

PROPERTY RIGHTS TO INTERNATIONAL FISHERIES RESOURCES
AND
CONSEQUENCES FOR FISHERIES MANAGEMENT

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Work in progress

BACKGROUND

The legal framework.

The legal framework when it comes to management of fishery resources is provided by the 1982 UN Convention on the Law of Sea (UNCLOS) (UN 1982). That convention establishes the regime of 200 nm EEZs for coastal states (UN 1982, Part V). Within the EEZ, the coastal state has “exclusive rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living ----“ (UN 1982, Article 56 (1.a)).

Because of the mobility of fish stocks, some fishery resources may cross the EEZ into neighbouring EEZs and/or adjacent high seas (UN 1982, Article 63; Article 64). According to Munro *et al.*, 2004, this gives rise to the following classes of transboundary fish stocks:

- (a) Shared stocks crossing the EEZ boundary into the EEZs of one or more coastal states;
- (b) Straddling fish stocks – stocks crossing the EEZ boundary into the adjacent high seas.
- (c) Highly migratory stocks as defined in a special annex to the Convention.

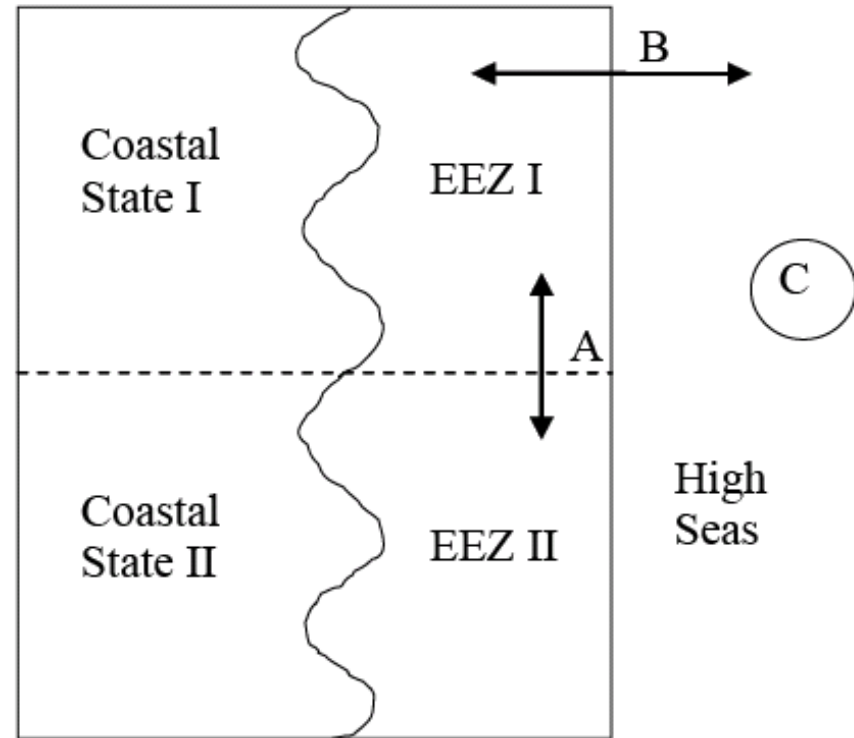


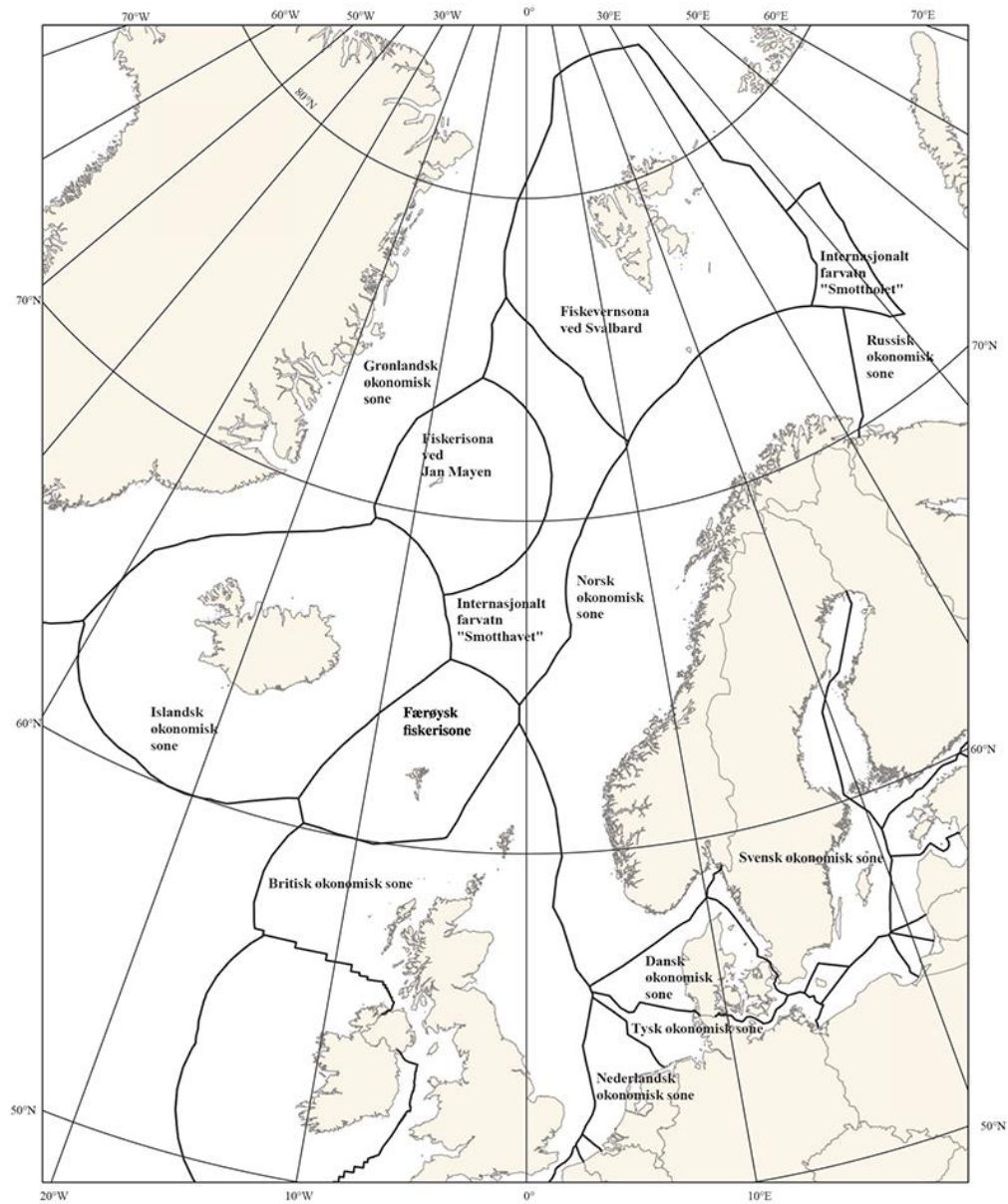
Figure. Shared stocks. A = shared stock. B = straddling stocks. C = discrete high seas fish stocks.

The management of shared stocks is dealt with in the 1982 UN Convention in Article 63(1). The article calls upon the relevant coastal states to come together “—to seek ----to agree upon the measures necessary to co-ordinate and ensure the conservation and development of such stocks ----“ (UN 1982, Article 63(1)).

Importantly, however, UNCLOS does not require the relevant coastal states to reach an agreement. If the relevant coastal states undertake a good faith attempt to achieve a cooperative agreement, but do not succeed, then each state is to undertake to manage its share of the stock as best it can, in accordance with other provisions of UNCLOS (Munro *et al.*, 2004).

According to the 1995 United Nations Fish Stocks Agreement (UNFSA; UN; 1995), straddling fish stocks and highly migratory fish stocks are to be managed by Regional Fisheries Management Organisations (RFMOs), consisting of coastal states and relevant Distant Water Fishing States (DWFSs) with a “real” interest in the fishery.

As an example, management of straddling stocks in the North East Atlantic is governed by the North East Atlantic Fisheries Commission (NEAFC), an RFMO under the UNFSA (Bjørndal 2009).



Fiskerisonene i Nordaust-Atlanteren

The stocks under consideration are harvested by coastal states and DWFSs. The relevant states engaged in the fisheries negotiate to set annual total allowable catch quotas (TAC) and quota shares.

Exclusive fish stocks existing in the EEZ of only one coastal state are under the management of the relevant state (UN, 1982). When it comes to shared, straddling and highly migratory fish stocks, however, the matter of property rights becomes much more complicated.

Principles for quota sharing

- *Zonal attachment* is a concept that has been suggested as a way to overcome disputes on how to share the TACs set for fish stocks. “Zonal attachment” = the share of the stock residing within a particular country’s EEZ, weighted by the time it spends in the zone over a year, if necessary.
- Although this principle might appear easy to apply, this is not necessarily the case. Shepherd and Horwood (2019) point out zonal attachment ignores several complicating factors. Fish migrate all the time, and there may be shifts in their distributions in response to climate change and other environmental factors. The reality is that one does not know where the fish are with any accuracy most of the time and there is no obvious basis for deciding how to assess and combine whatever information is available.

Qualifications to zonal attachment:

- Where are the fish most easily fishable?
- Where do the fish gain most weight?
- Location of spawning grounds
- Closeness to landing ports

All these variables may impact cost of harvesting and/or the price of fish.

It is also important to bear in mind that zonal attachment is based on quantities. In many cases, prices vary between countries as do costs. This means that if benefits are shared in terms of revenues or net revenues, the outcome may be different from that of quantities (Bjørndal & Lindroos, 2004).

Climate and other environmental changes have had important impacts on fisheries all over the world. This impact is expected to become even greater in the future (Barange, 2018).

Unforeseen changes in fish stock migrations between national EEZs make the issue of arriving at and maintaining cooperative agreements on TAC and the distribution of these among interested nations difficult. With the division of catch quotas based on zonal attachment, it is not surprising that changes in fish migrations lead to a breakdown of existing agreements. **This is an example in which a cooperative agreement may not be time-consistent.**

Modelling issues

- Study of existing international property rights systems
- What elements are needed for stable sharing rules among countries
- Existing literature
- Future work needed

Sharing rules

- Theory, Shapley value etc based on cooperative game theory
- Endogenous sharing rules, eg in partition function games, consider also the externalities for countries not in the agreement
- 3 stages needed, (i) setting the sharing/allocation rule, (ii) formation of agreements, (iii) fishers play the game
- Note that (i) could also be replaced by countries setting management schemes/instruments

Comparing sharing rules

- Theoretically optimal ones, like Almost Ideal Sharing Scheme which maximises the number of countries in the agreement and performs bioeconomically best
- Actual ones that are a result of political processes, lobbying, history etc like the relative stability principle
- Simple ones like Equal sharing rule

Literature

- Kulmala et al. 2013, Baltic Salmon, relative stability principle results in only the trivial coalition being stable, hence relative stability causes instability.
- Nieminen et al. 2016, Multispecies management stabilises cooperation

Future work 1

- Set up a model where we concentrate on stage (i)
- Non-cooperative behaviour on choosing the allocation / management scheme
- Bargaining on allocation / management scheme
- Application to a case study

Future work 2

- Build a two-period coalition formation game
- Study various allocation rules
- See which ones would perform best in time, or with stochastic shocks in the future (2nd period)