CEVIS

Comparative Evaluations of
Innovative Solutions in
European Fisheries Management

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Final activity report

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Project coordinator organisation: Aalborg University

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1 Problem and Research Strategy

The Comparative Evaluations of Innovative Solutions in European Fisheries Management (CEVIS) Project was a three year exploration of how science can address policy questions at perhaps their most general level. With an eye toward possible implementation under the CFP we evaluated four management innovations that were receiving the most attention in current discussions of potential changes in European fisheries management at the time we developed the project:

- Participatory approaches to fisheries governance
- Rights-based regimes
- Effort-control regimes
- Decision-rule systems.

While we use the term 'innovations' to indicate that these approaches to management had not been used extensively in Europe at the time we developed the project, these were not new or untested ideas and all of them had been incorporated into modern fisheries management regimes in developed countries. All of them were also being widely discussed within Europe as options for the Common Fisheries Policy (CFP) as the CFP moved towards a more adaptive and ecosystem-based approach to fisheries management.

The project had two phases. The first phase used a cross-disciplinary approach. During this phase we carried out four in-depth studies of areas outside of Europe where innovative fisheries management regimes had been implemented. These were New Zealand, Canada, Alaska, and Iceland. The visits were made by teams that included at least one social scientist and one natural scientist. Cross-disciplinary teams carried out the research using social science methods based on carrying out and analyzing in-depth interviews. They did a literature review of fisheries management in the area and then made visits of approximately two weeks where they interviewed various stakeholders. These areas were chosen because they had implemented at least two of the innovations that CEVIS was interested in investigating.

The second phase was carried out in disciplinary working groups and took a basically multi-disciplinary approach. Each working group focused on one of the objectives identified in the original project call to be used as the basis of the evaluation of the innovations. In order to get a handle on the objective described in that call as 'robustness with respect of varying conditions' we decided to focus on the 'biological robustness' of the fish stocks and the 'social robustness' of the management institutions. So the disciplinary working groups were four: two run by economists examining the innovations with respect to economic efficiency and costs of management; a group of biologists examining the innovations with respect to biological robustness; and, a group of social scientists examining social robustness. All four groups used data from Europe, including the Faroe Islands. Their assignment was to identify and test specific hypotheses about the relationship between the innovations and their objectives using the methods and data that could be feasibly applied from their discipline.

The approach we took was predicated on the following levels of analysis:

- Social robustness would be examined at the level of the fishing community.
- Economic efficiency would be examined at the level of the fleet.
- Biological robustness would be examined at the level of the fish stock.
- Costs of management would be examined at the level of the polity.

2 CEVIS Results

The results of CEVIS have been published in the form of a book entitled Comparative Evaluations of Innovative Fisheries Management: Global Experiences and European Prospects, which is forthcoming from the Springer Publishing Company. This summary is abstracted from the introduction and conclusion of that volume. The overall results are extensive and complex. This summary is not meant as an alternative to reading the more detailed discussions of issues of interest. However, it does provide a shortcut to the main findings for busy people interested in general fisheries management policy. The following is organized by the four main innovations and offers a few general findings about each.

2.1 Participatory Governance

1. **Participation can increase the quality of many aspects of fisheries management**.

Participation in fisheries management may take many forms, and in this context they include consultation in regulation questions, local management, fishermen's contribution to the knowledge base, and consultation on the overall objectives and means. Participatory governance can increase the quality of many aspects of fisheries management, including increased support of the system and better conflict management. The case studies on New Zealand, Canada, Alaska and the Faroe Islands revealed pride among management stakeholders. It is worth noting, however, that in many cases after a set of institutional changes the group of stakeholders that remains involved is smaller than before and the voices of those who are excluded are no longer heard. Even in broadly participatory programmes the highest positive regard from stakeholders for the system will be from the representatives of stakeholder groups rather than grassroots members. Of course, they are the voices of their group and are the ones that managers have to deal with most directly.

The Baltic case shows what may happen when innovations or new forms of regulations are implemented in a top-down fashion. The management system lacks acceptance and trust and fishermen comply much less frequently with the rules. A fundamental distrust may make any change difficult to accept and thereby hamper institutional learning. Participatory governance may thus help manage conflicts, which are increasing and spreading with the advent of spatial management being carried out in the context of broader marine spatial planning. Participation and trust can also create institutional contexts in which it is easier for people to behave responsibly and thereby have a positive effect on biological robustness. The Community Management Boards in Canada demonstrated increased responsibility for the resource and improved the commitments to scientific advice. A similar sense of responsibility was observed in the Alaska case, where scientific advice enjoyed trust and respect in the participatory TAC-setting process in the Fisheries Management Council.

2. Excluding the broader civil society may reduce gains from participation.

While almost all CEVIS cases included some form of participatory governance, both European and non-European cases include examples where representation of organisations from civil society is limited. The civil society may be less relevant in the direct management of the fishery. For example direct participation by civil society in the Biesheuvel Groups in the Netherlands or the Community Management Boards in Canada, where day-to-day conservation is acted out, would have less impact on reaching fisheries management goals than it would in the European Regional Advisory Councils where broader conservation goals are set. A relevant issue for future Europe is to discuss the role of environmental NGOs and civil society in general and at what scale their influence is most relevant. The Alaska case exemplifies that environmental organisations have used campaigns, court cases and eco-labelling as tools to influence public opinion. However, they also expressed a wish to have a voting member on the North Pacific Fisheries Management Council, implying that they did consider a role in negotiations as fruitful for achieving their objectives.

3. Participation is important in science and data collection as well as management.

Participatory governance can also imply changes in the role of science from simply 'telling the answers' to cooperation with stakeholders on the knowledge production and evaluation. Icelandic fishermen decide half of the fishing locations for the scientific ground fish survey. Alaska stakeholders evaluate factors to ensure optimum yield. Canadian stakeholders work closely with the same set of scientists over long periods of time in facilitating stock assessments. The fishing industry in the Faroe Islands has a central role in evaluating the scientific advice for effort regulations, and the fishing industry in New Zealand has the responsibility to provide the necessary scientific basis for quota decisions. Participants in all of these exercises report that they increase the trust in scientists and confidence in their results, while scientists report that they are able to maintain scientific quality.

In CEVIS, the EU cases on the interface between science and stakeholders focus on the quality of catch data, i.e. discard data and illegal landings. Cooperation in these cases implies improvement of data in the scientific stock assessments. In terms of biological robustness, the studies on discard data suggest that it may be more important to identify and address possible sources of bias than to increase the sample sizes, but that biological robustness may not be affected when only immature fish is discarded. Cooperation to improve the catch data can also improve the economic performance of the fishing fleet. These results were conditioned on a TAC regime as the simulations indicated a slightly negative effect on economic results in an effort scenario. Getting proper data on management costs has been a challenge, but in the Spanish Basque case, the administration costs increased when the RAC was created. It is too early to conclude whether the increased costs will be permanent, or whether these are implementation costs.

2.2 Rights-Based Approaches

4. Transferable rights increase economic efficiency.

Increases in the qualities of fishing rights such as transferability, security and durability clearly increase economic efficiency. This is shown theoretically and empirically in the cases where Individual Transferrable Quotas (ITQs) have been implemented. These characteristics have developed a sense of ownership and have generated an involvement in management and enhancing of competitiveness. Further, it appears that the rights-holders are more concerned about protecting the resources and environment. An obvious benefit with rights-based systems is that it makes planning easier for rights-owners. In Iceland and Alaska, this planning has resulted in efficiency gains, especially with regard to processing. This is particularly so in the latter case as the management system moved away from a dangerous race-for-fish. In Nova Scotia those Community Management Boards that do not allow transfers of IQ among members have had many more problems dealing with exits from the fishery than those that do.

The case studies show several examples where rights are given in exchange for increased responsibilities of the rights-owners. The Alaskan cooperatives, the Biesheuvel group and the Canadian Community Management Boards were given the responsibility to do local level management, while the New Zealand industry had to provide and pay scientific advice. The extra burden has been possible to bear economically. In several of the cases the profitability of the fisheries due to stronger rights has enabled the industry to shoulder additional management services, and hence reduces costs to the public.

5. Rights-based management programmes can and should have a flexible design.

There are many aspects to take into consideration when designing a rights-based management programme, including the nature of the property right, management units, determination of total allowable catch, monitoring and enforcement, need for other regulations, rent extraction and cost recovery and initial allocation. The Iceland and New Zealand cases illustrate that ITQ systems can develop over time so that sufficient flexibility should be built into the ITQ systems to be able to amend and adjust rules. In New Zealand the initial allocation was in fixed tonnage, which had to be changed to an allocation in percentages of the quota.

The case studies show that rights-based management systems change over time and that flexibility of the system combined with institutional learning improve this process. The systems of the North Sea, the Faroe Islands and the Western Shelf demonstrated capacities for institutional learning and for keeping a fairly high stakeholders' acceptance among the commercial actors. However, the institutional learning within the rights-based management

RBM systems was mostly geared towards making rights more tradable and/or secure or exclusive. Future learning may thereby be reduced since rights-holders will want to maintain the value of their investment in the rights. The ITQ system in Nova Scotia has reduced potentials for adaptive management by locking ecological realities that evolve either naturally or as a result of greater scientific understanding into hard institutional boxes. A fish stock is an ecological reality that is hard to define and that interacts with other ecological realities. Property rights are powerful social constructs with strong implications for policy. Their treatment is much more likely to be determined by courts according to the principles and precedents of property and finance, than by marine managers seeking to take an ecosystem approach.

The initial allocation of quotas has proven to be especially difficult regarding legal aspects, where national rules of equal treatment, the right to a free choice of occupation and the protection against deprivation of property have challenged ITQ systems. Actors that have not received rights may perceive the system to be unfair. The equity problem was partly solved in the Alaska case by buy-out programmes and by offering alternative economic opportunities. In both the Canada and Alaska case though, most of the controversy in relation to the rights-based system stemmed from the initial allocation.

6. Transferability of rights has social costs that it is possible, but difficult, to mitigate.

When rights-based management is introduced it may be an important policy goal to avoid the concentrations of quota either geographically, or in numbers of owners, or both. As in the New Zealand and the Iceland case, the ITQ system in Nova Scotia has intensified the organizational and geographical concentration of the industry. It has also shifted more of the burden of reducing excess capacity to crew members than is perhaps fair. Attempts to reduce these negative impacts through the design of the system and closely related policies have had mixed results and remain controversial. Limits on transfers within groups have reduced concentration in the North Sea and Canadian cases. In the UK some mechanisms have been deployed to favour retiring skippers by maintaining their rights even when they leave the trade. These mechanisms are, however, criticized for creating a class of 'slipper skippers'. Furthermore, when nations aim at protecting fishing communities and own national interests, care must be taken to avoid infringement on European Community law and the EC Treaty. State aid of various forms and ways to shield quotas from being bought by other nationals may not comply with existing laws and agreements. Limits on transferability create a definite cost in economic efficiency. This is directly reflected in the prices of individual quotas which are lower where transferability is limited than where it is not. Determining what the cost in efficiency actually is for some degree of limits on transferability remains a critical research question.

7. Transferable rights do not reduce capacity but rather make rapid capacity reduction smoother and more humane.

The New Zealand case shows that ITQ systems do not necessarily reduce capacity; capacity was reduced in both the Canadian ITQ system and the Alaska cooperative case, but the reductions cannot be directly traced to the ITQ system. In Alaska there was a buy-out and scrapping programme while the main engines for the reduction were much smaller quotas and the introduction of effective enforcement. The tendency of some stakeholders and even the general public, which we found particularly in the Icelandic and Canadian cases, to use ITQs to explain all the changes in population and employment patterns over the past two

decades is a gross oversimplification. The basic lesson seems to be that it is the enforcement of restricted quotas or other fishing opportunities that is the real driver of a reduction in fishing capacity. While not minimizing the problems of equity and pain involved in initial rights allocations, transferable property rights do make the radical capacity reductions that are sometimes required less chaotic and more humane by providing alternatives to bankruptcy as the mechanism for exits from the fishery that are being made unavoidable by the enforcement of restrictions on fishing.

2.3 Effort Control

8. Carefully designed MPAs increase biological robustness but with economic costs.

Simulations suggest that MPAs generally have a negative effect on the profitability of most fleets over a period of 10 years. MPAs create increased costs because of fewer options in fishing locations while at the same time reducing short-term catches. This also includes the Danish fleet except that some small fleet segments do show increased profit, likely based on advantageous location vis-a-vis the MPA. Further simulations indicate that spatial and/or temporal closures as a supplement to either TAC systems or effort control improve biological robustness. However, the robustness is very closely linked to how the effort is re-allocated between fleet-segments, areas, and seasons, and is also sensitive to the assumptions in relation to fleet specific catchability. Evaluations of the effect of closures thus require high resolution information on the actual effort allocation by vessel and about fleet behaviour.

9. Effort control increases biological robustness when the link between effort and mortality is controlled.

Simulation studies indicated that effort-based management is more biologically robust than TAC regulations, but that these results are conditioned on allowing sufficient year-to-year variation in effort. Explanatory factors are that advice for TAC-based management is more sensitive to knowledge uncertainties and that effort control results in less discards.

In the case of direct effort management, biological robustness is found to be conditioned on monitoring and controlling the link between fishing effort and fishing mortality. Such a control is challenged by the dynamics of species and fleets, but also environmental factors, all of which influence the relationship between effort and fishing mortality. An effort regime can account for such influences, e.g. by including additional measures on allocation of effort in certain seasons and/or areas. The Faroese case is a counter example where a failure to monitor and control increases in capacity has hampered biological robustness.

2.4 Decision Rule Systems

10. Adaptive rule-based systems can increase biological robustness.

Implementing an adaptive approach in harvest control rules has the potential to improve the biological robustness in TAC regimes. This was shown by a simulation study where the TAC was adjusted within the fishing season by including the most recent information. In addition, long-term catches increased. Given the world-wide struggle to implement the ecosystem approach, the management of Alaska groundfish offers a rather pragmatic contribution: an upper limit to all catches in a given ecosystem. The more complex Traffic Light approach in Canada was tried and put aside because it was too complex to give clear guidance, however it is being experimented with again in shrimp management. The Alaska case suggests that TAC regulations can provide a precautionary harvest of groundfish, but that the success of a TAC regime also depends on management measures to make a harvest control effective. The TAC setting process is supported by most stakeholders, the exception being the environmental NGOs who call for greater consideration to reducing the ecosystem impacts of fishing. The same is true in the Regional Advisory Councils, where EU stakeholders are getting a role suggesting and evaluating decision rules, but where environmental NGOs also feel that their participation could be strengthened.

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Activity Report by Work Packages

WP 2: The development of the Innovation Evaluation Framework

Objective
To develop an Innovation Evaluation Framework (IEF) to be used to evaluate the suitability of potential regime-level innovations for implementing community policy in particular fisheries and areas.

The IEF has two basic components as described in the technical annex. The first was a description of the practical questions and action that would be required for the implementation of the innovations in Europe. The second was the identification of regime performance indicators related to each of the general management objectives that can be used to evaluate the impact of the innovations to be examined on the performance of the regime.

Partners
All CEVIS partners participated in the creation of the IEF under the leadership of IFM-AAU and IMR.

Work package activities
The main WP 2 activities were the three project plenary meetings and the IEF was addressed at each one of them. Work Package Two is responsible for the development of the innovation evaluation framework and its development during partnership meetings. The initial draft of the indicators for the IEF (Deliverable 19) was written by IFM-AAU and sent to all partners during the first reporting period. During the second reporting period the partnership met at the mid-point meeting and used this draft IEF as a guide for developing hypotheses to be tested in the second half of the project. It was clear at this point that this hypothesis testing would be what would produce the first component of the IEF, i.e. the description of the practical questions and action that would be required for the implementation of the innovations in Europe.

During the second half of the project, however, the indicators part of the IEF was considerably revised. The plan agreed to at the mid-point meeting was to try to use trans-disciplinary categories to produce definitions of key concepts that had the same basic structure in all disciplines. This did not turn out to be practical as both the economists and the biologists found these structures quite difficult to apply in practice. Instead we decided to develop the indicator analysis of the IEF inductively based on abstracting the indicators from what the disciplinary teams were actually doing in the hypothesis testing. The strategy resulted in the final IEF consisting of 40 proxy indicators of processes important for evaluating fisheries management regimes. These indictors corresponded to 28 operational definitions of 9 broad concepts for regime evaluation.

After the final meeting a further questionnaire was sent out to disciplinary work package leaders asking them about the indicators that they had used. IFM-AAU and IMR collated

the final IEF by pulling together this information about indicators and summarizing the individual chapters reporting on all CEVIS activities within individual work packages.

Results

The IEF has been completed and written as the concluding chapter of the CEVIS book (Deliverable 18). The first component of the IEF, the practical questions about implementation, is essentially synonymous with the entire book, but it is summarized in the concluding chapter. The second component of the IEF, the identification of the regime performance indicators makes up the other half of the concluding chapter.

The following are the summary statements of the main practical lessons about implementing the innovations in Europe:

Participatory governance

1. Participation can increase the quality of many aspects of fisheries management.
2. Excluding the broader civil society may reduce gains from participation.
3. Participation is important in science and data collection as well as management.

Rights-based approaches

4. Transferable rights increase economic efficiency.
5. Rights-based management programmes can and should have a flexible design.
6. Transferability of rights has social costs that it is possible, but difficult, to mitigate.
7. Transferable rights do not reduce capacity but rather make rapid capacity reduction smoother and more humane.

Effort control

8. Carefully designed MPAs increase biological robustness but with economic costs.
9. Effort control increases biological robustness when the link between effort and mortality is controlled.

Decision rule systems

10. Adaptive rule-based systems can increase biological robustness.

The following table summarizes the IEF work on indicators:

Concepts	**Operational Definitions**	**Proxies**	**Discipline**
Biological Robustness	Maintenance of an adequate SSB	Median SSB	Biology
		Probability that population falls below minimum SSB	
		Percentage of years where management targets were met	
		Years required to get a population above Blim	
Social Robustness	Stakeholder acceptance	Respondents' reports of perceived levels of compliance with management measures	Social Science
		General acceptance expressed by respondents	
	Institutional learning	Documentation and respondents' reports of	

		specific instances of learning and problem solving	
Economic efficiency	Pareto efficiency = maximum resource rent after costs, which includes all external costs and earnings	Landed value minus costs minus the social costs of the change in the fish resource abundance	Economics
		Net present value disregarding the social costs of the stock abundance	
Cost effectiveness	Amount and type of effort needed to implement management innovation in terms of administration, research and enforcement costs	Records and perceptions of changes in expenditures	Economics
Participatory management	Greater cooperation in monitoring fishing activities by improved reporting of catches	100% observer coverage of discards implying improved stock assessment	Economics
		Reduced level of underreporting implying improved stock assessment	
	NWWRAC	Respondents' understanding and documentary information from before and after implementation	
	Decreased variability and bias in discard estimates	Increased sampling directed to possible sources of bias	Biology
		Increased sampling directed to higher precision	
		Gradually decreasing levels of catch underreporting	
	Dutch Biesheuvel Groups	Respondents' understanding of system before and after implementation in terms of the quality and breadth of participation	Social Science
	NWW RAC	Respondents' understanding of system before and after implementation in terms of the quality and breadth of participation	
Rights-based management	UK Producer Organisation management of Fixed Quota Allocations	Respondents' impression of system changes before and after implementation both overall and in terms of its a) economic impact b) practicality c) qualities of initial allocation d) impact on exit and entrance to fishery	Economics and Social Science
	Territorial Use Rights in Fisheries (TURFs) for Anchovy	Respondents' impression of system changes before and after implementation both overall and in terms of its a) economic impact b) practicality c) qualities of initial allocation d) impact on exit and entrance to fishery	
	Faroe Islands fishing days system	Respondents' impression of system changes before and after implementation both overall and in terms of its a) economic impact b) practicality c) qualities of initial allocation d) impact on exit and entrance to fishery	
	Northern Hake ITQ	Respondents' impression of system changes before and after implementation both overall and in terms of its a) economic impact b) practicality c) qualities of initial allocation d) impact on exit and entrance to fishery	
	North Sea Pelagic Fishery	Respondents' understanding of system in respect to costs	Economics
	Dutch ITQ system	Respondents' understanding and documentary information from before and after implementation	
	Danish ITQ system	Respondents' understanding and documentary information from before and after implementation	

Rule-based systems	Cod recovery plans in the Baltic	Administrators' perceptions of system impacts.	Economics
Effort management	The number and size of fishing vessels allowed (fishing capacity controls), the amount of time the vessels are allowed to operate (vessel usage and activity controls), or the product of capacity and activity (fishing effort controls).	Vessel such as the number of vessels is kept constant	Economics
		Days-at-sea such as the days with the lowest net profit are dropped first when effort restrictions are imposed	
	Restrictions on overall capacity or restrictions of access for a certain capacity to given resources in given area value (MPAs)	Catch Per Unit Effort (CPUE) per ICES square per species such that CPUE will be zero in the closed area	
	Polish area closures and days at sea system	Respondents' understanding and documentary information from before and after implementation	
	Swedish MPA system	Respondents' understanding and documentary information from before and after implementation	
	Limitation of effort by the fishing fleet	Days at sea (DAS; horsepower days at sea), seasonal days at sea	Biology
		Area closed for fishing	
		Sensitivity to misreporting based on a reduction in assessed effort by 10%	
		An indirect proxy under fishers stop fishing before exhausting their catch limits and then report their total catch	
	Faroese fishing-days system	Respondents' understanding of system before and after implementation	Social science
	Area and seasonal closures in Baltic		
	EU days-at-sea programme		
TAC management	Allocation of annual quota	TAC based on EU long-term management plans for plaice	Biology
		Sensitivity to misreporting based on yearly 10% F reduction	
		An indirect proxy under which fishers continue until they have finished the TAE and do not report the extra catch	
	Limitations on landings	Landings in terms of live weight of each species implying that the landing with the lowest net profit per unit TAC will be dropped first when restrictions are imposed	Economics

WP output

- D19 The Innovation Evaluation Framework as the concluding chapter of Deliverable 18.

Impact of WP work

The CEVIS project was conceived nearly five years ago. It set out to explore how science could help to evaluate some of the suggestions for policy changes being made in the then current discussions. Five years is a long time in fisheries policy. The innovations we elected to examine have followed policy trajectories that will determine their eventual fates much

more than the evaluations carried out by this work package. The IEF was an experiment in how experts on fisheries from many disciplines could use science to inform fisheries policy debates. The cross-disciplinary approaches worked very well. These consisted mainly of social scientists and economists working with biologists carrying out social science type research that involved interviews with biologists and other fisheries management professionals. The disciplinary mix led to richer questions and discussion topics. Significant results emerged from of trans-disciplinary work involving biologists and economists. Importantly, the trans-disciplinary work that was successful was based on many years of work in several different projects developing bio-economic modelling for fisheries. The development of the IEF yielded, in our opinion, some useful results. It also contributed to creating a cross-disciplinary team that has had some important experiences and learned some valuable lessons about using science to contribute to managing policy problems.

The indicators in the abstracted IEF (see table above) were of mixed usefulness and that usefulness is discussed for each one in the IEF itself. The major contrast seen in the abstracted IEF indicators is between the social scientists approach to hypothesis testing that relied mainly on before and after evaluations of the implementation of measures and the simulation modelling carried out by the biologists and the economists. The underlying point of quantification is the transparency of reasoning and comparison that careful measurement makes possible. The limit on this power is finding and using comparable concepts and measurements, for example measuring participatory governance as “gradually decreasing levels of catch misreporting”. This proxy indicator hardly captured the concept of participation, in anything approaching the richness yielded by respondents insights about what happened before and after the innovation was carried out, but it allowed the team to develop a very specific and useful recommendation about how one aspect of participation should be structured. This was a common pattern in the development of the IEF and reflects both the need and possibility for cooperative work among scientific disciplines for the support of policy.

WP 3: Evaluation of innovative approaches to fisheries management outside the European Union: The cases of Alaska (USA), Canada, Iceland and New Zealand

Objective
The objective of CEVIS's WP3 was to gather information and to evaluate the performance on innovative fisheries management regimes in four developed regions where these systems have been implemented. These regions are Alaska, Canada, Iceland and New Zealand. Although in these cases a given management system is identified as the core of the system (e.g. ITQs and New Zealand and Iceland), all cases exhibit many aspects of rights-based management, participatory management, effort control and use of harvest control rules.

Partners
AZTI (WP leader), IFM-AAU, DIFRES, OKO, IMR FRI.

The WP3 studies on the fisheries management innovations
The Alaskan case was carried out by OKO and IFM. This case discusses findings on two innovations in Alaskan fishery management: (1) Overfishing Level (OFL) tier system, which is a decision rule that is part of the TAC setting process and applies to all fish stocks, and (2) cooperatives that jointly harvest pollock in the Bering Sea (BS) region. This case describes the two innovative management systems and assesses them against their biological robustness, economic efficiency, cost-effectiveness of management and stakeholder acceptance.

The case of Nova Scotia in Canada was carried out by IFM and DIFRES. It discusses the recent history and outcomes of rights-based management in Nova Scotia, with a particular focus on the inshore mobile gear fishery, and participatory governance. This case describes the local fisheries co-management initiatives called Community Management Boards (CMB) and the combination of innovations such as the CMBs' transferable rights-based system. It also reviews the advances the Canadians have been making in participation in scientific and decisional aspects.

The case of the Icelandic ITQ system was carried out by IFM and the University of Iceland. It reviews the history of the innovation and assesses and evaluates the outcomes of the system in terms of the major goals of fisheries management such as biological robustness, cost-effectiveness, economic efficiency and social robustness. Complementary innovation to management is also discussed such as Harvest Control Rules for cod and temporarily closed areas.

The case of the New Zealand quota management system was carried out by AZTI Tecnalia and IFM. It describes the history of the innovation and the reasons for the introduction of the market based solution. The chapter reviews the backbone of the innovation being the Monitoring Control and Surveillance system and the quality of the property rights. Then it looks into the complementary innovations of the QMS, inter alia participation, the cost recovery system and the deemed value instrument. Finally, it reviews the outcomes from the system with regard to industry development, indigenous people and communities, and resource sustainability.

Work Package Activities

September 2006

Literature reviews aiming at getting in contact with management innovations in Alaska, Iceland, Canada and New Zealand were carried out and finished by September 2006. The IEF was used to sketch functioning of each management innovation and this was discussed in a meeting held in Bergen. In the Bergen meeting study trips were scheduled and further actions were agreed.

November 2006-March 2007

Study trips to the four places were carried out. In all, 86 interviews were carried out.

July - October 2007

Each group submitted their case study report to the coordinator of the WP3.

October 2007-November 2007

Deliverable D.5 and D.6 have been finished by AZTI Tecnalia and comprise the four reports, an introductory section and a concluding chapter that draws best practices in the introduction of innovative approaches to management for the EU.

WP 3 output

- Combined D4 and D5 Evaluation of innovative approaches to fisheries management outside the European Union: The cases of Alaska (USA), Canada, Iceland and New Zealand. Submitted in December 2007.

- Property rights and complementary innovative mechanisms: General lessons from Iceland, New Zealand, Canada and Alaska (USA). By Martin Aranda, Anne-Sofie Christensen, Kjellrun Hiis Hauge, Troels Jacob Hegland, Geir Oddson, Clara Ulrich-Rescan, Doug Wilson, Franziska Wolff. This paper was submitted to the Commission consultation on rights-based management in fisheries in January 2008. Available at http://ec.europa.eu/fisheries/cfp/governance/consultations/contributions260207/cevis_en.pdf

- Contributions to a book to be published by Springer: The four cases studied have been rewritten in the format of four chapters to be part of a forthcoming publication by Springer. These chapters are:

  - Abundant fish stocks and profitable fisheries off Alaska – a study on harvest control rules and pollock cooperatives. By Franziska Wolff and Kjellrun Hiis Hauge.
  - The Icelandic ITQ system. By Anne-Sofie Christensen, Troels Jacob Hegland, and Geir Oddson.
  - The New Zealand QMS and its complementary mechanisms. By Martin Aranda and Anne-Sofie Christensen.
  - Rights-Based Management and Participatory Governance in South West Nova Scotia. By Clara U. Rescan and Douglas Clyde Wilson.

Impact of WP work

The WP3 output contributes to the knowledge basis required to implement management innovations in the near future. It reviews a wide variety of experiences with innovative management systems in very different management contexts. Our findings not only contributed directly to the overall results of CEVIS by providing detailed information on the practical implementation of the management innovations, they provided a number of ideas and insights which became an important the basis for the work of WP 4-7.

WP 4: Evaluating economic efficiency of innovative management regimes

Objective
Economic efficiency can be conceptualized and evaluated in various ways. The main objective of this work package is to review both theoretically and empirically how economic efficiency in fisheries can be estimated and summarised as an indicator of performance. The resulting approach will make it possible to estimate the likely economic efficiency outcome of various management options for a range of case study fisheries.

Partners
UCPH (WP leader), AZTI, IMARES.

Work Package Activities
The WP4 partners have met four times during the project:

- Group meeting at the mid-term project meeting held in Pasaia, Spain on May 21-25, 2007, where the group made a research plan for the WP.
- Group meeting in Copenhagen, DK, on October 1-2, 2007, where the group members presented descriptions of the different case studies, including data collection in preparation for model assessment analyses. Furthermore, the group discussed the model frameworks to be used in the different case studies.
- Group meeting in Copenhagen, DK, on May 21-22, 2008, where progress on the case studies was discussed, and plans were discussed for final reporting (D10) of the results, which will be published as a report from UCPH. Furthermore, the group planned the work to be made on the WP chapter for the project book (D18).
- Group meeting at the final project meeting in Luleå, Sweden, on August 25-29, 2008, where the group finalized the WP chapter for the project book.

The case studies analysed in the Work Package comprise:

- The Danish fishery for cod in the Baltic Sea.
- The Dutch beam trawl fishery for plaice and sole in the North Sea.
- The fishery for cod, haddock and saithe by pair trawlers and long liners at the Faroese Islands.
- The Northern Hake fishery by Spanish baka and pair trawlers on the Western Shelf.

Table 1 presents the hypotheses relating to the innovative management regimes considered in each case study.

Table 1. Hypotheses connected to case studies assessing economic performance

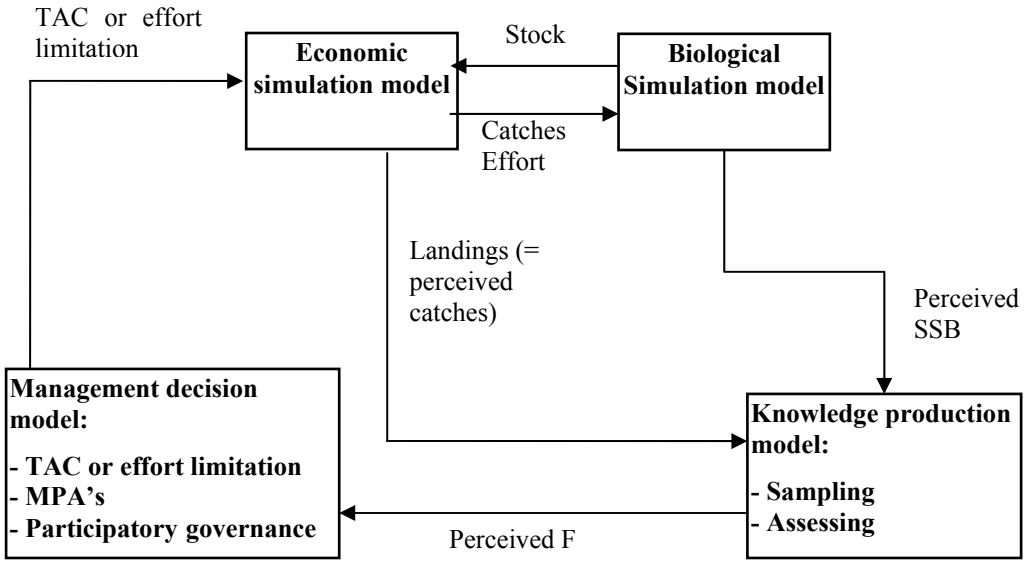
	North Sea	Baltic	Western Shelf – Hake	Faroe Islands
Technical measures and MPA's are likely to reduce economic efficiency		X		

(in the short run).				
Participatory management will in the long run increase economic efficiency (by increasing biological robustness).			X	
A system of Effort Control leads to higher economic efficiency than a system of TACs.	X			X

To assess these hypotheses, the WP has conducted the following activities:

- Review of the state of knowledge on economic efficiency of European fisheries, and of indicators used for measuring economic efficiency. The results of this review are collected in a working paper, Review of Economic Indicators, which covers deliverables D7 and D9 of the work package. An important point made in the review is that it might be more operational to refer to the economic performance of fisheries instead of economic efficiency, because the latter is a more theoretical concept that might often be difficult to obtain in practice. The discussions resulting in the working paper resulted in a common approach for evaluating economic performance in the selected case studies, based on a common set of economic indicators. It was decided that the main indicator of economic performance for each of the management tools considered would be net present value (NPV).
- Economic information (cost and earnings, landings values, etc.) was collected for the 4 case studies, and descriptions of relevant data from an economic point of view were produced. These descriptions will be included in the final deliverable D10 (The Impact of Innovations on Economic Efficiency in EU fisheries).
- Each partner developed and implemented bio-economic model frameworks that were used in the analysis of their case studies. All approaches are based on the model frameworks developed in the EFIMAS project. Figure 1 shows the basic structure employed by all models. Three of the four case study analyses have been performed in collaboration with WP5, namely the North Sea, Western Shelf and Faroe Islands.

Figure 1. Basic structure of the bio-economic models used to assess economic performance



Results

For each case study simulations were run to test the innovative schemes under consideration. For each scenario net present values covering the simulation periods were evaluated and compared to assess whether the hypotheses (table 1) could be confirmed. The results of the simulations are summarized below:

The North Sea and Faroese case studies both indicate that whether days-at-sea restrictions result in better economic performance than TAC management depends on how the effort restriction is set. For the Western Shelf case effort management generally seems to produce better economic performance than TAC management. In the North Sea case, however, the economic performance of effort management relative to the performance of TAC management depends on the allowed amount of effort. When the allowed amount of effort increases, the effort management scenario changes from having better economic performance than the TAC scenario in both the short and the long run to only having better performance in the short run. In the Faroese case, a cautious effort scenario show approximately the same economic performance as a TAC scenario, while using increasing effort has a clearly negative effect on economic performance. The latter result corresponds with what has been observed in the North Sea case study.

Co-management (observed discards) improves economic performance for the Western Shelf fishery in the TAC scenario, an effect that is even stronger when the underreporting level is also reduced. Moreover, in the long run this improvement is higher the more profitable the fleet (pair trawlers). Contrary to this outcome, participatory governance has a slightly negative effect on economic results in an effort scenario.

Finally, in the Baltic case, the overall effect of increased marine protected areas on the economic performance of the Danish fleet is negative, even though some small fleet segments profit from the change.

In all the WP has fully covered the objectives, firstly illustrated through the theoretical review of how economic efficiency is assessed in European fisheries together with a review of which indicators are used for this assessment (D7 + D9). Secondly the WP has shown how this theoretical framework can be used empirically to assess economic performance in a number of European fisheries (D18 + D10).

WP output
The following outputs have been produced by the Work Package during the project:

- D7 Report on state of knowledge on economic efficiency of European fisheries.

- D9 Synthesis review of indicators and their measurement for evaluating economic efficiency

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  (Deliverable D7 and D9 are combined in the above mentioned working paper 'Review on Economic Indicators').

- D18 WP chapter for the project book 'Evaluating Economic Efficiency of Innovative Management Regimes'.

- D10 Report published by UCPH collecting the results from the case study analyses of the economic effects of innovations in European fisheries management.

Impact of WP work
It is clear that management innovations are most often aimed at stock recovery for threatened stocks, i.e., they have biological objectives. However, the analysis performed by the work package emphasizes that such innovations should also account for the economic implications for the concerned fishing fleets as these may in some cases suffer economically when new management innovations are introduced. As such, any management scheme should focus on maintaining biological as well as economic sustainability. In this respect, the work produced by the work package contributes significantly to possible improvements of current management assessment schemes, as the work package has illustrated in four very different case studies what a great potential there is in combining biological and economic assessment models.

WP 5: Evaluating biological robustness in the IEF test cases

Objectives
A range of management innovations is evolving worldwide, aimed at improving the current state of fisheries. These are mainly based on the principles of participatory governance, rights-based approaches, effort control, and decision rule systems. Within CEVIS, the relationship of some of these management innovations to biological robustness is explored through a small set of case studies.

The influence of innovative management alternatives (participatory governance, effort management, decision rules) on Biological Robustness (BR) in various fisheries relevant to the EU (Baltic, Western Shelf, Faeroes, North Sea), was estimated using a numerical simulation model developed in the EU FP6 Projects EFIMAS and COMMIT.

Partners
IMARES (WP leader), DTU-DIFRES, IMR, AZTI, FRI

Work performed
Five different case studies were defined: North Sea – evaluating participatory approaches and effort management, Baltic System – evaluating effort management including fisheries closures, Western Shelf Hake – evaluating participatory approaches and effort, Western Shelf anchovy – evaluating decision rules, Faeroe Islands – evaluating effort management.

Within these case studies, the analyses were structured around three main hypotheses:

1. Improved information, assumed to result from participatory approaches, increases biological robustness.
2. Management through effort restrictions leads to higher biological robustness than management based on TACs.
3. Decision rule systems that include recent information lead to higher biological robustness.

More in depth research questions were formulated to guide the research. Through these questions we were able to give clear answers to the hypothesis above.

Results
Definition of Biological Robustness (BR): The index for BR was set as the percentage of years in which standard biological reference points (B_{pa}, F_{pa}) were met.

Participatory Approaches: The results suggest that new information obtained through participatory approaches may affect BR by reducing bias rather than increasing precision, implying that a participatory approach should rather focus on potential sources of bias than on (perceived) low sampling efforts.

Rights-Based Regimes: Further analyses suggest that rights-based regimes combined with catch quota restrictions improve BR.

Effort vs. TAC system: The relative effect of catch quotas versus effort management on BR varies with circumstances, implying that careful and case-specific analyses are needed to

weigh one against the other. This requires more detailed data than generally available at present, including electronic surveillance, detailed catch data, environmental/productivity data, recruitment and misreporting.

Decision rules: We analysed a decision rule consisting of a two-step management system, which allows TAC adjustment according to the state of the stock monitored during the fisheries season. Such measures may improve the BR, especially when the decision rules are based on recent information.

Methods and approaches

North Sea Case Study: A simulation model is used to analyse the effects of bias and uncertainty in discard estimates on the BR of a management strategy. Here we assume biological robustness to increase when SSB increases. In this model, the beam trawl fishery and population dynamics of the age structured plaice stock in the North Sea are coherently simulated. While fishing, the fleet generates discards which, if over- or underestimated, may introduce an artificial measurement error into the model. By varying the precision of the measurement error we simulate the number of observations available, where error is assumed to decline with increasing observations.

Baltic Sea Case Study: A spatially and seasonally determined stock and fleet based bio-economic model using FLR (http//:www.flr.org; http://www.efimas.org; Kell et al. 2007) was established as described in detail in Bastardie et al. (2009). This monthly model based on ICES squares model was used to model multi-fleet dynamics and simulate the performance and sensitivity of the adaptive approach under both TAE and TAC systems. The main characteristics and differences between the two systems lies in the decision rules used according to the cod recovery management plan (CEC 2006). The TAC restrictions for the coming year corresponded to a 10% reduction in F from the assessed F level in the previous year. Meanwhile, the TAE restriction corresponded to a 10% reduction in the total fishing effort in the previous year (if the assessed $F > 0.3$), assuming a linear relationship between F and E (i.e. constant catchability).

Western Shelf Hake Case Study: The analyses were done using a simulation model written in FLR (Kell et. al, 2007) within the COMMIT and EFIMAS EU-projects. The algorithm was described in detail in Garcia et. al (2008) and was used to analyze possible long-term management plans for this stock (STECF 2007). Simulations involved both the population and fleet dynamics as well as the management process. The parameterization of the model was based on ICES data available to the working group. An initial random population of 2007 was projected to 2040 under different management options. Each year of projection a management process was run from which a management advice was obtained for next year. This management advice was then assimilated by the fleets. The management advice was determined by the HCR which aimed at reaching a fixed target fishing mortality. Each year the observed fishing mortality was compared with the target and the management advice was adjusted in order to be able to reach the target in the next year.

Western Shelf Anchovy Case Study: The analyses were done using the management strategy evaluation algorithm implemented within the FLR framework (Kell et al., 2007) to compare the biological robustness of the TAC management regimes in different scenarios. The model simulates the population dynamics (operating model), the fleet dynamics, the surveys (observation model) and the management process. The operating model consists on a single age-structured stock exploited by a single fleet with harvest rates (ratio of catch to

total biomass) in seasonal time steps (half year basis). The parameters of the operating model were based on the results from the seasonal Integrated Catch-at-Age Analysis (ICA) of the relevant ICES Working Group (WGMHSA) in 2006, (Report STECF/SGBRE 0801). The 2007 population was projected to 2017 with the different scenarios defined. The HCR is based on the biomass, the age one recruitment and the TAC in the previous year.

Faeroe Islands Gadoid Fisheries Case Study: A management strategy evaluation model was developed within the FLR framework (http//:www.flr.org; http://www.efimas.org; Kell et al., 2007) to compare the Faroese effort management system for the gadoid demersal and mixed fisheries with a TAC system currently applied in EU fisheries, both on a single and multi-stock basis. Standard stock assessment data from ICES was used (ICES, 2006). Fleet data was obtained from the Faroese Fisheries Laboratory, Thorshavn. This model included several sources of uncertainty (on abundance indices, recruitment levels, weight-at-age estimates, and fleet selectivity patterns) to mimic both environmental influence and variability induced in the system in order to assess the biological robustness of the effort regulation model. Observations were made by manipulating the overall fishing activity and investigating its effect on stock trends (Baudron et al., 2009).

Products

D11 Synthesis Review of Indicators and their Measurement for Evaluating Biological Robustness and D12 Scientific paper on the Methods and Results of the Analysis of Biological Robustness in the Case Studies are delivered in the shape of 4 scientific papers and a chapter in D18:

- Scientific paper on North Sea case study:
  Hintzen, N.T. and J.J. Poos (in prep): *Self-sampling discard observations, and how its bias and precision affect the robustness of management.*

- Scientific paper on Baltic Sea case study:
  Bastardie, F., J.R. Nielsen and G. Kraus (in submission): *Management Strategy Evaluation framework for the Eastern Baltic cod fishery to test robustness of management against environmental conditions and fleet response scenarios.*

- Scientific paper on Western Shelf case study:
  Murillas, A., D. Garcia and E. Diaz (in prep.): *Evaluation of Innovative Management in the Northern Hake fishery.*

- Scientific paper on Faeroese Case study:
  Baudron, A., C. Ulrich-Rescan, J.R. Nielsen and J. Boje (in prep): *Comparative evaluation of the mixed fisheries effort management system in the Faroe Islands.*

- Chapter 6 of D18 A book on the Evaluation of Potential Regime-Level Innovation for Use in EU Fisheries Management: Kjellrun Hiis Hauge and Douglas Clyde Wilson (eds.): *Comparative Evaluations of Innovative Fisheries Management: Global Experiences and European Prospects.* Dordrecht: Springer Publishing. 2009, see WP8.

Impact

As most of the work described here has not been published yet, and the book describing most of the work executed within CEVIS is not yet published, it is difficult to state to what extent the findings will impact on the industry or research sector. However, it is most likely that management will consider the suggestions made within this study and hence will, based upon the results presented here, direct new management questions towards more case specific research to determine the best option for their question.

WP 6: Evaluating social robustness of innovative management regimes

Objective
The objective of this WP is to use the second draft of the IEF to evaluate the overall social robustness of the management regimes and the ways in which the management innovations being examined will have an impact on that robustness. We understand social robustness in this context to be a combination of the acceptance of the regime by the stakeholders, the institutional sustainability of the regime, and legal conformity of the innovations to the existing legal context. The result will be a revised list of indicators with a discussion of their use and measurement that will be the basis of the social robustness section of the final IEF and the report on the potential for the four innovations for maintaining social robustness.

Partners
IFM-AAU (WP leader), FRS, LTU, AZTI, OKO.

Work package activities
The group had three meetings in relation to the WP6 work and five virtual meetings:

- May 21st to 25th 2007 in Pasaia, Spain. The aim of the meeting was to formulate hypotheses from which the field trips had to be conducted, and to operationalise set definitions.
- February 14th to 15th 2008 in Berlin: The aim of the meeting was to discuss the results of the field trips and coordinate the writing of the deliverables.
- August 25th to 29th 2008 in Luleå to finalise the deliverables.
- The virtual meetings took place October 11th 2007, March 25th 2008, April 28th 2008, May 16th 2008, and June 11th 2008.

The case studies analysed in the WP6 comprise:

- Demersal fisheries on the Faroe Islands
- Spanish Basque fisheries for anchovy and northern hake on the Western Shelf.
- Dutch flatfish fisheries and Scottish groundfish fisheries in the North Sea
- Cod fisheries in the Baltic Sea.

Social robustness was defined as a combination of two factors that allow a management regime to adapt to a broad range of potential ecological, economic and political situations: 1) acceptance by stakeholders, reflected in how they perceive and respond to management, and 2) capacity for institutional learning, the process in which institutions change in reaction to internal or external socio-economic or ecological pressures. Please find five hypotheses regarding social robustness below that was applied to the four case studies:

		Social robustness	
		Stakeholder acceptance	Institutional learning
Management regime /innovation	Rights-based management (including management of effort allocations)	1. RBM systems tend not to have broad stakeholder representation. 2. Commercial fisheries actors' acceptance of a RBM system is higher when a) the management system is perceived by the fishermen to be practical [and necessary]; b) the management system (in RBM: the initial allocation) reproduced the status quo of fishing opportunities when introduced; c) new entrants are facilitated; d) retirement options are provided for.	4. Rights-based management systems restrict capacity for institutional learning.
	Participatory governance	3. The more diverse the stakeholder involvement in the development and/or operation of a management system, the lower its acceptability by the affected commercial fisheries actors.	5. The more diverse the stakeholders involved in the development and/or operation of a management system, the more institutional learning takes place.

To assess these hypotheses, the WP has conducted the following activities:

The four case studies were carried out using a common two-step methodological framework. First step was to review existing literature including scientific documents, grey literature and press reports relating to social robustness and fisheries management in the case study areas. The second and most important step of the framework was the interviews with different stakeholders including fishermen, conservationists, scientists and managers conducted on field trips to all the relevant sites. The aim of the interviews was to gather insights into the social robustness of the respective innovations. In order to do so, it was necessary to develop a general understanding of how the systems work and of possible trade-offs in the systems. Moreover, the interviews sought to identify day-to-day issues in fisheries management, as well as contingency measures undertaken to counteract threats to the well-being of the resource such as non-compliant behaviour. The interviews covered two important aspects: the history and development of the innovations (institutional learning), and the views and opinions of fishermen, the wider industry, managers, and civil society stakeholders on the management system and compliance with it (stakeholder acceptance).

Results

The outcome of WP6 presents a framework for analysing the social robustness of fisheries management regimes – defined by the two dimensions, stakeholder acceptance and capacity for institutional learning. The framework was applied to four innovative management regimes in European fisheries which all combined some form of RBM with participatory governance, using five hypotheses on the interrelations between these two management features and the two dimensions of social robustness.

Two of the management innovations – in the North Sea and Faroe Islands cases – seem to be socially robust with relatively high degrees of stakeholder acceptance and with the ability, in many situations, to institutionally learn. In the case of Basque fisheries, management seems to be socially robust with high institutional learning, but the stakeholders do not fully accept the system. The Baltic case seems to be less socially robust compared to the other cases: the innovations in the Baltic were implemented in a more

traditional top-down fashion, and complex learning – that contains more fundamental questioning of redefining the underlying values and ends – has not taken place, affecting social robustness negatively. All the case studies only include narrow groups of stakeholders and it is easy to assume that a broader representation of stakeholders would have affected stakeholder acceptance and institutional learning and thus, social robustness.

Looking more closely at the factors influencing stakeholder acceptance, the North Sea, the Faroe Islands and the Western Shelf cases enjoy a generalised acceptance among, at least, industry stakeholders. The systems are all perceived to be practical and necessary by the people who have to work them, i.e. the commercial actors and, in some of the cases, the management. Conservation or green organisations do not play a central role in any of the cases studied although they are represented in some through the Commission's RACs. Yet, on the Faroe Islands critical voices that say that the fishing industry is too strong and that the biologists are ignored in decision-making processes can be found, even though no green organisations are represented in fisheries management. Stakeholder acceptance of the management in the Baltic case is much lower than in the other case studies. The management system is not perceived to be practical and necessary, and as a consequence issues of stakeholders' acceptance and compliance have arisen. These same issues do not seem to be as large in all the other case studies.

Regarding institutional learning, the studied systems of the North Sea, the Faroe Islands and the Western Shelf have demonstrated capacities to institutionally learn and keep a fairly high stakeholders' acceptance among the commercial actors. This happened in spite of the involvement of narrowly defined groups of stakeholders. The finding was not consistent with the initial hypotheses. However, institutional learning within the RBM systems mostly took a very specific path: It was typically geared towards making rights more tradable and/or secure or exclusive. This actually creates a paradoxical situation where options for future learning in the system may be reduced since rights-holders will want to maintain the value of their investment in the rights.

To sum conclusions on the five hypotheses:

Relationships between rights-based management systems, participatory governance, stakeholder acceptance, and institutional learning in the four case studies are complex. Five hypotheses were developed to help disentangle the complexities. The case studies turned out to be inappropriate for testing some of the hypotheses because of the lack of broad stakeholder participation in the governance systems studied. Therefore, it was not possible to come up with a conclusion about whether rights-based management precludes broad stakeholder representation (Hypothesis 1) or whether broad stakeholder participation in governance decreases the acceptability of the system for commercial fishers involved (Hypothesis 3). However, the research led to an appreciation of the importance of pre-existing traditions for or against broad stakeholder representation. In addition, support was found for an alternative to hypothesis 3, which is that RBM systems with narrow stakeholder representation seemed to have a high degree of acceptance among those stakeholders involved.

The critical factors affecting commercial fishing actors' acceptance of a new management system were, as predicted in hypothesis 2, whether it is perceived by the fishermen to be practical and necessary and whether a new management system (in RBM: the initial allocation) reproduced the status quo of fishing opportunities when introduced. Somewhat

less important were the facilitation of new entrants and provision of retirement options. The capacity for institutional learning was not, apparently, restricted by RBM systems, contrary to hypothesis 4, in so far as some kinds of institutional learning could be identified in the development of each of the RBM systems studied. Moreover, contrary to hypothesis 5, even though stakeholder involvement was narrow in all of the cases studied, they all showed some capacity for institutional learning.

Finally, the various case studies exhibit some factors which cannot be assigned to the management systems, and their characteristics have influenced the social robustness of fisheries management systems. On the Faroe Islands, cod was exceptionally abundant during the first years after the introduction of the fishing-days system – this took the pressure off the fisheries management system. In the case of the Basque fisheries, the emergence of RACs is seen as a positive development that allows the Basque fishing groups to defend their interests and to participate in giving advice. The RAC could take the pressure off the regional fisheries management. In the North Sea cases, social robustness of the co-managed RBM systems was fostered by the fact that inequitable quota concentrations have, so far, been avoided. In addition, in both countries capacity reduction, days-at-sea schemes and strengthening of enforcement frameworks supported the systems' working over the years, maintaining economically viable fishing opportunities for those still involved. Looking at co-management, social robustness was promoted in the Netherlands in particular by the Dutch neo-corporatist and consensus-oriented culture, which pervades many aspects of social life.

WP output
The following outputs have been produced by the Work Package during the project:

D13 Detailed Study of Social Robustness in Four Cases
D14 Synthesis Review of Indicators and their Measurement for Evaluating Social Robustness
D15 A Legal Policy Brief for Potential Legal Conflicts with Management Innovations

WP 7: Evaluating the cost effectiveness of management in the IEF test cases

Objective
WP 7 had as its objective to analyze the management innovations in selected European fisheries in terms of management costs.

The costs management depend on the flag of the fishing fleet, the complexity of the fishery concerned as well as the management regime operating. The objective of this work package is to identify the influence of these parameters, encapsulate them in indicators and to estimate how the costs of the management of the fishery would change if new management regimes were introduced.

Partners
JRC (WP leader), AAU, IFM, DTU-DIFRES, SFIG, AZTI

Work performed
Research was performed into the cost of fisheries management in selected European fisheries and attempts were made to relate these costs to the fisheries management innovations adopted. Case studies were conducted in eight countries where fisheries management innovations have recently been implemented. The aim of the exercise was to obtain measurements of actual changes in management costs following the implementation of these management innovations. While this does not necessarily provide much information on the minimum costs of running the management systems in question, it offers insights into the costs experienced during the adjustment to the innovations and the early stages of the new fisheries management systems and may well be indicative of the real long-term costs of running these systems.

The final deliverables present background discussion on fisheries management systems and the management innovations. This is followed by a description of the main case studies conducted in Denmark, the Netherlands, Spain and Poland, and supplementary ones conducted in France, Sweden, UK and Faroe Islands. The first four cases were selected early in the research programme as the most promising examples. The selection was also partly determined by the actual physical location of the partners involved. The supplementary cases, which are related to specific fisheries management innovations, were added to obtain additional empirical data for the final evaluation of the management costs associated with the fisheries management innovations. In all cases, data were collected from various data sources. They all made substantial use of face to face interviews with the people involved, including scientists, government and enforcement officials, and fisheries representatives. The interviews were conducted according to a uniform questionnaire prepared beforehand.

The data acquired were somewhat different from the data that it was planned to acquire. The basic data on fisheries management in separate case studies is not available in most cases, because the countries have budgets allocated for specific management functions like research, enforcement and administration, but not necessarily for the specific management regimes. In most cases the same people work on different regimes thus the final numbers for the specific regime are very arbitrary, not based on hard data.

For the baseline study of management regimes and case studies, desktop study was performed reviewing literature available and data sources accessible. To get a better insight into the management structures case study-based interviews were performed with major stakeholders according to the commonly agreed questionnaire. In the separate case studies different methods were employed to find out how much management innovations actually cost.

Impact

The impact of the project is probably most valuable to the fisheries administrations of the governments and less to industry and the research sector. According to the project findings, it seems that governments' spending on fisheries management are based on some probably political issues or changing stock sizes, but not on the basis of the management regimes deployed. We found that the change of management regime does not change the government spending. However, industry and the research sector will benefit from the findings as well, because all stakeholders are directly dependent on the fisheries management decisions and spending.

WP 8: Evaluating the Potentials for Regime-level Innovations in the EU

Objective
To synthesize the results of the four IEF test case studies across all four of the general management objectives.

Partners
All partners under the leadership of IMR

Work performed
The CEVIS project has an agreement with Springer to publish the CEVIS book (D18). Each work package has contributed with at least one chapter. The book has been submitted to Springer for publication in the same version attached to this report. . The work, which has mainly consisted of coordination and reviewing text, has been performed under WP8.

Products

- D18 A book on the Evaluation of Potential Regime-Level Innovation for Use in EU Fisheries Management:
  Kjellrun Hiis Hauge and Douglas Clyde Wilson (eds.): *Comparative Evaluations of Innovative Fisheries Management: Global Experiences and European Prospects.* Dordrecht: Springer Publishing. 2009.

- D20 Policy Implementation Plan
  The Policy Implementation Plan is meant to summarize the basic results of the CEVIS project for European fisheries policy makers. We did not feel that it was appropriate to try to create a step-by-step plan for implementation of the various fisheries management innovations we have studied. Rather we present the lessons that our research has yielded about what needs to be considered when managers decide to implement these innovations in specific contexts in Europe.
  The Policy Implementation Plan is based on the Chapters 1 and 12 of D18 A book on the Evaluation of Potential Regime-Level Innovation for Use in EU Fisheries Management: Kjellrun Hiis Hauge and Douglas Clyde Wilson (eds.): *Comparative Evaluations of Innovative Fisheries Management: Global Experiences and European Prospects.* Dordrecht: Springer Publishing. 2009.
  The Policy Implementation Plan constitutes furthermore the publishable summary of the Third and Final Activity Reports of the CEVIS project.

Impact
It is expected that the outputs from WP8 will stand as a lasting contribution of CEVIS, which will be of use both to researchers and policy-makers in the years to come.