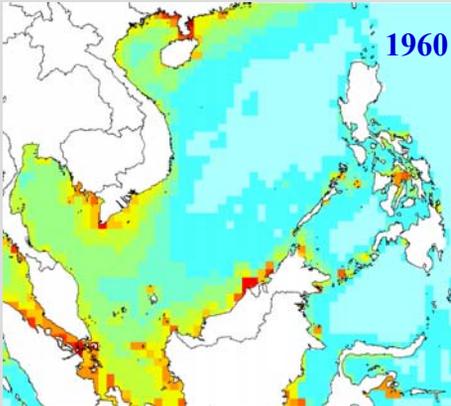


Same thing off West Africa....

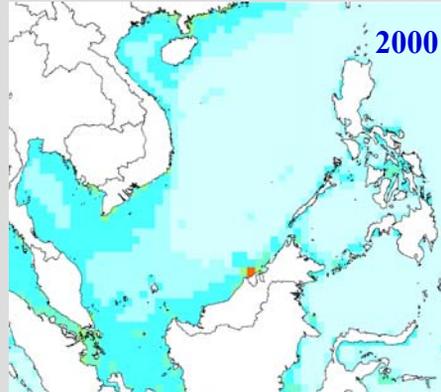


Christensen *et al.* (2002). Dakar Conf. Proceedings (*in press*)



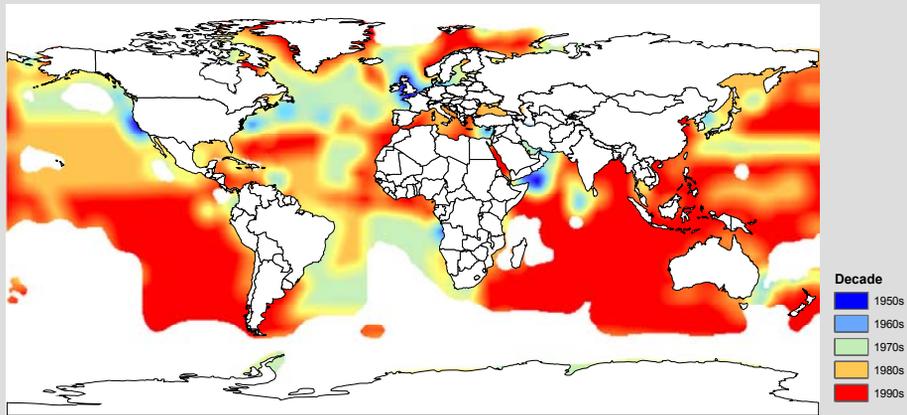


and in Southeast Asia...

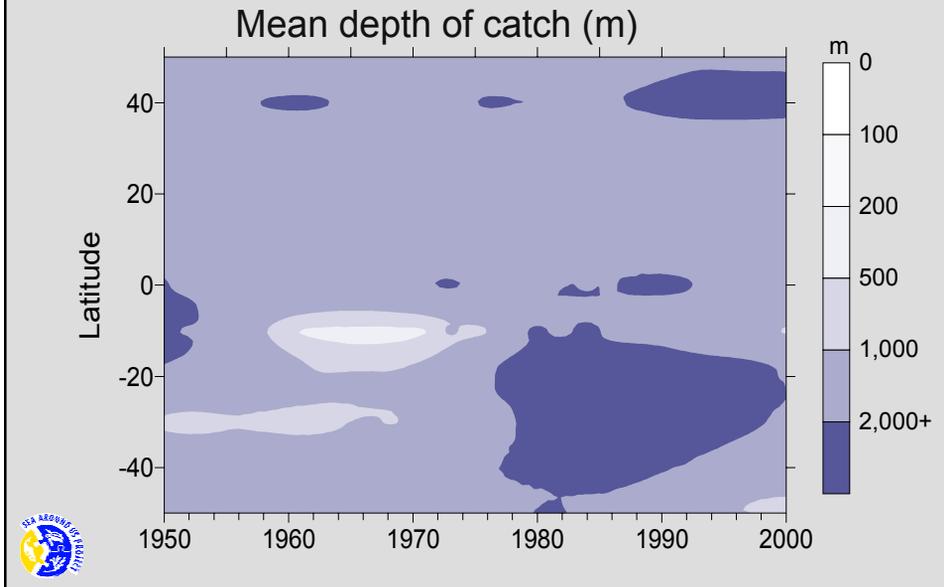


Christensen *et al.* (in press)

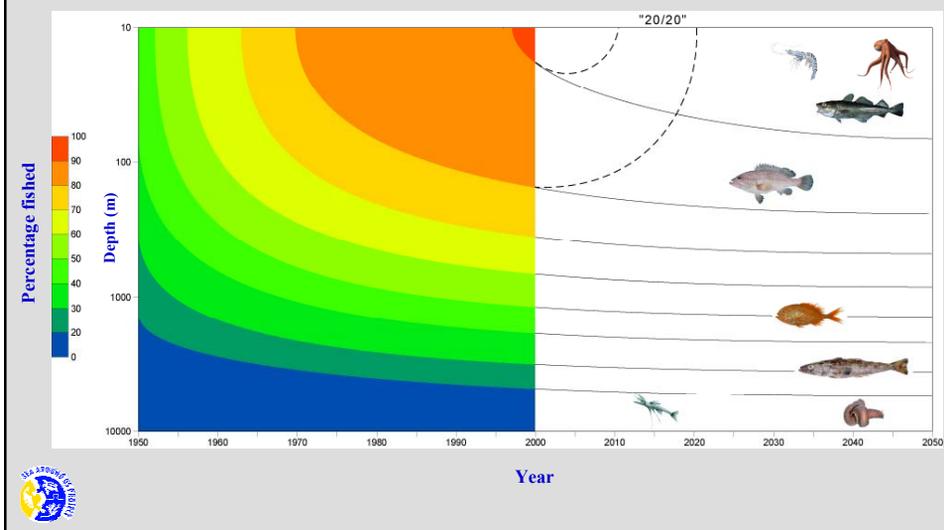
Present catches would be declining faster, were it not for the expansion of fishing into deeper areas and further offshore, especially in the Southern Hemisphere...

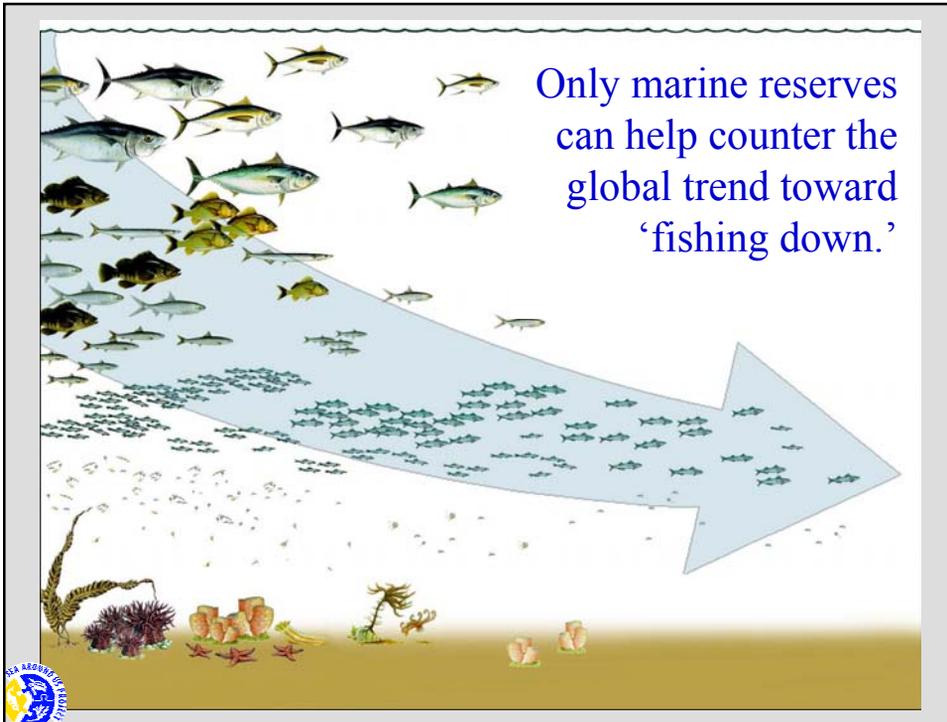


Here is an illustration of this expansion toward greater depth, especially in the Southern Hemisphere...

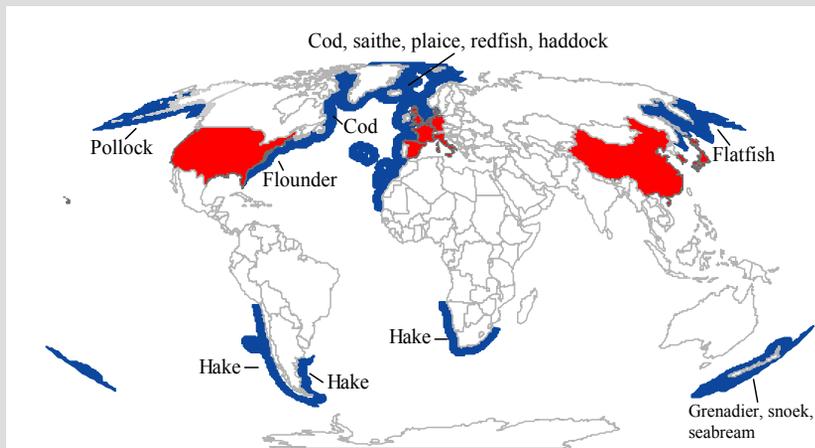


Here is another representation of the same trend, extrapolated to 2050. Clearly, we don't want to go there. However, turning that around will be extremely difficult.

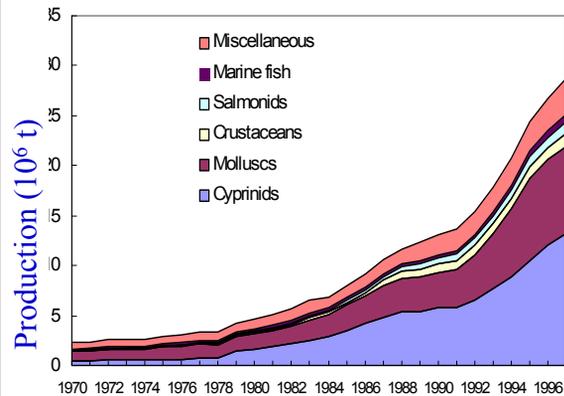




However, consumers in the 'North' have not noticed much 'fishing down:' while most seafood trade is between the EU, the USA and Japan, the 'South' has so far met the shortfall in the 'North'....



Now to aquaculture, especially mariculture, which has grown tremendously in the last decades and which therefore may be seen as the solution to our fish supply problem ...



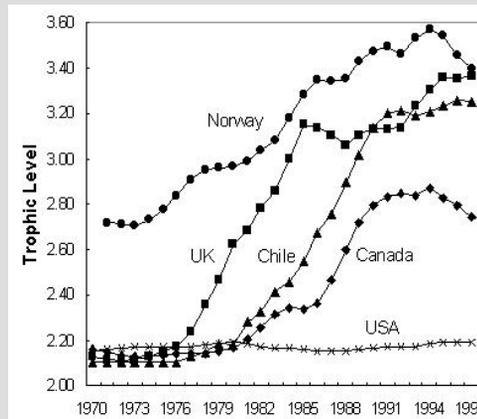
There are two problems with this:

- The overwhelming bulk of reported increase in global aquaculture production is due to reports from East Asia (and there are good reasons to assume that over-reporting may also affect these statistics); and
- In most other parts of the world, aquaculture growth is driven by increasing production of carnivorous fishes (e.g., salmon, bass), i.e., by fish, which to reach market size, must consume more fish products than they themselves contribute.

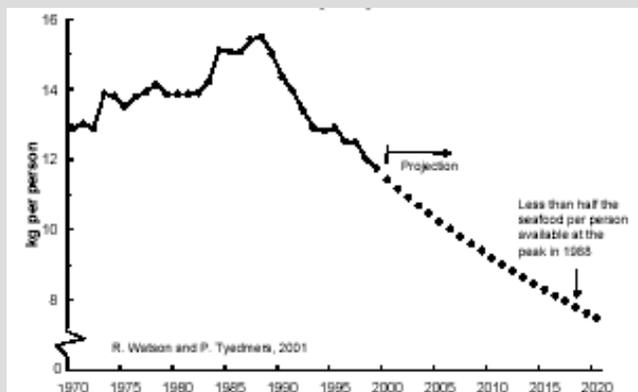


The latter trend, which may be called ‘farming up the food web,’ is documented here for a selection of major producing countries ...

Note absence of an increasing trend for the USA, due to a high production of (low trophic level) catfishes (Pauly *et al.* 2001. *Conservation Biology in Practice* 2(4): 25).



Thus, with business as usual, the global annual supply of seafood per person may well decline as shown here...

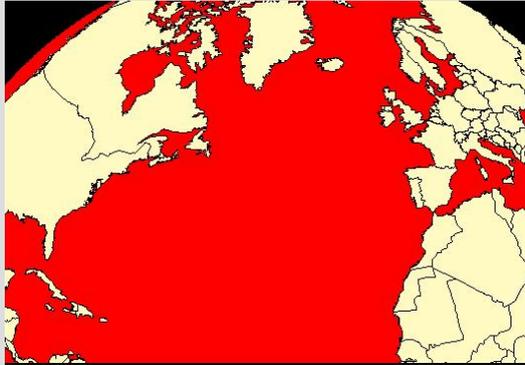


Seafood available per person based on corrected catch data and population data from the U.S. Bureau of the Census.



There are no techno-fixes to the global fisheries crisis.  
We must deal with its root cause, illustrated by this  
map, where areas where no fishing whatsoever is  
permitted are shown in green ...

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**Thank you.**