

Sustainable levels of fish catch in Iceland

1. Introduction

This case study focuses on fish as a renewable resource and the possibilities of policy to keep fishing within sustainability limits. The fisheries analysed are those of Iceland including all commercial stocks, such as herring, capelin, cod and redfish. The goal is to exploit stocks at levels that obtain the maximum yield whilst still maintaining the population size at the point of maximum growth rate.

2. Description of the case

During the first half of the twentieth century, Iceland, like other industrialised fishing countries, had a problem with overexploitation of its fish resources. This was a classic example of the tragedy of the commons, whereby the resource is shared by numerous individuals each seeking to maximise their yield, despite the fact that depletion of the common resource is contrary to the group's long-term best interests. In Iceland there were numerous international and domestic fishers competing for shares in the resource, resulting in excessive fishing capital and effort compared to the reproductive capacity of the fish stocks. This overexploitation resulted in the serious decline of fisheries resources, including total collapse of the herring stock in the 1960s. This was followed by a sharp drop in the demersal stock, with catch levels of capelin being seriously threatened by overfishing.

The area studied covers Iceland and, more specifically, the waters within its exclusive 200-mile economic zone. Iceland's exclusive fisheries zone has an area of 760,000 square kilometres, seven times the area of Iceland

itself. The cod and capelin stocks are found inside Icelandic waters. Other large stocks migrate in and out of Icelandic waters, including the Atlanto-Scandian herring and blue whiting stocks, while others are situated close to the 200-mile limit, such as the oceanic redfish stock. Icelandic vessels also fish in international waters, such as Atlanto-Scandian herring stock in the northeast Atlantic managed by the North East Atlantic Fisheries Commission, and the northern shrimp fisheries on the Flemish Cap in the northwest Atlantic, managed by the North Atlantic Fisheries Organisation. For these fisheries the total allowable catches (TACs) are set by the regional fisheries management organisations, but Iceland assigns its national quota to individual vessels.

Methodologically the case is analysed following the DYNAMIX project framework. It uses a case study approach based on ex post evaluation of policy measures targeted to economy wide resource reduction. A specific emphasis in this framework is given to agricultural goods and biotic materials, fossil fuels, metals and construction material. The evaluation of the identified policy mixes usually distinguished between the **effect** of the policy mix, i.e. the results of a measure that can be attributed to its implementation (which implies a causal link between the policy action and its intended impacts on human behaviour and the environment) and its **effectiveness**, i.e. whether or not the intended objectives and targets have been achieved. In addition, the policy mix's **efficiency** and **(social) sustainability** were evaluated. Efficiency of the policy mixes was assessed comparing the achieved level of resource and impact decoupling with the monetary (or other) resources applied to achieve the outcome. Sustainability of the policy mixes was assessed by evaluating

the social effects and environmental effects not covered in the key targets (e.g. local effects, toxicity, marine issues). Social effects, however, were only assessed for EU countries, while environmental effects were assessed globally based on data availability. This fact sheet mainly reflects on the effectiveness

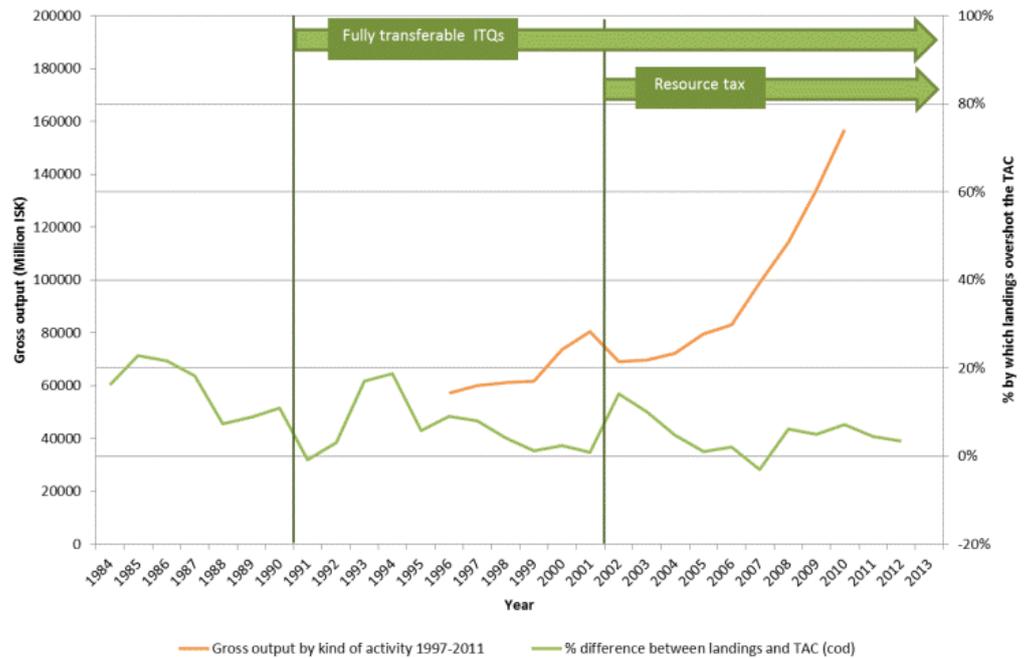
3. Measured absolute reductions

As fisheries are a renewable resource the overall goal is to exploit stocks at levels that obtain the maximum yield whilst still maintaining the population size at the point of maximum growth rate by harvesting the individuals that would normally be added to the population. This would allow the population to continue to be productive indefinitely. The environmental problem in

the fisheries case, therefore, is exploitation that exceeds these sustainable levels. **The case study identified an absolute decoupling.** It is measured by the degree to which Icelandic landings of cod (one of the most fished species) exceed the Total Allowable Catch (TAC) set by the Icelandic government. The decoupling from GDP is measured in gross output, in millions of Icelandic Kroner, of the Icelandic fishing sector (as a whole). Figure 1 below shows that the economic performance of the sector has grown steadily and very significantly over the period. At the same time, overexploitation of the fisheries resource has shown an overall downward trend, stabilising over the past decade at fewer than 10%. It can therefore be concluded that decoupling has been achieved to a large degree (absolute decoupling within limits).

Figure 1

Performance of the policy mix in relation to gross output of fishing activity



Source: Newman and Mazza 2013, p. 10.

4. Policy implications on reductions

The overexploitation of fish stocks was addressed by a policy mix. The policy mix contains three instruments: total allowable catches (TACs) for all commercially exploited species; individual tradable quotas (ITQs) for the same species; and a resource tax.

TACs, i.e. catch limits on how much fish can be caught, can be employed as a fisheries management tool on their own. An ITQ is a tool that intrinsically requires the setting of a limit (in this case, the TACs). ITQs are a cap-and-trade mechanism, where the TAC constitutes the cap on fishing opportunities. Therefore it could be stated that TACs are

the primary instrument, and ITQs are an enhancing instrument. The introduction of ITQs was a pioneering step in fisheries management globally, with Iceland being one of the first countries to try such a system.

There are numerous contextual elements which have influenced the introduction and development of the policy mix. The Icelandic economy has always been heavily dependent on fisheries. In fact, fisheries and sheep farming were the mainstays of the Icelandic economy in the past. For most of the twentieth century, Iceland's economic growth was led by the fisheries sector. Consequently, changes in the fish catch and export prices of marine products were the leading source of fluctuations in output growth. In addition to the export of fish products, many auxiliary companies have developed around the fishing industry, providing supporting services and products.

Prior to the introduction of the first limits on landings in 1975 (for herring only), the sector was barely regulated. Once it became known that fishing grounds were not inexhaustible, Iceland attempted to exclude foreign fleets from its waters. It declared an Exclusive Economic Zone EEZ of 12 nautical miles in 1958, increased to 50 miles in 1972, and extended to 200 miles in 1976. Soon after the extension of the EEZ to 200 miles, a special Fisheries Act was adopted by Parliament, giving powers to the Minister of Fisheries to restrict access to fishing grounds in Icelandic waters. Without establishing its jurisdiction Iceland would not have been able to assign any form of rights-based fisheries management system.

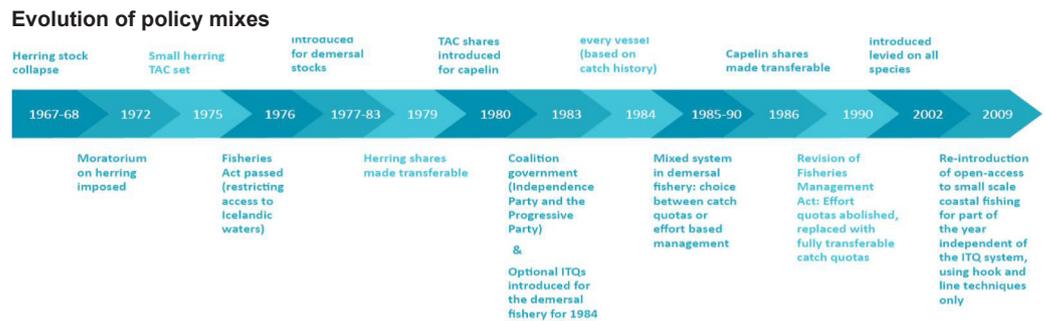
In 1983 this was followed by the partial introduction of catch quotas in the demersal fisheries. This is a well-established policy response in resource economics theory, though Iceland was one of the first countries to implement the system in practice.

The catch quota, however, came under pressure as opponents argued that it was unfair to give a public resource away for free to certain individuals and that the policy needed tweaking so that at least some of the profit derived from the exploitation of the resource (known as resource rent) could go to the Icelandic public. It was suggested therefore to capture the resource rent through a resource tax. This led to debate over the level at which to pitch such a tax from efficiency and equity points of view.

The policy mix has developed over time, in an ad hoc manner in the sense that the developments have not occurred as a result of a formal policy review cycle. In short, TACs and ITQs were introduced to the herring and other pelagic fisheries in the mid-seventies to early eighties. These were then gradually applied to the demersal stocks, and in 1990 TACs and ITQs were obligatory for all commercial fisheries. A resource tax was introduced in 2002. Together these elements now constitute the policy mix. The operational side of the policy mix has a formal cycle, in that TACs are set annually for the fish stocks for the year ahead.

Introducing property rights in fisheries was a major institutional reform, as was the introduction of a resource tax.

Figure 2



Source: Newman and Mazza 2013, p. 16

5. Transferability to other areas

The Icelandic example has provided numerous lessons for others attempting to overcome the tragedy of the commons in the fisheries sector. The most fundamental lesson would be that such a policy mix can be highly successful at rebuilding fish stocks. This has also been evidenced by similar schemes in other countries.

It became apparent from the Icelandic example that the gradual introduction of ITQs in the demersal fisheries (i.e. the mixed system) was less effective than the much more direct and complete introduction of ITQs in the pelagic fishery. However, the rationale behind having a mixed system was to improve acceptability of the scheme, and such concerns should be taken into consideration when designing a catch share scheme. Improving acceptance of the system was also the reason behind the initial (free) allocation of catch shares, which has since been criticised. Thus a balance needs to be struck between improving acceptance of such schemes and compromising on efficiency and effectiveness.

The Icelandic example also demonstrated that it was easier to introduce the policy mix to a sector of the fishing industry that was more homogeneous. In the herring fishery, vessels were similar in size and had recently experienced the collapse in the fishery, and

this is thought to have helped the sector to come to a consensus on property rights. In the cod fishery, there were important differences between fishing regions, and the fleet was more diverse in terms of size. Consequently it was more difficult to get agreement in these circumstances. This could be of interest to other administrations seeking to design and introduce a catch share system.

The EU Common Fisheries Policy (CFP) already includes TACs for a large number of stocks. In principle a system of transferable quotas could be applied at the EU level as well. In 2013, the European Commission proposed the introduction of mandatory tradable quotas (ITQs) for all Member States with the aim of reducing overcapacity in its proposal for the 2013 reform of the CFP, but this was very unpopular and rejected early on in negotiations. In Iceland's case, the ITQs also proved unpopular at the beginning, but these eventually yielded excellent results. In any case, Member States are free to establish tradable quotas, as some do, including Denmark and the UK. A resource tax could also be introduced, but would need European Council unanimity in order to be introduced at the EU level. While there are no immediate plans to introduce such a tax on a regional level, individual states are free to establish national resource taxes, if they so wish.

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6. Other reflections and conclusion

The implementation of the policy mix in Iceland has achieved sustainable exploitation of fisheries resources and enabled the fishing sector to become highly profitable. It has therefore been successful in meeting the objectives of the Fisheries Management Act to promote the conservation of exploitable marine stocks. Recent reports confirm that the implementation of similar schemes worldwide ('catch shares') could halt and even reverse a widespread fishery collapse and thus help drive economic growth.

By contrast there have been social concerns throughout the development of the policy, and these remain. These relate to the initial allocation of quotas and the subsequent concentration of catch shares, with some parties arguing that this has been inequitable. There is disagreement over the importance of these concerns and the extent to which they are valid. Little research has been done, particularly in recent years, to analyse these

issues. However, the fact that such debates and concerns persist suggests that the policy mix has not been as successful in this regard. Nevertheless, the objective of the social element of the Fisheries Management Act was to promote stock conservation and efficient utilisation "thereby ensuring **stable employment and settlement** throughout Iceland". Incidentally, there is evidence to suggest that the policy mix has enabled fishing firms to remain stable while the rest of the Icelandic economy was in crisis (although there is a downward trend for employment in fisheries this is not due to low stocks or poor returns). In addition, there are indications that the policy mix has bolstered the economy of rural villages, thereby helping to slow or reverse the trend of outmigration from these villages to the capital city.

It should therefore be considered that the policy mix has had mixed results in terms of social sustainability. However, it is unlikely that certain social concerns outweigh the environmental, economic and social benefits.

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Related website: <http://dynamix-project.eu/results>

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