Beyond Capacity Adaptation – for what should it be adapted?

Jacob Hagberg

It is well known that keeping fish stocks at optimum stock sizes will increase the production of fish leading to larger profits for fishers and increased food production. The Southeast Asian countries have started to make efforts to adapt fishing capacity to the available amounts of fish. But the step to translate scientific recommendations into a practical change of the fishing effort is often the most sensitive, especially from decision making perspectives. Decision makers feel pressured to meet the demands of different interest groups, often sacrificing the long-term larger profits for more short-term smaller gains. One solution to simplify this process is to use Harvest Control Rules.

Many countries around the world are successfully using a legal tool called Harvest Control Rule (HCR) to agree in advance, how fishing effort should be adapted to the size of the fish stocks. By deciding on pre-determined rules for adapting the fishing effort, "Harvest Control Rules," takes away some political pressure to increase fishing and makes decisions transparent to the fishers and the public. An HCR is a short legal document that explains how fishing capacity or effort should be adapted depending on the result of a scientific assessment of the fish stocks. The target of HCR is often formulated to maximize fish production, which could indicate that fishing effort should be for example, equivalent to the Maximum Sustainable Yield (MSY) or that the biomass of a fish stock should reach **x** percent of the MSY by year **y**. An example of a simple harvest control rule could be:

> *"If a scientific stock assessment recommends to change fishing effort for the Indo-Pacific mackerel by **x** per cent to reach the target of the HCR, then number of gears licensed to fish the Indo-Pacific mackerel should be changed by **x** per cent."*

In practice, most fishing methods all over the world catch more than one species in what is called a mixed fisheries or multispecies fisheries. Such situations could also be handled by the HCR. Let's say we also catch anchovy when we fish for mackerel. If results of scientific stock assessment recommend that fishing effort for anchovy could be increased by 20 per cent but for mackerel it can only be an increase of 10 per cent, the HCR should be designed to handle this situation. The precautionary formulation of a HCR that handle a mixed fishery could be:

> *"If scientific assessments recommend different effort changes for different species caught by the same gear, then the number of gears should be changed in accordance with the most conservative change recommended for the species caught by the same gears."*

In this case, the HCR would lead to an increase of effort by only 10 per cent and an optimal harvest for mackerel but under-harvesting the anchovy since the recommendation was that anchovy could be increased by 20 per cent. The most un-precautionary approach would be to have the opposite approach of the HCR where effort is increased by 20 per cent and optimally utilizing anchovy, but could lead to overfishing of the mackerel. This would likely lead to a situation where the status of the mackerel stock is deteriorating for the next assessment, ultimately leading to a very bad situation for the mackerel. Normally, the precautionary approach leads to more stable stocks with less variation which is often preferable from the market and industry perspectives. **Box 1** shows an existing HCR which have been agreed between Norway and Russia. The two countries fish on a transboundary stock of cod in the North Atlantic. After the two countries agreed to follow this HCR, the catches have doubled and the fish stock has been stable at the MSY level.

HCR can also be designed to handle both a quota-based and effort-based systems. Between the two extremes presented above, there are other intermediate solutions where some deviations are acceptable from the target of, for example, the MSY, but the thresholds are decided under which the fishing effort must be reduced. See for example **Box 1**.

Box 1. Harvest Control Rule for North East Arctic Cod

*The Norwegian-Russian Fisheries Commission (inter-governmental organization) manages their shared/transboundary fish stocks in the North East Arctic Ocean. Below is a translation (not official) of their Harvest Control Rule for cod (*Gadus morhua*). This example is based on a system of catch quotas but similar rules could be designed for different kinds of effort regulation systems.*

Management Rule for the North East Arctic Cod

The Parties agreed to follow a harvest strategy for cod that fulfill the objectives of:

- Securing a long-term high yield from the stocks;
- Achieving stability in the Total Allowable Catch (TAC) from year to year; and
- Achieving full utilization of information on all available stock assessments at all times.

Based on these principles, the Parties confirmed that the following decision-making rule would be used for setting the annual quota for the North East Arctic cod:

TAC is calculated as the average forecasted catch for the next three years using target level of fisheries mortality (Ftr).

The target level for fisheries mortality is calculated based on the spawning stock biomass (SSB) in the first year as follows:

- If SSB < Bpa, then Ftr = SSB/Bpa x Fmsy;
- If Bpa ≤ SSB ≤ 2 x Bpa, then Ftr = Fmsy;
- If 2 x Bpa < SSB < 3 x Bpa, then Ftr = Fmsy x (1 + 0.5 x (SSB - 2 x Bpa)/Bpa);
- If SSB ≥ 3 x Bpa, then Ftr = 1.5 x Fmsy; where Fmsy = 0.40 and Bpa = 460,000 metric tons.

If the spawning stock in the current year, previous year and each of the three coming years is more than the Bpa, the TAC shall not change by more than +/- 20% relative to the current TAC year. In this case, however, F should not fall below 0.30.

Note: Bpa is the pre-cautionary reference point for the SSB; and Fmsy is the fishing mortality consistent with achieving the MSY.

HCR can also include mechanisms to try to avoid large variations in the effort or quota that is allowed each time a new effort is decided and recommended. Large variations can be difficult for fishers to adapt to and can have negative effects on the market price. Finally, HCR should include precautionary limits that can overrule the previous rules if the fish stock decreases below a certain level, in which case, more drastic decreases in fishing effort should be applied in order to restore a stock to full productive capacity.

Effort or Quota Regulation

Some argue that in fisheries with gears that target many species, it is better to use quotas for each species that are caught in a certain gear, *i.e.* the so called single species quotas. This practice has been used in northern Europe for a long time. In bottom trawls for example, many different species are caught with separate yearly quotas. Until 2014, fishers were allowed to continue to fish until all quotas were fully utilized. This meant that species who's quotas were fished fully early in the year were overfished each year. In the 1980s, about 80 per cent of the fish species were heavily overfished and the ecosystem also changed because of the disappearing species. In an "effort regulation system" such as that applied in Thailand where the number of days at sea is limited, it is also necessary to handle all major species that are caught by setting a suitable effort level. This shows that the problem in mixed fisheries is similar whether a "single species quota system" or an "effort system" is used. There are other regulatory systems such as results-based fisheries that are much better at handling mixed fisheries, but these depend on stricter control and surveillance system. Nevertheless, with sensible HCR, situations in mixed fisheries could be reasonably handled either with effort or quota regulation.

Way Forward

Developing the design of HCR should involve all stakeholders to enhance understanding and compliance. It is often much easier to agree on the targets and rules for deciding the fishing effort before the fishing effort should be set. A harvest control rule could be implemented at all levels from local and national to regional. Most importantly, it has the dual advantages of reducing the pressure on decision makers from stakeholders and at the same time, making the target for the fisheries regulation and the decision process transparent.

About the Author

Dr. Jacob Hagberg is the International Fisheries Policy Expert of the SEAFDEC-Sweden Project, based at SEAFDEC Secretariat in Bangkok, Thailand.