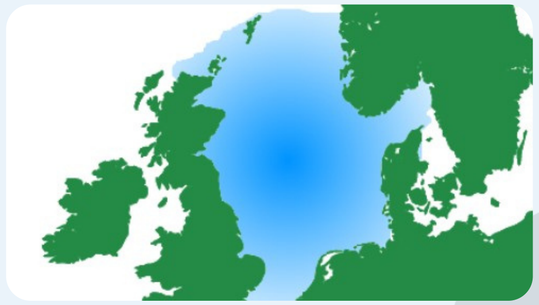
“I think we need to take a broader view about ecosystem health”



North Sea case study

Species: Cod haddock saithe whiting sole plaice hake mackerel herring sprat horse mackerel brill turbot

Research: Density dependence food webs enviromental drivers industry self-sampling

Dr. Marc Taylor

Institut für Seefischerei Thünen-Institut
Bremen, Germany

(Interview has been edited for length and clarity)

What kind of pressing issues do you find kind of coming out from researching there?
We've been focusing on the demersal fisheries of the North Sea. Cod is the big choke species at the moment its quota has been going down a lot in the last 5 to 10 years. It's been historically over fished but it's actually had some recovery recently but it's one of these stocks that's really affected by climate change. And there's strong evidence that changing temperatures and such have really hurt the recruitment capability of stock.

The overall stock size is getting smaller and there's a northward shift in the stock so the quotas have been getting smaller and smaller. And we see that in our simulations as well when we get the quotas the individual stock quotas every year that are produced by ICES and we put them into our models at the mixed fisheries advice group. Then we simulate forward in time using all the assumptions that these assessment groups have used for what they expect next year's recruitment to be and so forth. And Cod is usually one of the main choking species for much of the fleets.

You mention that Cod is slowly recovering in the North Sea - does that mean it’s role as a ‘choke’ species is changing? How does it affect the wider catch?

It has had a little bit of recovery but not nearly enough to really take it out of that position. It's a tricky one. If you look at a lot of the demersal stocks - flat fish and round fish - the trend is that the fishing mortality has gone down quite a bit. And we see that they're biomasses are recovering overall but there's still some problematic stocks in there. And there's others that they've just never really been able to fish the full quota like plaice. This is one that's really benefited in the last 10 to 20 years and expanded its range. And that quota is never really completely taken up because they're choked by these other ones or in some cases they don't believe that the stock is as big as the assessment has been saying. So here's a little bit of back and forth between what the fishers are thinking and what these statistics are saying.

We're hoping for new information and hopefully that's something that comes out of Pandora. One of the things that we've been looking at in the North Sea is trying to better understand recruitment dynamics what's driving it.
The typical model that one uses is just to relate the size of the adult population what we call the spawning stock to how many new recruits you expect in the next year. This spawning stock measure can give you an idea of how many eggs are produced and spawn into the environment. And hopefully that's some sort of indicator of what you would expect next year. It's not a linear relationship but that's the main parameter that you'd want to look at.

The problem is in reality you have a lot of noise around this relationship. And so there must be some other factors contributing to how many babies are born and recruit to the population. Better environment seems to be one of those things that people should be taking more consideration of these inter-year variations in temperature or currents or what have you it might be different for each stock.

That trend seems to be still missing for quite a few species in the North Sea.

There's a paper we published recently where we describe a framework for exploring spatial temporal data. So if you had pictures of what sea surface temperature is every month throughout a long time series you could try to extract signals from this very complicated data field and explore them in a statistical model to see if you can improve your predictions of future recruitment. Or you could improve your understanding of the stock recruitment relationship generally.
We developed this and used it on the case study of cod we came up with some of the factors that have been shown before; so sea surface temperature is important spawning stock biomass is also significant and important. But then we identified a few other things like salinity in some areas that may relate to currents and those haven't been really identified before. We developed this model and applied it to cod, haddock, saithe and whiting. Then we produced some models that were better than the typical just taking into account spawning stock biomass.

It is encouraging that PANDORA is starting to shine a light on these trends and offering some indication of the overall health of the North Sea. These assessments fit into the EU’s Common Fisheries Policy (CFP) as well. Do you think the CFP is working for the region?

I would say it's working pretty well. There's always wiggle room between what ICES’ advice is for catch quotas and what actually gets implemented in terms of the quota each year. But for the most part Brussels seems to take these advice levels pretty seriously in establishing the quota. Coming back to cod again that's one where the economic impact of dropping a quota by 50% in one year is something that they take into account and maybe find some middle ground. But in general they are sticking with the concept of MSY and applying that. But of course fishing MSY is not maybe compliant with other sorts of aspects related to ecosystem health . It's a very stock specific perspective on optimal harvests.

And the use of other indicators of health of populations trying to maybe instead of just managing the spawning stock biomass but also manage the distribution of ages and sizes in a population to have more of an ecosystem-based approach is something we're also interested in not necessarily within Pandora but we are also using eco path models to explore sort of spatial management options. And I think this is also more and more going to be coming to the table as another tool to maybe create a more robust and resilient ecosystem maybe there's areas that we want to close off to fishing completely.

What kind of solutions are starting to emerge in the region? Monitoring seems to be the greatest concern.

If you look at some of the best managed fisheries in the US and Canada Pacific Coast they have almost full monitoring of their fishing. And it just adds a whole different layer of certainty to the data that you're dealing with that that we don't have here in Europe. I think it's a big issue. The bycatch our data dealing with these data limited stocks is also a continuing issue going forward. There's quite some development in the models that we have available to us. In some ways we've got back to very simple models where we're not really trying to divide up the stock into different age categories. And we're just lumping it all into one big biomass pool. You need in some cases like 20 years of data to even be able to analyze the trends to some degree. It's not a silver bullet for every situation.

What changes would you like to see made right away either from policymakers or from the industry itself?

Modelers often say we need better data. I wouldn't necessarily say that. But I think we need to take a broader view about ecosystem health. Sometimes this can be very simple indicators that reflect ecosystem health. Maybe it's information about the size spectrum of species in an ecosystem and having a representation of both the fast growing small species and long-lived species. Are they all coexisting in the ecosystem? Those sort of macro indices I think could be interesting for monitoring.

Another topic that's quite important how these stocks are distributed. A marine protected area could be helpful in some cases but it's also one of those things is probably just an extra tool in the toolbox you can't allow no fishing in one area and allow fishing to be unlimited outside of it – it just doesn't work like that for many stocks especially if they have larger spatial ranges in their distribution - they're not going to be protected to the degree that you would want. I think I think this spatial management is something that may come onto the scene a bit more in the next decade.

@pandora_project
pandora-fisheries-project.eu
marc.taylor@thuenen.de