

Results based management in fisheries: Delegating responsibility to resource users



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ARTICLE INFO

Article history:

Received 17 December 2013

Received in revised form

8 October 2014

Accepted 10 October 2014

Keywords:

Results based management

Co-management

Common fisheries policy

Cost recovery

Shifting the burden of proof

Governance

ABSTRACT

While the notion of results based management has been devoted recent attention in the context of reforming European fisheries management, it remains unclear what it entails. A conceptual model of results based management in fisheries is proposed as a way for public authorities to delegate specific management and documentation responsibilities to resource users. The model comprises three defining features: (1) That authorities define measurable objectives for the utilization of fisheries resources; (2) that resource users are made responsible for achieving these objectives and for (3) providing documentation that allows for an audit of the extent to which they are met. Selected cases are used to illustrate these features. Rationales and prospects of introducing results based management as an alternative in a European fisheries management context are discussed, giving consideration to how it may be pursued under the reformed common fisheries policy.

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1. Introduction

Preparing for the third reform of the common fisheries policy (CFP), the European Commission published a Green Paper [1] reviewing the problems of the existing CFP. The Green Paper identified five main structural failings: fleet overcapacity, imprecise policy objectives, short-term focus, insufficient industry responsibility, and poor industry compliance. In its analysis, the Commission emphasized the vicious cycle set off by overcapacity and overexploited resources, which generate pressure on authorities to make derogations and exemptions from particular regulations, and leads to a demand for more regulations. The outcome is what the Commission terms “micromanagement”, a myopic management system that is becoming increasingly complex, ineffective, difficult to understand and costly to maintain [1,2].

The Commission suggested “results based management” (RBM) as a way to overcome micromanagement: “The industry can be given more responsibility through self-management. Results based management could be a move in this direction: instead of establishing rules about how to fish, the rules focus on the outcome and the more detailed implementation decisions would be left to the industry. Public authorities would set the limits within which the industry must operate, such as a maximum catch or maximum by-

catch of young fish, and then give industry the authority to develop the best solutions economically and technically” [1].

According to the Commission, a basic problem is that public authorities have become too closely involved in the details of fisheries management. The solution, presented under the label of “results based management” involves a principled shift in the division of responsibility between public authorities and industry partners in management issues. While public authorities should decide overall objectives, decisions on the practical means to achieve them should be left to the industry. Instead of the passive and unwilling receivers of management decisions resulting from the current system, the industry partners must be actively engaged in, and take on real responsibilities for, management issues.

While the general direction of the reform ideas included under the heading of RBM seems clear, it leaves a number of questions unanswered. The notion of RBM is relatively recent within fisheries governance and does not come with a ready-made definition explaining what it is and how it can be implemented in practice. What are the basic features of a RBM model? How are roles defined and responsibility distributed between authorities and resource users in an RBM system? How to ensure that the overall objectives set by the authorities are pursued and achieved when the implementation of measures is left to resource users?

The purpose of this paper is to address such issues by proposing a conceptual model of Results Based Management. Concepts and practices of RBM in intergovernmental organizations and public administrations are reviewed. Subsequently, a conceptual

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model of RBM in fisheries will be proposed and discussed as an approach by which a fisheries management authority may delegate specific management and documentation responsibilities to fisheries resource users. Features of the model are illustrated through selected cases, giving particular consideration to lessons made with RBM different contexts that seem important when moving in this direction in fisheries. Finally, the normative underpinning of RBM is discussed as well as prospects of implementing it within the reformed CFP.

2. Conceptual background: Results based management in public organizations

Results based management (RBM) is focused on achieving specified results, and on documenting that they are achieved. This means that “managers and/or organisations are given flexibility in order to improve performance and are then held accountable for results” [3]: 128. This is in contrast to what the Green Paper referred to as micromanagement, which is focused on input control and on specifying detailed requirements of a management process. RBM typically deploys incentive logic, such that achievements of results elicit benefits for those to whom responsibility has been delegated.

In the context of public administration, RBM can be placed within “New Public Management”, a loosely defined reform trend that, in particular in OECD countries, has been going on since the 1980s. This management style had taken inspiration from result oriented management in the private sector. Characteristic elements of New Public Management include emphasis on accountability, decentralization, “value for money” and delivery of measurable results—in contrast to regulating and overseeing a particular process [4–6]. RBM is closely associated with an “evaluation culture”, which aims at developing robust governance systems through orientation towards the achievement of identified objectives in a transparent process. It is also strongly related to what Michael Power has identified as ‘the Audit Society’ [7].

RBM – also often known as ‘Objective Based Management’ and ‘performance management’ – has been extensively used as an instrument to reform administration processes in major intergovernmental organizations such as the UN, the OECD and the World Bank. In addition RBM related strategies have been deployed to reform a range of national administrations and regional governments [3,8–10]. RBM has also been applied within regional forestry management [11,12] and national aid programs.

“broad management strategy aimed at achieving important changes in the way government agencies operate, with improving performance (achieving better results) as the central orientation” [5].

Seen in isolation, this definition, like the similar definition endorsed by the OECD,^a neither captures what RBM is, nor what sets it apart from other management strategies. For instance, one may ask if not all management strategies are orientated towards improving performance and achieving better results in some sense.

To get a better grip on what RBM is in the context of the UN and the OECD, one must go beyond their definitions and turn to their conceptual frameworks and practical guidelines for implementing RBM [13,14]. In 2004, the UN’s Joint Inspection Unit reviewed experiences from the process of reforming UN agencies based on RBM. This review offered a list of “key RBM techniques”, indicating what RBM is, and how it may be practised [15]^b:

- Formulating objectives (results).
- Selecting indicators to measure progress towards each objective.
- Setting explicit targets for each indicator to judge performance.
- Regularly collecting data on results to monitor performance.
- Reviewing, analysing and reporting actual results vis-à-vis the targets.
- Integrating evaluations to provide complementary performance information.
- Using performance information for purposes of accountability, learning and decision-making.

As this suggests, RBM is a goal-oriented management strategy that systematically uses evaluations to improve performance in a learning process. The standard against which RBM takes on meaning is the command-and-control chain, as portrayed in Weber’s model of the perfect bureaucracy [16]. In such a system, the organizational apex in principle should know and be responsible for everything that goes on at subordinate levels. The RBM model departs explicitly from that and is built on the principle of coordinating activities in relatively autonomous sub-units, dispensing with detailed central direction and control. Under this principle, the activities of individual sub-units are instead orchestrated towards the common goals through information management and incentive systems.

As the above suggests, RBM should be understood as a reform instrument: While its definition is typically kept open, it will in practice take on much of its identity from the system that it originates in and is set up to reform. This article addresses how this may play out in the context of fisheries management.

3. Results based management in fisheries: A conceptual model

The European Commission’s suggestion of RBM implies making resource users responsible for implementing appropriate management means, as long as their operations remain within limits set by public authorities [1]: 11–12; see also [17–19]. This envisages a change in the relationship between public authorities and resource users. Within the command-and-control logic of management, in particular in its perverted form known as “micromanagement”, the role of resource users is reduced to that of passive (or disobedient) clients. An important first step in moving towards RBM is hence to redefine the role of the resource user, establishing them as responsible partners in a common management framework. In this way, RBM comes with a strong commitment to a governance form in which the role of the central authority is no longer to regulate action in detail, but to advise, facilitate, and oversee self-management of industry partners. Importantly, the Commission links RBM to a shift in the “burden of proof” from management authorities to resource users [17,20,21]: “It would be up to the industry to demonstrate that it operates responsibly in return for access to fishing. This would contribute to better management by making the policy considerably simpler and removing the current incentives for providing false or incomplete information” [1]: 12.

With a starting point in the Commission’s suggestions, this article conceptualizes RBM in terms of a contract situation between public authorities and resource users. Here, the authority defines the specific requirements to be met, and leaves it to resource users to achieve them and to document that they are achieved.

RBM accordingly includes three defining features: (1) that public authorities specify measurable requirements for the resource users; (2) that resource users have considerable autonomy and flexibility of choosing appropriate management means; provided that they (3) document that they satisfy the requirements set by authorities. In addition, RBM requires that

^a The OECD defines RBM as “A management strategy focusing on performance and achievement of outputs, outcomes and impacts” [13].

^b See [5]: 10 for a similar list.

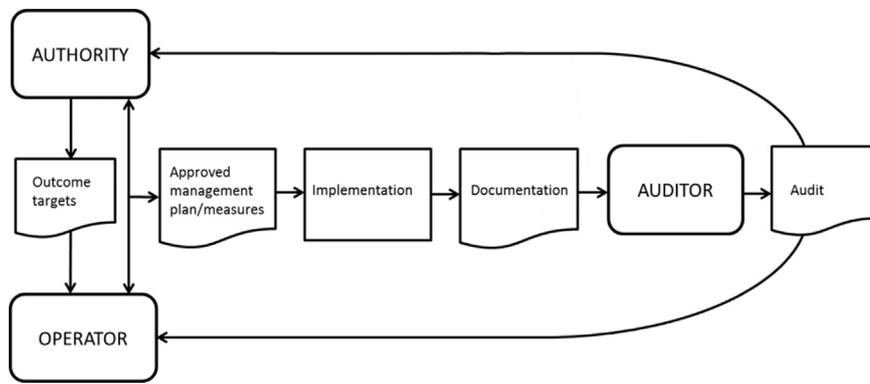


Fig. 1. Conceptual model of a results based management in fisheries. See text for explanation.

information provided by resource users is systematically assessed in order to monitor outcomes with regard to defined requirements. On the basis of this concept, a conceptual model of results based management is proposed, which includes three generic agencies: operator, authority and auditor (Fig. 1).

The *authority* is an organizational entity enacting authority in pursuit of the policy objectives decided for a fishery. It represents the interests of the public and is ultimately responsible for the management of the resources in question. In practice, the authority could be a complex agency. For instance, the authority in an EU context would comprise agencies at a CFP level (i.e. the Council of Ministers, the European Parliament and the European Commission) as well as decision making agencies at a member state level (i.e. national ministries).

The *operator* is an organizational unit of resource users with delegated responsibility to develop management plans and oversee or conduct fishing operations within the standards decided by the authority. It could be an organized group of fishermen fishing for the same type of resource in a given area.

The *auditor* is an organization with a competence in evaluating the extent to which specific and measurable policy objectives, as pursued within management plans developed and implemented by operators, are met. To enhance the legitimacy of the management system, it is generally recommendable to arrange for institutional independence of the auditor from both the authority and the operator. This is particularly important if there is a low degree of trust between the latter, but is also a way to prevent that authority–operator relationships are skewed by conflicts of interests and a lop-sided distribution of power. Given that RBM can be seen to involve a contract situation between the authority and the operator, an independent audit function enhances transparency and accountability in the management process by evaluating the extent to which each part has fulfilled its side of the contract.

Acting in the interests of the society it represents, the authority is responsible for achieving certain policy goals regarding the resource in question. To enable RBM, the authority needs to define specific and measurable requirements (*outcome targets*) as a way to operationalize its policy relating to the use of a particular resource. Operators may then propose a strategy for achieving these requirements through a suggested set of management measures that they find suitable in the given context. In addition, they must propose a way to monitor the performance of these measures with regard to the requirements. In practice, the operator may cooperate with the authority and relevant expertise about the development of the proposal. A plan of sufficient quality, and which includes a convincing strategy to achieve the requirements, can be approved by the authority and subsequently be implemented by the operators. The plan will serve as a contract between the authority and the operators. As specified in the contract, the

operator is responsible for collecting information, and it may contract research services to this end. The information will be analyzed by an auditor. Based on the auditor's report, the authority may for instance request modifications of to the existing plan or reward achievements.

3.1. Defining acceptable impact: Specific, measurable and controllable outcomes

RBM requires that policy objectives are made explicit such that (a) responsibility for achieving them can be meaningfully delegated to operators and (b) the extent to which they are achieved can be assessed. For our purposes, it is convenient to term such specific, measurable and controllable requirements *outcome targets*.

Setting outcome targets implies that minimum or maximum bounds for acceptable performance are defined in terms of appropriate indicators. A given RBM strategy should only involve requirements that operators are actually in a position to achieve. For instance, a fisheries policy might include objectives for employment or profitability. Depending on how such objectives are translated into explicit requirements, however, operators may not be able to ensure their achievement. In that case, the responsibility for achieving such requirements cannot meaningfully be delegated to operators and should remain with the authority.

It is an advantage to seek a direct relationship between policy goals and outcome targets. For instance, if the objective is to achieve “biological sustainability” of a stock, it is better that this objective is made explicit in terms of a SSB level than a TAC level. In this example, the TAC is merely a means to achieve sustainability, which is more precisely expressed in terms of SSB. Further, TACs must typically be updated annually, while outcome targets in terms of SSB may require less frequent adjustment. In this way, defining outcome targets in terms closely related to what one wishes to achieve ensures flexibility of means as well as a longer planning horizon.

3.2. Granting flexibility of means

Much of the potential of RBM to lead to improvements relates to operators' proximity to a practical context, which allows them to innovate and implement local solutions. In a given fisheries management context, there will be basic legal constraints that are difficult to remove or change. However, to be worth pursuing, RBM must begin from a minimum of regulations in order to grant operators flexibility required to develop efficient solutions. To continue with the above example: if outcome targets are specified in terms of TAC reductions, this reduces the scope for operators to come up with alternative management measures. It is worth

noting that experience from other contexts have shown that a focus on accountability for results, without granting the operating agency flexibility to do things differently may easily lead to disappointment as RBM in such cases degenerates into a mere reporting exercise [9].

3.3. The operator's burden of evidence

In the suggested form, RBM involves a 'shift in burden of evidence' such that resource users are requested to document the sustainability of their activities in return for a permission to fish [17,20,22]. In this context the notion "burden of evidence" is more appropriate than "burden of proof. While it would be nearly impossible for resource users to "prove" the sustainability of their practices, authorities can request them to provide documentation of a certain standard. This would typically imply cooperation between the resource users and relevant experts. Under a cost recovery regime, and when carrying the responsibility for documentation as a condition for being allowed to use the resource, the operator has an incentive to find efficient ways to minimize research costs [23–25]. One way to achieve this might be that the resource users themselves participate in data-collection [26].

3.4. Comparing RBM to a standard model of fisheries management in the CFP area

The generic nature of the presented model allows it to be adapted to a given fisheries context, with relevant local entities serving in the respective roles of authority, auditor and operator. In the subsequent section, some of the versatility of the model is illustrated based on empirical examples. First, however, it is important to explain how RBM differs from current management practices. This is important because RBM as a reform instrument acquires its identity in opposition to an established system. As the proposed RBM model has taken its starting point in the ideas formulated by the European Commission, it is relevant to explore how it differs from a standard model of fisheries management in the CFP area.

Fisheries management in the European Community is, as the Commission pointed out in the Green Paper, generally centralized and "top down". While main policies and regulations are being decided in common, implementation and monitoring is generally left to individual member states. In principle the main biological objective pursued is to keep stocks above MSY levels [27]. Annual management decisions focus on TAC levels for single stocks and are based on stock assessment and advice performed within ICES [28,29]. The stock assessments are based on data collected by member states or obtained through international data collection programmes. Most stocks are managed by way of a combination of TACs, gear and area restrictions, effort limits, and minimum landing sizes. Fishing activities are subjected to a number of regulations that specify how much, where, how, what, when and with which gear one may fish.

These brief characteristics are intended to capture, in a simplified way, the standard approach to fisheries management within the CFP, in order to compare it to the described RBM model. The CFP model has structural elements in common with the RBM model: the management process is oriented towards achieving specific objectives, which are related to relevant indicators (MSY related reference points defined in relation to F or SSB) and performance regarding those objectives is assessed regularly (annual stock assessments) as a basis for decision making. But the two others defining features of the RBM model are absent as the burden of evidence generally remains placed with the management authority [20,21] and as resource users have little or no flexibility regarding management measures and regulations.

4. Results based fisheries management at different organizational levels

When the Commission in 2009 proposed RBM as an approach suitable for reforming the CFP it could draw on a limited number of practical cases, both within and outside the EU, where such an approach had been deployed. Some of these cases had been explicitly developed according to a notion of RBM [18,30]. Other cases bear strong structural similarity to the model of RBM proposed here, despite being identified by different labels [23,26,31–39]. Such cases are useful in considering how the theoretical entities and functions in the model can be translated into a practical setting. How, for instance, can actual policy goals, serving specific functions within the CFP, be turned into outcome targets of an RBM system? What does it take for a group of fishermen to make the leap from a micro-managed environment of the CFP to become competent co-managers within an RBM system? How can the division of responsibilities between authority and operator, essential to the RBM model, be adapted to work within the CFP, where the responsibility for resource conservation is vested in EU institutions and cannot be formally delegated?

Two cases are described and compared in order to address these issues. The cases are chosen to illustrate RBM in fisheries that differ on a range of important dimensions. The first case, Catch Quota Management, has emerged as a pilot project within a CFP context. This is a case of RBM on a vessel basis: the vessel is granted an additional catch allowance, provided that it also accepts an additional "burden of evidence". Here, limited resource management responsibility is delegated to resource users, and no collaborative organizational work and planning by resource users is involved. The second case, New Zealand Rock Lobster management, involves substantial delegation of management and research responsibility to resource user organizations regarding a resource of high commercial importance. Here, industry organizations have acquired a significant role of in resource management on national and regional levels in the course of decades. Taken together, the two cases illustrate that the concept of RBM represent a flexible and versatile approach, spanning from limited to substantial involvement of resource users in management and research processes.

4.1. Catch quota management with CCTV

In recent years, several RBM inspired approaches have been initiated within a CFP context. Two notable examples include the instrument of 'catch quota management' as opposed to management focused on landing quotas, and the opportunities for member states to obtain additional effort allocations within the EU's "long term management for cod" provided that they documented "cod avoidance" in specific fisheries [18]. The former example will be used to illustrate RBM at a vessel level.

Catch quota management (CQM) involves management and documentation of catches (which include discards) as opposed to management and control of landings. Proposed by the Danish government, a CQM system was first tested in Europe in the years 2008 and 2009 in a pilot project, which involved remote electronic monitoring of the catches of six Danish vessels fishing for cod [30]. The project has been continued and extended since then, and other CQM projects have been carried out in the Scotland [40], England [41] and Germany. The catches of the vessels participating in CQM were continuously filmed by Closed Circuit Television cameras (CCTV), and the images were later used to estimate discard volumes and catch compositions. The main incentive for fishermen that wished to enter the CQM scheme was that the catch quota they received for the target species (cod) would be higher than the landing quota they would otherwise obtain.

The CQM system comprises RBM features. An acceptable limit is specified for each vessel (the catch quota), and then it is up to the vessel operator to document that operations are within the limits. In practice, the documentation requirement involves an obligation of ensuring continuous monitoring of catches and discards by CCTV as well as extended requirements for reporting fishing activities in electronic logbooks. In addition to provide a possibility to monitor the catch limit of the vessel, the documentation can potentially be utilized to enhance stock assessments. Importantly, CQM creates an incentive for the fishermen to reduce catches below the legal landing size in order to maximize the revenue from the catch quota [30]. Proponents of CQM argue that technical regulations (such as restrictions on gear types and allowed effort) can be simplified or removed within a CQM framework, and that it can reduce the need for costly inspections at sea [42]. The potential for deregulation and relaxation of controls has, however, to our knowledge not been utilized within CQM in the CFP area.

4.2. Management of commercial rock lobster resources in New Zealand

The management of rock lobsters (*Jasus edwardsii*) in New Zealand has been described as a case where ‘devolved governance’ or ‘co-management’ has evolved within a formalized and rights based resource management system [34,35,43]. This case will here be considered as, and serve to illustrate, a comprehensive RBM approach, where an industry organization has assumed substantial responsibility for management and research regarding a significant commercial resource on a national level. A pivotal event for this outcome occurred in 1990, when rock lobster resources shifted from being primarily managed through a limited entry system to become included in New Zealand’s ITQ system, i.e. the Quota Management System [44].

ITQ proponents contend that secure property rights in fisheries provide incentives for quota holders to, in the words of Scott [45]: 305, “take more long run interest in the betterment of “their” fish stock”, and to develop “fish stock managing coalitions” in pursuit of management goals. While ITQs remain controversial (see e.g. [46]) such tendencies have been observed in relation to some New Zealand fisheries [23,33,37,38,47], not least with regard to the role of the commercial rock lobster fishery organizations in management and research [31,34,35,48]; Daryl Sykes. Pers. Comm. 2013.

Another important event that contributed to the development of a strong role of commercial rock lobster fisheries in management and research was that research contracts became contestable in the mid-1990s, opening for the possibility for commercial stakeholder organizations to bid for assessment related research contracts with the government [34]. As a final point, an amendment of New Zealand’s fisheries act in 1999^c created a legal basis for delegating responsibility for research and management functions to Approved Service Delivery Organizations.

For the present purposes, it will suffice to focus on a few details of the resulting rock lobster management system.^d The industry’s participation in management of rock lobster stocks and fisheries in New Zealand involves cooperation between regional and national levels. New Zealand’s rock lobster resources are divided into 9 management areas. In each area, commercial harvest strategy decisions are made in a CRA Management Advisory Committee

(CRAMAC—CRA being the acronym for rock lobsters), comprising quota share owners, processors, exporters, and fishermen of rock lobsters. The CRAMACs in turn participate in a national association, the New Zealand Rock Lobster Industry Council (the NZ RLIC). In the course of recent decades, the NZ RLIC and individual CRAMACs have taken on considerable responsibility in management and research activities. The industry’s motivation for participating in the management has been to improve the management of the resources (and hence the value of their resource shares) and to exert greater influence on the management process run by the Ministry for Primary Industries (MPI). In addition, the cost recovery regime in New Zealand has encouraged the industry to find ways to enhance the cost-effectiveness of management and research processes [24,25]. In practice the industry has hired scientific consultants who helped them to develop harvest strategies. Aiming to rebuild stocks and enhance profitability, stakeholder groups developed decision rules for setting catch limits for two stocks in the 1990s [31,49]. The decision rules contributed to the rebuilding of the stocks [49] and similar approaches are now used for seven CRAMACs. Such harvest strategies are in some cases oriented towards achieving MEY, with stock levels above the statutory requirement that stocks should move to, or be at or above B_{MSY} [48]. In some CRAMACs, the harvest plans implied that the industry refrained from harvesting the full commercial allocation (Total Allowable Commercial Catch—TACC) in order to build stocks to more productive levels [31].

Consultants have supported the development of a sampling protocol connected to an advanced electronic logbook system. This has enabled the collection of data of high quality from the fisheries in some CRAMACs at a relatively low cost. Since 1997, the NZ RLIC has been contracted by MPI to provide assessment related data for rock lobster stocks. This remains a special case in New Zealand, where assessment data have been typically collected and analyzed by contracted research institutions, with the National Institute of Water and Atmospheric Research being the main provider of these services. The assessments are subsequently reviewed in a technical working group process, which is facilitated and overseen by MPI and which is open for participation by all stakeholders and can accommodate information provided by the latter [50,51]. The latest available assessments indicate that New Zealand Rock lobster fisheries are performing well overall although the status of stocks in two CRAMACs is uncertain [52]. Quota prices and export revenues reflect a highly profitable industry.

4.3. Comparing RBM like arrangements at different scales

It has been illustrated what the proposed concept of RBM might involve in practice. The purpose is not to evaluate the performance of RBM in the two presented cases, but to illustrate the versatility of RBM as a management approach at different organizational scales^e Table 1.

In CQM, the organizational unit of the operator is an individual vessel. The defined acceptable limit for each vessel is its catch quota. The vessel is free to maximize its economic performance within this limit as long as it delivers required documentation (video records of catches and extended electronic logbooks). In this case, the documentation is analyzed and assessed by an external agency (organized by the researchers that conduct the CQM experiments). Potentially a range of regulations (e.g.

^c Fisheries Act 1996; Part 15 A. (<http://www.legislation.govt.nz/act/public/1996/0088/latest/DLM394192.html>).

^d This section builds on [31,34,35,48], and extensive interviews (in April 2012) with Daryl Sykes, who is the executive officer of the NZ RLIC, as well as information presented at the NZ RLIC’s homepage (<http://www.nzrocklobster.co.nz/rl-home>—last visited 30.07.2013).

^e In a CFP context, RBM has much in common with, and is motivated by similar rationales as the suggestion to regionalize the CFP (e.g. [53–56]), which notably includes rationales related to the notion of subsidiarity. RBM differs from some models of regionalization as it implies delegation of responsibility to resource users, not to a lower level of public authority. RBM therefore appears compatible with, and is likely to benefit from, regionalization but does not require it.

Table 1

Two cases of results based management in fisheries at different organizational levels. See text for explanation.

	Operator's organizational unit	Outcome target	Operator's burden of documentation	Audit process	Flexibility of means	Incentive mechanism
	CQM with CCTV	Vessel catch quota	In situ: CCTV recordings and extended electronic logbooks	Researchers in CQM project	None at present but intended as part of the CQM concept	Increased catch quota
	NZ Rock Lobster management in New Zealand	MSY proxy	Ex situ: Assessment data; cost recovery (notably including assessment and control related costs)	Open assessment workshops	Harvest plans to achieve stock levels $\geq B_{MSY}$ some harvest plans have a MEY focus	Property rights secure operators claims to economic gains from well managed fishery; enhance cost-effectiveness of management and research (due to cost recovery); ownership in management process

regarding effort limits and gear specifications) could be removed within CQM, granting operators additional flexibility as long as their operations are documented to adhere to set limits.

The operator in the case of rock lobster fisheries management in New Zealand entails a nested system consisting of a national industry organization (the NZ RLIC) in cooperation with a set of regional industry organizations (CRAMACs). Each CRAMAC is involved in the management of a specific rock lobster stock, and has the opportunity to decide on maintaining a level of stock abundance consistent with the statutory requirement of meeting B_{MSY} . In some CRAMACs, the industry has developed harvest control rules in cooperation with contracted expertise, and fishermen participate in data collection for stock assessments [35]. While the overall management authority remains with the MPI, the industry exerts influence to promote timely and cost-effective decision-making.

CQM involves what Fitzpatrick et al. [17] refer to as RBM with “in situ” documentation; the vessels are monitored directly with respect to the indicator in terms of which specific limits have been defined (catches/vessel catch allocation). In contrast, the management of Rock Lobsters in New Zealand involved ex situ documentation: The question whether a given Rock Lobster stock is within the statutory requirements of B_{MSY} cannot be measured directly but requires a stock assessment that utilizes data provided by the industry. As pointed out by Fitzpatrick et al. [17] the drawback of ex situ monitoring is that there is a time lag between activities and the possibility to monitor outcomes. Another drawback is that there potentially are a range of factors (e.g. environmental factors) which are beyond the operator's control and which could influence the performance of the management with respect to the objective in question. Depending on the quality of documentation provided by operators, it may not be possible to differentiate between adverse environmental conditions and the effect of implemented management measures.

In New Zealand, a main resource management requirement is that stocks are managed to, and/or are maintained at or above B_{MSY} . In assuming responsibility for management of rock lobster resources, the industry must enable this objective. In turn, a vessel participating in the CQM project must document that its catches do not exceed its annual catch quota. Keeping stocks at or above B_{MSY} reflects a policy goal that is on a higher level than that of complying with an individual catch quota; the latter is a mean to achieve the former. Assuming responsibility for a stock objective like B_{MSY} requires considerable capacity for planning, management and documentation. However, this responsibility also grants operators flexibility to arrange for more cost effective management and research processes, and it comes with an enhanced sense of ownership in these processes.

CQM, in turn, works through a clear and immediate incentive mechanism. In CQM, fishermen can maximize the revenue from their catch entitlements while reducing unwanted catches. This incentive structure replaces an incentive system that encouraged

destructive practices (legal discarding as well as illegal high-grading). CQM potentially allows for deregulation as long as individual vessel document that defined catch limits are respected, but it does not in itself involve collaborative efforts by resource users in planning and optimization of the resource use.

5. Discussion: Rationales and challenges for RBM in fisheries

The Commission's Green Paper identified RBM as a strategy for avoiding micromanagement by making the industry responsible for achieving defined objectives, but left the concept open for interpretation. RBM in fisheries can take on different shapes, depending on, among other things, the organizational level of the operators involved.

On a vessel basis, some experience has been made with RBM in Europe in the form of CQM with CCTV. The outcomes have generally been reported as positive and it appears that the concept can be implemented on a larger scale [30,40,42]. As Symes noted [56], however, RBM in the form of management plans developed and implemented by the industry is ‘a largely untested idea’ in Europe. While there are cases of industry initiated management plans, the authors are currently not aware of cases in which the industry has taken responsibility for implementation and research related to such plans within a CFP context. In New Zealand and elsewhere, in contrast, there are cases where industry have initiated fisheries plans, and have taken on significant responsibility in research and management processes.

CQM appears as an immediately feasible way to reduce discard problems in Europe, while enhancing monitoring. Although CQM formally qualifies as an example of RBM, it has limited potential for enhancing management and research processes through delegation of defined responsibilities to resource user organizations. The following section attends to how different governance rationales may be combined in a RBM approach, with a focus on RBM models that involve collective arrangements developed and management by resource users groups. Subsequently, major challenges that can be expected with moving towards RBM in fisheries are discussed. Finally, possibilities for implementing RBM arrangements within the new CFP, which was adopted in 2014, are addressed.

5.1. Integrating state centred, participatory, and market based governance rationales

The state centric or hierarchical model of fisheries management should be recognized as one among several generic approaches within a broader notion of fisheries governance.^f As pointed out by

^f Although it was suggested in another context than resource management, it useful to borrow Renn and Roco's [57]: 157 concise characterization of ‘governance’: “Governance includes the processes, conventions and institutions that determine: How power is exercised in view of managing resources and interests;

Gray [58], participatory and market based approaches to fisheries governance are on the advance. Gray relates this tendency to the experience that the state centric model has not met its objectives successfully in different contexts. It may also be related to a change in emphasis regarding the basic values that underpin fisheries governance; i.e. a shift from representative democracy towards participatory democracy, and from administrative rationality towards economic efficiency [58]. However, the fact that the state centred model nevertheless remains dominant within fisheries governance indicates that this approach not only has weaknesses, but also advantages. It will be suggested here that the recent interest in RBM in Europe as an instrument to deregulate fisheries activities and to delegate responsibility to resource users may be linked to its potential of integrating main rationales from each of these governance modes.

The fisheries co-management literature (see e.g. [59]) describes normative and substantive rationales for delegating management and research responsibilities to resource users. Drawing on ideals of direct or participatory democracy, it may be argued that those affected by certain policy decisions should also have an opportunity to voice their opinion or even participate in decision-making regarding such policies. Participation by affected parties is expected to enhance the legitimacy and compliance to a given policy [60]. A substantive rationale for including resource users in decision-making is to benefit systematically from experience based knowledge in order to secure a broader and potentially more detailed knowledge base for management and implementation.

Seen in isolation, these rationales favour a transition from state centric governance to self-governance by resource users. However, there are also important rationales that underpin state centric fisheries governance. As remarked by Gray [58], the hierarchical or top down model fits well with the notion of representative democracy by which policy making regarding public resources is left to elected leaders (supported by relevant scientific expertise). In practice, ideals of representative democracy may be in conflict with ideals of participatory governance [61]; decisions made within a user group may be internally legitimate but not externally legitimate in larger societal context [60].

RBM represent a compromise between participatory and representative approaches insofar the public authorities remain in control of over-all policy setting and are informed about outcomes through an audit process, while management and implementation responsibility is delegated to a user group level. The case of rock lobster management in New Zealand illustrates how both these governance rationales may be in play simultaneously. In addition, this case deploys rationales relating to market based governance. Being a pioneer of an ITQ system, New Zealand has built its fisheries management system on a market based approach, hereby seeking to enhance the economic output of the fisheries and the cost effectiveness of the management system, while minimizing public costs [44]. As Yandle [34] draws attention to, the rock lobster case is particularly interesting because it illustrates how co-management may develop within a formalized ITQ management system. The participation of rock lobster industry organizations in management and research processes is to a large extent motivated by economic incentives. Through systematic participation in resource planning and data collection, the industry have managed to reduce cost while increasing the economic performance of the fisheries, which in turn is also reflected in higher values of the shares in the fishery [34].

5.2. Challenges with moving towards RBM in fisheries

Mayne [62] suggested that the major challenges with implementing RBM in general can be divided into organizational and technical challenges. Organizational challenges involve difficulties of getting actors interested in, and committed to, the implementation of new practices. Technical challenges in particular relate to obtaining and using relevant information efficiently. Main issues pertaining to both kinds of challenges, as they can be expected to emerge in a fisheries governance context, will be briefly addressed.

On the technical side, a well-known problem in RBM is the goal displacement that arises when operating agencies focus more on documenting measurable outputs than on achieving overall objectives [3,5,63]. This problem underlines the significance of creating incentives for operating agents to achieve overall goals, not just to deliver impressive performance statistics. This challenge relates to how management performance can be measured, allowing for an assessment of whether objectives have been achieved or not. Here, the development and selection of appropriate indicators is crucial [2,64,65]. An extensive review of performance of RBM within the UN agencies suggested that over-complexity of performance management systems is an important significant threat for a successful implementation of RBM [15]: 17. In a case of environmental forestry management, for instance, indicators were selected through a process that involved participation by a range of different stakeholder groups, which were invited to define indicators to represent their concerns. Although an inclusive process, it resulted in a vast number of indicators, that impeded their use in an overall management process [11]. In the case of New Zealand rock lobsters, maintaining stocks above B_{MSY} is the key operational objective that resource users must achieve. Defining more than a few outcome targets may stifle the flexibility that is vital for RBM to be successful, and lead to a different form of micromanagement instead of reducing it.

On the organizational side, Hatton and Schroeder [66] emphasize that performance of RBM ultimately depends on the capacity and commitments of the operating partner. The issue of capacity requires thinking about framing conditions in which effective stakeholder organizations can develop and thrive [43]. In turn, the issue of commitment brings us to the challenge of how to engage operating partners in a RBM strategy. Here the issues of motivation and leadership are focal as they, as Mayne [62] puts it, are part of what fosters a climate in which RBM will thrive. Both the authority and the operators must perceive RBM to have something to offer. A key recommendation for a successful implementation of RBM by Hatton and Schroeder [66]: 431, is therefore to incentivize achievements of results. The incentives for a vessel to participate in CQM are immediately apparent and will be elicited once it is accepted in CQM. This is not the case for the industry lead management of rock lobsters in New Zealand, where economic incentives are linked to the potential of achieving successful and cost-effective management in the long term. In this case, good leadership appears to have been an important factor [35] (see also [37]). Mayne [62] regards strong leadership as a first principle for best RBM practices, but also emphasizes the importance of creating ownership for the different partners involved, and of defining their respective responsibilities clearly.

5.3. Outlooks for RBM in the reformed CFP

Reforming organizational arrangements based on RBM is noted to be a time consuming process that requires commitment and perseverance from all involved parties [15]. In New Zealand, a range of commercial stakeholder organizations have developed the necessary organizational capacity required to take on significant responsibility for management and research processes. This outcome stems from

(footnote continued)

how important decisions are made and conflicts resolved; and how various stakeholders are accorded participation in these processes".

decades of efforts and has involved success as well as failure [43]. A similar process cannot be expected to happen overnight in Europe.

In general, the development of a fully-fledged RBM system seems to comprise the following four conditions: first, an organizational environment that is conducive to active stakeholder participation and strong and consolidated industry cooperation; second, a political and legal framework that allows delegation of management responsibilities to industry partners; third, a strong commitment to the reversal of the burden of evidence, for instance in terms of cost recovery or industry-led data provision; fourth, secure entitlements for resource users, so that long-term gains from industry-led management improvements can be secured for those who make commitments with regard to their realization.

It is fairly obvious that the current CFP framework does little to fulfil these conditions. In addition to the problem of fragmented and uneven development of stakeholder organizations across Member States, the top-down style of micro-management is not conducive to the development of industry partners ready to take on management responsibilities. Whereas the establishment of Regional Advisory Committees (RACs) and the involvement of national and/or transnational producer organizations (POs) in quota management are steps in the right direction, there seems to be a long way to go in developing strong industry partners capable of taking on a comprehensive role as operators in a RBM system. Further, the responsibility for resource conservation, as set forth in the Treaties [67], leaves very little room for delegating management responsibility, be it to regional management bodies or industry partners. Further, there has been little movement in the direction of and cost recovery and of sharing or reversing the burden of evidence. Finally, while there are movements towards ITQ-like systems in some EU fisheries, strong arrangements for securing rights and privileges of resource users are absent in most cases. Resource users, and their organizations may therefore lack sufficient motivation for investing in management and research through RBM like arrangements.

As this suggests, the current CFP framework is not conducive to the development of RBM practices. To the extent that cases with RBM-like features can be found, these are at best partial, as in the cases of stakeholder initiation of management plans or in the implementation of recovery plans, or do not involve RBM in an organizational sense, as in the case of CQM.

To which extent will the current CFP reform be able to change this state of affairs and construct a framework better suited for the RBM model? Given the thrust of the Green Paper, in particular its emphasis on RBM as an approach that could repair the structural weaknesses of the CFP, this appears as a possibility. On the other hand, the CFP is strongly committed to ideas that are incongruous with RBM forms, and previous reform attempts have demonstrated that it does not change easily.

Since it is not yet clear how the reformed CFP will be implemented in detail, definitive answers cannot be given to this question. The final compromise text on the Basic regulation on the CFP [68] and the Market Organization [69], however, include elements on RBM, although in a significantly changed form than the Commission envisaged in its Green Paper:

The new CFP emphasizes the importance of developing multi-annual management plans. As is the case under the existing CFP, such a plan has to be formally adopted by the Council and the Parliament, based on a proposal by the Commission. For each fishery, the multiannual plan will set the objectives and the timeframes by which they should be achieved. In the new CFP, the power to implement the plans will be delegated to a regional level, i.e. to the member states with interests in the fisheries in question, provided that they agree on a joint recommendation of these measures. Instead of involving a relationship between resource users and authorities, the concept of RBM is accordingly

now used by the Commission to characterize the new regionalization aspect of the coming CFP: The CFP institutions will delegate power and responsibility to cooperating member states for achieving the objectives stated in multiannual plans.[§]

However, steps have also been taken that may strengthen the capacity for industry partners to take on responsibilities in management. These include a stronger defined role for POs in the market regulation, requesting them to submit integrated production and marketing plans for their members as a means to contribute to the achievement of the sustainability oriented objectives [69]. Moreover, the basic regulation strengthens the roles of Regional Advisory Councils. While it is difficult to predict what practical effect this will have, these developments seem to allow and invite an increased role for industry organizations in management, particularly with regard to implementation aspects of management plans.

In the coming years, the “obligation to land all catches” stated in article 15 of the basic regulation of the new CFP may prove to be an important element in the reformed policy with regard to RBM like arrangements [68]: 38. Through the RACs, the Commission has invited the industry to take initiatives and propose measures with regard to discards mitigation plans, which formally may be endorsed as joint recommendations of member states concerned. For instance, the Pelagic RAC and the North Sea RAC are working on a range of such plans. The incentive mechanism involved reflects RBM rationales: If the Commission does not receive such plans in time it will implement *de minimis* restrictions on discards, which are likely to be stricter than the measures proposed by member states or industry organizations. With deadlines for discard mitigation plans set for most fisheries, the landing obligation may offer a crosscutting test case and experience basis for RBM arrangements in the reformed CFP.

While this may fall short of the expectations on RBM that may have been created by the Green Paper [70] and does not allow for a formal recognition of an opportunity for operators to propose or implement management plans, there is a move towards RBM like arrangements. With no clear and mandatory initiative on cost recovery, and the fact that development of ITQs are left to the discretion of Member States, it appears that this move is fairly modest. Given the strong legal requirement against delegation of responsibility for conservation issues and the predictable political difficulties in reaching agreement on ITQ and cost recovery, this does not come as a surprise. While the coming CFP does not arrange for RBM in a systematic and formalized sense, it nevertheless comprises some openings for operators to pursue RBM like arrangements in cooperation with member states, mainly as concerns the implementation of management plans and landing obligations.

Acknowledgement

This work is an outcome of the EcoFishMan project (www.ecofishman.com)—a 7th Framework research project that seeks to develop a results based fisheries management alternative in Europe (KBBE; grant agreement nr. FP7-265401). The authors are indebted to project colleagues, stakeholders and external advisors. They are particular grateful to Mogens Schou (affiliated with Danish CQM initiatives), Daryl Sykes (director of the New Zealand Rock Lobster Industry Council), Pamela Maze, Rosemary Hurst and other experts in New Zealand, who generously offered

[§] Presenting the new regionalization aspects of coming CFP at a seminar in Brussels (25.10.13), Ernesto Bianchi, head of Unit in DG Mare, characterized this regionalization arrangement as “management by objectives” (http://ec.europa.eu/fisheries/news_and_events/events/20131025/index_en.htm—last visited 16.11.13).

insights in fisheries management processes in New Zealand and in cases where commercial stakeholder originations have a strong role in management and research.

References

- [1] CEC. Green paper: reform of the common fisheries policy. Brussels: Commission of the European Communities; 2009.
- [2] Degnbol P. Indicators as a means of communicating knowledge. *ICES J Mar Sci* 2005;62:606–11.
- [3] Curristine T. Government performance: lessons and challenges. *OECD J Budget* 2005;5:127–51.
- [4] Hood C. A public management for all seasons? *Public Adm* 1991;69:3–19.
- [5] Binnendijk A. Results based management in the development co-operation agencies: a review of experience. The Development Assistance Committee (DAC) working party on aid evaluation: OECD; 2001.
- [6] Oladele A. RBM-enhanced policy procedures in UNESCO: reflections on a United Nations' management reform strategy. *Int J Arts Sci* 2010;3:174–96.
- [7] Power M. The audit society: rituals of verification. Oxford: Oxford University Press; 1999.
- [8] Martin V, Jobin M. Results-based management: Comparison of the management framework of eight jurisdictions Canadian Public Administration (in French); 2004.47:304–331.
- [9] Moynihan DP. Managing for results in state government: evaluating a decade of reform. *Public Adm Rev* 2006;66:77–89.
- [10] Castro MF. Insider insights: building a results-based management and evaluation system in Colombia. In: IEG, editor. ECD working paper series. Washington, DC: The World Bank; 2008.
- [11] Fraser EDG, Dougill AJ, Mabee WE, Reed M, McAlpine P. Bottom up and top down: analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *J Environ Manage* 2006;78:114–27.
- [12] MOFARFPB. Fort St. John Pilot project review report. Victoria: Ministry of Forests and Range Forest Practices Branch; 2010.
- [13] OECD. Glossary of key terms in evaluation and results Based management. Paris: Development Assistance Committee; 2002.
- [14] UNDG. Results-based management handbook: strengthening RBM harmonization for improved development results. United Nations Development Group; 2010.
- [15] Ortiz, E.F., Kuyama, S., Münch, W., Tang, G. Implementation of results-based management in the United Nations Organizations. Part I. In: Unit JI, editor. Series on managing for results in the United Nations System. Geneva; 2004.
- [16] Weber M. Economy and Society—an outline of interpretive sociology. New York, NY: Bedminster Press Incorporated; 1968.
- [17] Fitzpatrick M, Graham N, Rihan DJ, Reid DG. The burden of proof in co-management and results-based management: the elephant on the deck!. *ICES J Mar Sci: J Cons* 2011;68:1656–62.
- [18] Kraak SBM, Bailey N, Cardinale M, Darby C, DeOliveira JAA, Eero M, et al. Lessons for fisheries management from the EU cod recovery plan. *Mar Policy* 2013;37:200–13.
- [19] Ulrich C, Wilson DCK, Nielsen R, Bastardie F, Reeves SA, Andersen BS, et al. Challenges and opportunities for fleet- and métier-based approaches for fisheries management under the European common fishery policy. *Ocean Coast Manage* 2012;70:38–47.
- [20] Lassen, H., Sissenwine, M., Symes, D., Thulin, J. Reversing the burden of proof for fisheries management. In: 6b SPD, editor. Deliverable No 6b of The SAFNAMS project. Copenhagen; 2008.
- [21] Linke S, Jentoft S. A communicative turnaround: shifting the burden of proof in European fisheries governance. *Mar Policy* 2012;38:337–45.
- [22] Charles AT. The precautionary approach and 'burden of proof' Challenges in fishery management. *Bull Mar Sci* 2002;70:683–94.
- [23] Arbuckle M, Drummond K. Evolution of self-governance within a harvesting system governed by individual transferable quota. In: Shotton R, editor. Use of property rights in fisheries management. Rome: FAO; 2000.
- [24] Harte M. Opportunities and barriers for industry-led fisheries research. *Mar Policy* 2001;25:159–67.
- [25] Stokes TK, Gibbs N, Holland D. New Zealand's cost recovery regime for fisheries research services: an industry perspective. *Bull Mar Sci* 2006;78:467–85.
- [26] Zacharin W, Dixon C, Smallridge M. Towards self-management for the Western King Prawn Fishery in Spencer Gulf, South Australia. In: Townsend R, Shotton R, Uchida H, editors. Case studies in fisheries self-governance. Rome: FAO; 2008.
- [27] Froese, R., Proelß, A. Rebuilding fish stocks no later than 2015: will Europe meet the deadline? *Fish Fish* 2010;11.
- [28] Daw T, Gray T. Fisheries science and sustainability in international policy: a study of failure in the European Union's common fisheries policy. *Mar Policy* 2005;29:189–97.
- [29] Nielsen KN, Holm P. A brief catalogue of failures: framing evaluation and learning in fisheries resource management. *Mar Policy* 2007;31:669–80.
- [30] Kindt-Larsen L, Kirkegaard E, Dalskov J. Fully documented fishery: a tool to support a catch quota management system. *ICES J Mar Sci* 2011;68:1606–10.
- [31] Breen PA, Sykes DR, Starr PJ, Kim S, Haist V. A voluntary reduction in the commercial catch of rock lobster (*Jasus edwardsii*) in a New Zealand fishery. *NZ J Mar Freshwater Res* 2009;43:511–23.
- [32] Dixon, C., Sloan, S. Management plan for the south Australian Spence Gulf Prawn Fishery. In: Australia PlaRS, editor. Adelaide; 2007.
- [33] Mincher R. New Zealand's challenger scallop enhancement company: from reseeded to self-governance. In: Townsend RE, Shotton R, Uchida H, editors. Case studies in fisheries self-governance. Rome: FAO; 2008.
- [34] Yandle T. Sharing natural resource management responsibility: examining the New Zealand rock lobster co-management experience. *Policy Sci* 2006;39:249–78.
- [35] Yandle T. Rock Lobster management in New Zealand—the development of devolved management. In: Townsend RE, Shotton R, Uchida H, editors. Case studies in fisheries self-governance. Rome: FAO; 2008.
- [36] Molares J, Freire J. Development and perspectives for community-based management of the goose barnacle (*Pollicipes pollicipes*) fisheries in Galicia (NW Spain). *Fish Res* 2003;65:485–92.
- [37] Yandle T. The challenger scallop enhancement company: collaborative management of a natural resource based in the private sector. *Public Adm Rev* 2006;148:50.
- [38] Yang Y, Cullen R, Hearnshaw E, Macdonald IA. An evaluation of self-governance in the New Zealand Bluff oyster fishery—the indicator system approach. *Mar Policy* 2014;43:273–82.
- [39] Holmes SJ, Bailey N, Campbell N, Catarino R, Barratt K, Gibb A, et al. Using fishery-dependent data to inform the development and operation of a co-management initiative to reduce cod mortality and cut discards. *ICES J Mar Sci: J Cons* 2011;68:1679–88.
- [40] MS. Report on catch quota management using remote electronic monitoring (REM). Marine Scotland, Fisheries Division; 2012.
- [41] MMO. Catch quota trials 2011—final report: April 2012. Marine Management Organisation; 2012.
- [42] Dalskov J, Olesen HJ, Møller E, Jensen SP, Jensen M, Schultz F, et al. Danish catch quota management trials—application and results; 2012.
- [43] Yandle T. The challenge of building successful stakeholder organizations: New Zealand's experience in developing a fisheries co-management regime. *Mar Policy* 2003;27:179–92.
- [44] Hersoug B. Unfinished business: New Zealand's experience with right-based fisheries management. Delft: Eburon; 2002.
- [45] Scott A. Development of property in the fishery. *Mar Resour Econ* 1988;5:289–311.
- [46] Hoyrup T, Schriewer K. European fisheries at a tipping point. Murcia: Universidad de Murcia; 2012 (Estudios Europeos).
- [47] Yang YW, Frazer A, Rees E. Self-governance within a QMS framework—the evolution of self-governance in the New Zealand Bluff oyster fishery. *Mar Policy* 2010;34:261–7.
- [48] Breen PA. A voluntary harvest control rule for a New Zealand rock lobster (*Jasus edwardsii*) stock. *NZ J Mar Freshwater Res* 2009;43.
- [49] Miller RJ, Breen PA. Are lobster fisheries being managed effectively? Examples from New Zealand and Nova Scotia *Fish Manage Ecol* 2010;17:394–403.
- [50] Starr P, Annala JH, Hilborn R. Contested stock assessment: two case studies. *Can J Fish Aquat Sci* 1998;55:529–37.
- [51] Marchal P, Lallemand P, Stokes K, Thébaud O. A comparative review of the fisheries resource management systems in New Zealand and in the European Union. *Aquat Living Resour* 2009;22:463–81.
- [52] MPI. Fisheries Assessment Plenary—stock assessments and yield estimates. Wellington: The Fisheries Science Group, Ministry for Primary Industries; 2013.
- [53] Hegland TJ, Ounanian K, Raakjær J. Why and how to regionalise the common fisheries policy. *Marit Stud* 2012;11.
- [54] Raakjær J, Hegland TJ. Introduction: regionalising the common fisheries policy. *Marit Stud* 2012;11.
- [55] Symes D. Fisheries management: in search of good governance. *Fish Res* 1997;32:107–14.
- [56] Symes D. Regionalising the common fisheries policy: context, content and controversy. *Marit Stud* 2012 (11:6. 2012:11).
- [57] Renn O, Roco MC. Nanotechnology and the need for risk governance. *J Nanopart Res* 2006;8:153–91.
- [58] Gray TS. Participatory fisheries governance—three central themes. In: Gray TS, editor. Participation in fisheries governance. Dordrecht: Springer; 2005.
- [59] Wilson DC, Nielsen JR, Degnbol P. The fisheries co-management experience: accomplishments, challenges and prospects. Dordrecht: Kluwer Academic Publishers; 2003.
- [60] Jentoft S. Legitimacy and disappointment in fisheries management. *Mar Policy* 2000;24:141–8.
- [61] Biegelbauer P, Hansen J. Democratic theory and citizen participation: democracy models in the evaluation of public participation in science and technology. *Sci Public Policy* 2011;38:589–97.
- [62] Mayne J. Challenges and lessons in implementing results-based management. *Evaluation* 2007;13:87–109.
- [63] Mayne J. Best practices in results-based management: a review of experience. A report for the United Nations secretariat 1. : Main Report. United Nations; 2007.
- [64] Rice JC, Rochet M-J. A framework for selecting a suite of indicators for fisheries management. *ICES J Mar Sci: J Cons* 2005;62:516–27.
- [65] Degnbol P. Science and the user perspective: the gap co-management must address. In: Wilson DC, Nielsen JR, Degnbol P, editors. The fisheries co-management experience: accomplishments, challenges and prospects. Dordrecht: Kluwer Academic Publishers; 2003.

- [66] Hatton MJ, Schroeder K. Results-based management: friend or foe? *Dev Pract* 2007;17:426–32.
- [67] EU. Consolidated version of the treaty on the functioning of the European Union. Official Journal of the European Union. C83/47; 2010.
- [68] EC. Basic regulation on the CFP—final compromise text. (As endorsed by the Coreper meeting of 14 June and submitted for consideration to the PECH meeting of 18 June); 2013.
- [69] EC. Proposal for a regulation of the European Parliament and of the Council on the Common Organisation of the Markets in Fishery and Aquaculture Products. Council of the European Union Brussels, 11 June 2013; 2013.
- [70] Symes, D., Raakjær T, J., Hegland, T.J. Improved governance remains the key to CFP reform. Viewpoint available at: http://www.ifmdk.digitalAssets/51/51868_viewpoint_on_cfp_reformpdf; 2013.