The change in cod biology is the great unknown

Eastern Baltic case study

Species: :Cod, herring, sprat, round goby

Research: Density dependence, spatial structure, food webs, environmental drivers

Dr. Rüdiger Voss

Kiel Marine Science
Kiel University (CAU), Germany

What do you see as being the most pressing issues kind of unique to the eastern Baltic region?

The fishery mainly depends on three species. And from these three species Cod used to be the one actually bringing in the money. That situation seems to have changed; the Cod biology has changed dramatically. So even within Pandora we have new estimates on growth of Cod and on natural mortality. I think it's quite obvious that climate change has some part to it. We will probably not be able to get back to the situation from the 80s when we had a very productive cod stock. But I feel that there is still this idea of 'if we just manage well enough, we might get back there', but I think this is not the case. So far, for the fishery and the associated socio economic systems I think this drop in stock productivity of cod is the major problem.

What type of changes are you seeing?

We see that cod is growing small, and slowly. It stays much smaller and the natural mortality has gone up. In our modeling, it turns out that if you grow slower and your natural mortality is higher, the amount you might harvest and sell is much lower compared to the times before. And it will of course, change all your reference points you're looking at - how much biomass there should be to secure recruitment, for example. The long term targets you would like to reach as a manager is drastically changed if these new estimates turned out to be true.

What do you think is the biggest unknown in the region?

It's still this change in cod. We can be quite sure that these changes in biology happened. But the reason is still unknown. There are different groups of scientists arguing for different things. And this might have very different management outcomes. So if this growth reduction is due to density dependence, then you would advise to remove more of the smaller cod so that the remaining ones can grow faster. It's still not really resolved, what actually causes this change in cod biology – it's the great unknown. So what we know is that there are large problems with the landing obligation; how much it is monitored and actually fulfilled.

Some companies adjusted to the new law and invested quite a lot of money. Others simply didn't care and carried on as before by discarding catch and it seems that nobody really cares. So there is no control, and no enforcement. And so of course those who invested money perceive it as being absolutely unfair that their competitors simply don't care.

Of course there is also one important unknown, is that we observe new species in the Baltic Sea, which causes a species change in the food web. That might also be one of the sources causing these changes in cod biology, for example. So we have the round goby showing up and being very successful.

I'm guessing these invasive species throw everything awry.

Fortunately, the food web seems to have quite good buffering capacity so it doesn't go completely nuts by having some new species. But still as goby becomes successful that of course will change something. When talking to fishermen I say that we are trying to do our best to understand what is going on. But I would not be too positive. Maybe we have to adapt to the situation and see how to make the best out of it. I think that that we need to be quite careful in communicating that. We are not sure what is going to happen. And it might be that even if we do the right thing, it will take quite a long time until we can go back to better cod productivity in the system.

How do you see the Common Fisheries Policy working for the region?

I think it was a big step forward to now look at the species combined. The only thing I'm a little bit concerned about is that this is a range which should be adjusted according to the general ecological conditions. We need to make sure that politicians or managers do not always select the upper range. Some may do this trade-off because politicians need to care about the fishing industry and tourism. So I think they're quite tempted to allow as much as possible.
I think that was not the idea of having these ranges. The idea was more to allow for some flexibility to mirror what is going on in the environment. So the combination of having an ecosystem assessment, species interactions, and then adding flexibility in the fishing effort is a really good idea.

I really like this kind of interdisciplinary research. I do see the problem that it complicates the advice even more already, but I think at some point at least medium term we should learn from the stakeholders what are their pressing issues and try to be include it in the ecosystem overviews. Having said that, from the modeling we do within Pandora. So we are running bio economic models for the multi species in the Baltic Sea. So what is quite nice, is that actually, using the social economics, we can actually argue for being more restrictive in preserving the stocks.
In this case, so our latest model results actually suggests that it's rather a win-win.

So if we now reduce fishing pressure to some degree, it will actually pay off even on the reduced stock productivity of cod. So and that is, I guess, something which could be communicated it that way.

Do you see any solutions emerging from the area?
I think it's a good time to actually take this up in, for example, the ICES reports. This is what we are working on. So that we so far, the assessment reports they have this ecosystem component. And so now you might argue if the socio economic should be part of this ecosystem assessment, somehow, you might have a separate section or whatever. I would be in favor of having the ecosystem assessments allow us to show both the environment developments and then also some of the social economic developments. In the end we can then have two or three documents which can be passed on to the decision makers. I think we are on a on a on a good way concerning this also in the Baltic.

In a project like Pandora we have a bio economic modeling component - this would not have been the case 10 years ago. It's a little bit of a slow process, but I think it's generally accepted that this bio economic modeling can give some interesting insights, and that it should be part of these fisheries management projects.

I can only imagine what it would be like if we started this earlier.

When I started in the economics department, I was really surprised because economic and fisheries communities were basically not connected, it was kind of strange. So the economists were running their models with a very simple biology but quite sophisticated economics. And then the fisheries biology had very detailed biology, but very basic economic idea - if at all. This changed dramatically over the last few years not least because we have these EU calls which are requesting this interdisciplinary work. So this is how people found each other. I think the this move from the EU to I have calls and have this mandatory collaboration part was very helpful.

I guess it's one of the benefits of Pandora, it's making one of those connections and bringing it forward.

Of course. In all the different cases, we have this combination new approaches to stock assessment, including new biological knowledge, new knowledge on environmental forcing, and new knowledge on the socio economic side. I like that quite a lot. So I think it makes perfect sense. And we can actually learn from each other even within the project so that I really like.

(Interview has been edited for length and clarity)

@pandora_project

pandora-fisheries-project.eu

voss@economics.uni-kiel.de