Chapter 3.

Lessons learned from case studies to rebuild fisheries

These case studies seek to identify the factors underlying the outcomes – successful or not – of various rebuilding plans and efforts. They cover many different fisheries both at the national and international levels and there are a set of common lessons to be learned. These include the importance of integrating economics early in the rebuilding design process as various social and economic aspects may hinder or help in the execution of the plan. This also underlines the importance of stakeholder involvement in designing the plans. If stakeholders are strongly opposed, the chances of success are low. Incremental approaches can be helpful, especially in situations where this is much uncertainty and little reliable data. The case study material also shows that monitoring and enforcement are necessary in order to deliver successful outcomes. Rebuilding international fisheries calls for joint and co-ordinated efforts of all countries involved in the fishery.

A central component of the OECD rebuilding project was the collection of case studies of fisheries rebuilding plans at the national and international levels to identify the factors underlying the outcomes of rebuilding programmes and efforts.

This chapter underlines the main lessons from the case studies. It also presents a literature review of other initiatives that assess rebuilding plans and to provide an overview of the case study methodology for this project. Additional information and the case studies are available in the OECD *Food, Agriculture, and Fisheries Working Paper series* (www.oecd.org/fisheries).

The objective is to identify the critical aspects of fisheries rebuilding plans that are useful to policy and decision makers in the formulation and implementation of future rebuilding plans, or in the revision of existing ones. There is a particular focus on the economic and institutional factors that facilitate or impede fisheries rebuilding so as to complement recent studies that have primarily examined biological and management factors. It is also important to have a basic understanding of the biological factors associated with each rebuilding case, as stock characteristics and basic biological traits are a significant factor in the success of rebuilding. Indeed, biological aspects such as fecundity have a strong role to play in the timeframe for rebuilding (e.g. short lived species may require less time to rebuild, while long living, slow growing species generally require longer time horizons) and are central in determining the types of rebuilding measures and timeframes that may be most effective for a particular situation. The case studies are intended to bring useful insight regarding the key elements of rebuilding plans and provide a rich dataset from which to extract a set of considerations as the basis for a set of best practice guidelines.

The case study is a research tool that allows for a holistic, comprehensive review of a complex and multifaceted issue (Feagin, Orum, and Sjoberg, 1991), and is effective when a limited number of examples are examined with a reasonable amount of detail. According to Yin (2004), the case study approach is appropriate in circumstances where the research question is broadly defined, where "complex multivariate conditions" as opposed to "isolated variables" are involved, and evidence must be drawn from multiple sources.

The case study approach in support of the OECD project on the economics of rebuilding fisheries will provide a compliment to the quantitative assessment of other projects studying rebuilding fisheries (e.g. the World Bank Rent Drain project). Such evidence-based research provides the necessary implementation examples of successful and unsuccessful elements of rebuilding plans and support the proposed development of best practice guidelines.

The case studies have been undertaken in three ways: by OECD in co-operation with individual Member countries; by consultants; and by member countries.

The proposed analysis represents an assessment on the common elements of fisheries rebuilding plans from an international perspective. It provides a systematic examination of rebuilding plans in OECD and non OECD countries that is intended to yield useful insights for policy and decisions makers, fisheries managers and others involved in the development of rebuilding plans. It should be noted that it is not the intention to evaluate the success or failure of individual rebuilding plans. The level of success of a particular fisheries rebuilding plan may nevertheless be measured against any objective or milestone identified within the plan itself.

The primary purpose is to develop an enhanced understanding of the issues associated with the development and implementation of rebuilding plans and provide information across the range of approaches used in different countries. Ultimately, this work contributes to the development of a set of best practice guidelines regarding the design, implementation or modification of rebuilding plans in both OECD and non OECD countries.

The inclusion of cases from a wide diversity of countries, geographic areas, fish stock characteristics, and institutional structures allows for a robust assessment of the various issues that arise in the development and implementation of a disparate set of rebuilding plans.

Analytical framework

The case studies have been developed through the use of a template developed with a view to providing a consistent structure for analysis. The criteria and indicators in the template cover institutional and management arrangements, economic, social, environmental, and biological criteria, and help highlight the roles of each of these aspects in fisheries rebuilding.

Case study selection

The overarching selection was undertaken so as to target the various thematic issues and ensure that they are incorporated, to the extent possible, to allow for a rich and diverse set of case studies. In particular, the primary characteristics include (but are not limited to) the following factors.

- *Vary the types of fisheries or industry groups*. This includes rebuilding fisheries in a multi-sector context which is composed of many fishers with disparate interests as compared to large consolidated industrial fleets; single stock or mixed stock fisheries as these cases may yield useful insights on the complexities of each situation. Further, case studies should span across the scale of the fisheries (coastal/inshore/deepwater) as each level may represent unique challenges.
- *Management tools and approaches.* Consideration of various types of management regimes. Management responses and tools used to rebuild fisheries vary across plans depending on the cause of the fisheries depletion and could include some combination of the following: input/output controls, rights based tools, stock replenishment, and/or habitat enhancement. Given that each fishery has its own distinctive characteristics, the rebuilding case studies should reflect the various tools available, particularly as there is no one solution to fit all fisheries.
- *Economic and social aspects:* Ideally, fisheries of various economic importance and value should be included; there should be adequate weight given to commercially valuable species, as to socially and culturally significant species. Extremely lucrative fisheries or those where there are many stakeholders/partners may provide insight into the issue of political economy and policy coherence. Cases that have employed market-based mechanisms or economic incentives towards fisheries rebuilding must also be included; for example, how have such incentive been applied to effectively manage bycatch and/or discards?

Box 3.1. Case study template

In conducting the case studies, the OECD draws upon the expertise of Member-country authorities and external experts. To focus the data gathering and analytical efforts of a varied group of researchers, a detailed and comprehensive template was prepared to guide the collection of information and review of the case studies. This template ensured that the information collected was focused on the economic, social and institutional factors associated with each rebuilding plan.

Each case study includes a short description of why it was chosen, the key characteristics of the fishery, and a short statement about the institutional context, as well as a description of major stakeholders. The case study includes an overview of the design, structure and implementation of the fisheries rebuilding plan. The key elements of the template to gather information and data on the case studies of rebuilding fisheries were follows:

- Background: This refers to the key facts relevant to the fishery that underscore the rebuilding plan, and basic contextual information on the institutional framework. This section also provides details on the rebuilding plan and approach.
- Economic and social aspects: Included here are economic instruments used to support the rebuilding process and other relevant economic information. A description of the key stakeholders, how they were involved in rebuilding, as well as distributional issues and any compensation packages or programmes to manage a transition would be described here.
- Implementation issues and lessons learned: This section is meant to obtain information on the political economy of the rebuilding process, including identifying obstacles and tradeoffs as well as how they were overcome. Best practices may eventually be identified from this section.
- Annex: Basic indicators of the fishery subject to rebuilding are included, as well as a profile of the fishing industry. This may yield valuable information on the progress of these indicators throughout the rebuilding period and the evolution of the industry(ies) involved in the fishery in response to the rebuilding measures.

– *Policy coherence*: Cases that highlight mutually reinforcing policy actions across government departments towards achieving agreed objectives, as well as cases that demonstrate the challenges that arise when there is a lack of coherence, are considered.

– *Political economy*: Examples that illustrate how political economy issues were addressed in the development of rebuilding plans include how distributional aspects were tackled as well as the role of stakeholders.

– *Successful vs. unsuccessful:* The choice of case studies are not be geared towards selecting so called "success stories". Rather, this exercise is about identifying examples of good practices and, to the extent possible, identifying what did not work and why. In addition, recent rebuilding plans should not be excluded simply on the basis that results are not yet visible; they may in fact provide useful information in terms of the design and implementation process as they may result from lessons learned from previous rebuilding plans and represent a course correction.

Literature review

Several recent studies examining the challenge of rebuilding depleted fish stocks utilised a case study approach with a view to drawing out best practices or developing guidelines for effective fisheries rebuilding plans. These studies are described here in order to provide a summary of previous research on this topic.

An overview of recent global experience with recovery plans for depleted marine resources and suggested guidelines for recovery planning by Caddy and Agnew (2004)

One of the first major overviews of stock rebuilding programmes was undertaken by Caddy and Agnew (2004). The study is based on an invited plenary lecture to the 2003 ICES Annual Conference and reviews eight case studies of successful and unsuccessful stock rebuilding programmes from the United States, Canada, New Zealand and the European Union. It develops a number of insights from the reviews and proposes tentative guidelines for best practice in fishery recovery plans.

This study approached the review of fisheries rebuilding cases in two ways: through a high level review of all plans targeted at rebuilding fisheries, using publicly available information whether in the form of a formal plan or a series of measures aimed at rebuilding. Second, a detailed assessment was made of eight cases from Canada, the United States, New Zealand and the European Union for Pacific Halibut, Gulf of Mexico King Mackerel, Striped Bass, Summer flounder, Pacific Ocean Perch, Canada [Atlantic] cod, Canadian haddock and Cod in the North East Atlantic.

The appendix lists 67 points of consideration for best practices in fishery recovery plans in six categories: actions prior to the recovery process; issues to be considered by the recovery team; recovery objectives; recovery management; and post recovery. These considerations focus primarily on biological advice, research and assessments, management processes, and monitoring and evaluation. There is also recognition of the political economy issues (e.g. political pressures post recovery) and the importance of consensus and negotiation with stakeholders. However, economic considerations or market-based approaches are not examined in detail.

An evaluation of rebuilding plans for US fisheries, Lenfest Ocean Programme by Swasey and Rosenberg (2006)

Swasey and Rosenberg (2006) undertook a major evaluation of the rebuilding plans for depleted stocks in the US and the results are summarised in Rosenberg *et al*. (2006). The study provides a detailed scientific review of the rebuilding plans and management for 67 fish stocks. It was found that, as of 2005, overfishing (where the fishing mortality rate exceeds the level that should support MSY) continued in 45% of the stocks under rebuilding plans and around 72% of stocks remained overfished. Three stocks had been rebuilt, but fish stock abundance appeared to be increasing in 48% of the stocks under rebuilding plans. The study methodology was based on publicly available data, and was assisted in its execution by the availability of precautionary reference points as required under the US fisheries legislation.

Review of institutional arrangements and evaluation of factors associated with successful stock recovery programmes
by UNCOVER

UNCOVER[1] is a major project funded by the European Commission that seeks to develop insights into strategies for stock rebuilding in a number of fisheries. The objective is to identify changes experienced during the decline of fish stocks, to enhance the scientific understanding of the mechanisms for fish stock recovery, and to formulate recommendations for fisheries managers on how to best implement stock recovery plans.

Four case study areas are analysed: Barents and Norwegian Seas (covering NE-Arctic cod, Norwegian spring spawning herring and capelin); North Seas (cod, plaice and autumn spawning herring); Baltic Sea (sprat and Eastern Baltic cod); and Bay of Biscay (Northern hake and anchovy). The overall work plan for the project is focused on modelling alternative strategies for stock recovery in the case study areas. It includes an economic component that focuses on bio-economic modelling of selected stocks, the development of four community socio-economic profiles for Spain, France, the Netherlands and Scotland, and a social impact assessment of one of the recovery strategies on a pilot scale for Denmark.

As part of the UNCOVER project, the Marine Resources Assessment Group (MRAG) undertook a review of institutional arrangements and the key factors associated with successful recovery plans (Wakeford *et al*., 2007). The study reviews 33 case studies from the United States, Australia, New Zealand and Europe and used 13 performance criteria to evaluate the relative importance of institutional, economic, social and environmental factors in stock rebuilding plans. Amongst the key findings from the study, the authors found that recovery is effective under the following conditions.

- Catches are significantly reduced over a short period of time, creating a positive shock to the stock.
- The recovery plan is part of a legal mandate which is automatically triggered on reaching pre-defined limit reference points.
- The economic efficiency of the fleet is evaluated and monitored throughout the rebuilding process.
- Effort reductions are created using input controls in addition to TAC reductions, rather than through output controls.

Recovering Canadian Atlantic cod stocks: The shape of things to come
by Rice et al. (2003)

Rice *et al* (2003) analysed the collapse of North West Atlantic groundfish stocks in the 1990s and note the following key observations and lessons learned.

- The potential for recovery is variable by stock so management approaches should be tailored accordingly, including the assessment of the economic impact. Some Atlantic cod stocks reacted favourably to moratoria and sustained commercial fisheries for a time, but then declined. Others have consistently remained at low biomass levels.
- If the underlying issues that led to overfishing are not addressed, such as the permanent removal of excess capacity, the risk of overfishing will reoccur should the stock recover.

– Deferral of rapid and decisive management action to reduce harvest because of uncertainty about stock status and concerns about the impacts of the reductions on the fisheries contributed to the severity of the collapse and ultimate severity of the measures needed to commence recovery.

These studies illustrate that the previous studies on rebuilding focussed on the recovery of stocks. The OECD study aims to build on this to examine rebuilding fisheries, which includes a healthy stock, ecosystem and industry through the early inclusion of economic analysis and market based measures.

Main observations

A total of 23 case studies have been done for this project.[2] These case studies reflect fisheries rebuilding plans and/or activities in OECD countries, developing countries, and those led by Regional Fisheries Management Organisations (RFMOs).

Table 3.1. Fisheries rebuilding case studies

Species	Country
Snow crab (Chionoecetes opilio)	Japan
Sailfin Sandfish	Japan
Chum Salmon	Japan
Sailfin Sandfish	Korea
Swimming Crab	Korea
Yellow Croaker	Korea
Cephalopods (octopus)	Mauritania
Hake	Namibia
Bluefin Tuna	CCBST
Greenland Halibut	NAFO
Herring and sprat	Estonia
Cod	Iceland
Capelin	Iceland
Herring	Iceland
Abalone	Mexico
Red grouper	Mexico
Pink shrimp	Mexico
Queen conch	Mexico
Hoki	New Zealand
Scallops	France
Groundfish	Canada
Cod	Sweden
Cod	Denmark

Integrating economics early

The Korean case studies note that limited information on the economic impact on the rebuilding plan can be a factor in the resistance by stakeholders, which in turn impede the effective implementation of the plan even if specific rebuilding measures are put into

place. In Korea, education on the basis of the plan coupled with consultation are emphasised as a means of overcoming this challenge, although it is also acknowledged that education and communications activities alone are not sufficient to tackle the challenge if the right incentives are not in place.

A key lesson from the Namibian hake case study is that social aspects require consideration during the design of rebuilding plans and that establishing the social success of a plan should be an objective and not only as a spill-over of economic success. In this case, employment levels and the redistribution of profits were taken into account.

The sailfin sandfish case in Japan illustrates that rebuilding a stock may not always immediately lead to a strong industry. A three-year closure of the fishery was imposed, resulting in significant recovery of the population. However, an unintended consequence was that the price of the fish decreased and economic returns were marginal.

The case studies from New Zealand and Iceland illustrate that rights-based management (RBM) systems may be effectively used to rebuild fisheries. Although they have mostly been discussed in relation to generating rent and reducing fleet capacity, they are also effective in rebuilding fisheries on the brink of collapse. RBM systems are driven by economic incentives but seem to be suitable to achieve other goals such as rebuilding fish stocks.

The rebuilding of the scallop fishery in St Brieuc, France was made easier due to the fact that fishermen's concern for their own profits helped to create a consensus for a rebuilding plan.

In the Canadian Pacific Groundfish programme, positive experience from earlier ITQ programmes helped in paving the way for the introduction of ITQs for rebuilding.

The Swedish case study on Baltic Sea cod demonstrates that increased landings are not sufficient to increase benefits in a fishery. Overcapacity must also be addressed. The same is true for the Danish Baltic Cod case where increased rents are mainly due to reduction of overcapacity rather than increased catches. This case study also highlights the importance of taking into consideration additional complexities when dealing with multi-species fisheries. If a bigger stock is not accompanied by increased flexibility in the fishery, the economic gains from increasing the biomass of a single stock may be small.

The importance of stakeholder involvement

Close collaboration with stakeholders in designing rebuilding plans and instituting measures is emphasised in several case studies. The Korean approach includes regular review and evaluation of the plans in consultation with stakeholders so that appropriate course corrections can be made as needed. The Namibian hake case study notes the importance of political will and support from national authorities as a key driver for success in the implementation a rebuilding plan.

In Japan, the initial reaction of fishers to proposed rebuilding measures were negative. For example, fishers opposed certain measures that would be instituted for the first time (e.g. concrete blocks) in the snow crab fishery primarily because their effects were unknown. To mitigate these concerns, an incremental approach was pursued where the biological effects of instituting one marine reserve were monitored and regularly communicated to fishers. Once fishers realised that stocks increased (and hence catch), the opposition to this measure declined.

The Korean yellow croaker case study illustrates the complexity of multi-species fisheries, wherein actions involving the directed fishery alone may not be sufficient for rebuilding. Given the potential conflicts among different segments of the fisheries, co-ordinating various interests generally presents a challenge for fisheries managers.

Effective communication between researchers and fishers is also crucial to rebuilding, as illustrated by the actions of the fishery research institute of Akita Prefecture in the sailfin sandfish case. Initial population models for the sailfin sandfish projected that catch would triple after a three-year closure of the fishery, while the catch actually increased more than originally projected. Key scientific information was shared by relevant stakeholders, and the process established trust between local fishermen and the research institute which assisted in instituting a fishery closure.

In Canada, a new structure was set up to efficiently engage stakeholders in the design of the rebuilding plan and obtain their buy-in. The Fisheries and Oceans Canada (DFO) provided a broad set of guidelines and requirements for the outcomes, while it was left to the stakeholders to decide on the specific nature of the programme to reach those objectives. In that way stakeholders were given responsibility while at the same time being empowered. Getting stakeholders to participate in the design of the rebuilding plan was very successful, especially by taking into account the number and different characteristics of stakeholders in these specific fisheries. It probably also prompted stakeholders to participate in the design of the rebuilding plan in that if they did not participate there was the indirect threat that a moratorium would be imposed with serious consequences for all stakeholders involved.

The use of flanking measures to support rebuilding objectives can ease the transition. In the sailfin sandfish case study, it was noted that as part of the agreement on the three-year fishery closure, the prefectural government provided incentives to those fishers who complied with the self-imposed (voluntary) regulation. This included decommission subsidies for inactive vessels and gear, low interest rate loans, and additional scientific research. Another *de facto* incentive provided by the government was the continuation of the limited entry system for the fishery. As there would be no new entrants to the fishery after the rebuilding, the expected benefits of the fishery closure (even though the exact amount of the future benefit was largely unknown) would be received by the same fishers who bore the costs of the closure.

The Icelandic experience shows that having the possibility of distributing quotas to hard hit regions or sub-sectors of the fishery may contribute to the sustainability of the fisheries management system. Widespread disagreement on distributional issues may undermine rebuilding plans and can have an effect on the probability of success and survival of such plans. Flanking measures may be necessary in RBM rebuilding plans to guarantee support. The Danish case study indicates how limitations on the transferability of rights between bigger and smaller vessels may impede apparent negative distributional effects.

Incremental approaches to rebuilding fisheries

The Korean cases demonstrate how an incremental approach to rebuilding can be undertaken in situations where full data for decision making is unavailable. Rather than pursuing more concrete scientific evidence, rebuilding plans were established. These are subject to regular reviews and modified based on monitoring and evaluation exercises. This demonstrates that immediate and early rebuilding efforts are an important feature of Korean rebuilding plans, and this incremental strategy could be one way to rebuild

fisheries in data-limited circumstances while following the precautionary approach. The Southern Bluefin Tuna case study notes that "the longer the delay and inaction, the higher the probability that the rebuilding will be unsuccessful, the greater the cost, and the greater the possibility of a stock collapse".

The necessity for a broad range of management measures

The Japanese and Korean case studies illustrate that addressing catch levels is not the only solution to rebuild some stocks. Habitat improvements and stock enhancement may need to be implemented as part of a broader range of measures in a rebuilding plan, particularly if these in areas that pose the most threat to the rebuilding of the species. This also holds true in other countries, and is particularly relevant for species such as salmon and eels (e.g. European eel). By the same token, the Japanese salmon case also indicates that that stock enhancement programmes should be implemented together with appropriate fishing regulations for a comprehensive approach to stock rebuilding. As noted in other studies, management measures must be accompanied by favourable environmental factors in order to be successful and that a holistic approach that addresses various threats to the species should be examined.

The Estonian case study illustrates that great improvements can be taken towards rebuilding a troubled fishery by changing the institutional structure of the industry. The challenges facing fisheries in need of rebuilding are not solely related to small stocks or low recruitment, but also with processing, transport, marketing, and the horizontal and vertical integrations in the value chain.

Monitoring and enforcement: key elements of a rebuilding plan

Both the Korean and Namibian case studies emphasised enforcement of rebuilding measures. In the case of the Korean swimming crab, the management committee placed particular emphasis on monitoring crab markets and investigating transactions involving illegal harvest of crabs (e.g. undersized crabs). Local governments, fisheries co-operatives and other representatives of fishers jointly monitor major fish markets on a regular basis. Nevertheless, monitoring and enforcement is still a challenge due to limited resources.

In the case of Namibia, monitoring, control and surveillance (MCS) measures were recognised as a key to the success of a rebuilding plan, also supported with a legislative framework (e.g. to include specific fines etc) and appropriate resources. In the Namibian hake fishery, Monitoring and control was greatly facilitated by the fact that there are only two landing sites and the fleet is industrialised.

While some fisheries are data rich and have advanced monitoring and surveillance systems, other do not. The Mexican and Turkish case studies underline the importance of using the knowledge and resources of the fishing communities to alleviate such problems. The Japanese experience with co-management and the use of TURFs demonstrate how fishers themselves can help in the monitoring and surveillance activity necessary for rebuilding.

Good quality of data and efficient control and surveillance was also a key element in the successful rebuilding of the scallop fishery in St Brieuc, France.

In Canada, the setting up of an efficient monitoring system was an integral part of the rebuilding plan and a key to its success. Although costly, it is unlikely that it would have

been possible to obtain better data and keep the fishing mortality within acceptable limits without setting up such a system.

Trans-boundary stocks require joint and co-ordinated efforts

The Greenland Halibut and Southern Bluefin Tuna case studies emphasise the need for actions that are not only agreed to by all relevant parties, but are also adhered to by fishers from all countries. In the case of swimming crabs which migrate across both Korean and Chinese waters, it has been noted that efficient management in only one nation is not sufficient to rebuild the stock. In addition, co-operation in terms of developing stock assessments and coherence across rebuilding measures is also required.

The Danish Baltic Cod fishery case further demonstrates the complexities of rebuilding fisheries which are not only harvested by many countries, but are also multi-species fisheries. This raises problems of how to account for unavoidable by-catch. It also shows how national policies can differ when decisions on TACs and technical measures are decided at a supra-national level, while decisions on management systems are made at the national level.

Notes

1. UNCOVER is the acronym for the full name of the project, Understanding the Mechanisms for Stock Recovery. The project is a consortium of 17 fisheries research organisations across Europe and is scheduled to be finished in February 2010.
2. See OECD Food, *Agriculture and Fisheries Working Papers* series (*www.oecd.org/fisheries)*.

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