Fisheries Research 187 (2017) 127–138

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Management strategy evaluation in regional fisheries management organizations – How to promote robust fisheries management in international settings

Shuya Nakatsuka

National Research Institute of Far Seas Fisheries, Orido 5-7-1, Shimizu, Shizuoka 424-8633, Japan

ARTICLE INFO

Article history:
Received 13 September 2016
Received in revised form
22 November 2016
Accepted 23 November 2016
Handled by A.E. Punt

Keywords:
Best practice
Management strategy evaluation
Regional fisheries management organization
Stakeholder buy-in
Uncertainty

ABSTRACT

Management Strategy Evaluation (MSE) is a process to develop a management strategy that is robust to uncertainties and appropriately reflects the trade-offs among the management objectives of stakeholders. It is widely recognized as best practice to develop a management strategy for fisheries management and has been implemented in a number of domestic fisheries. In contrast, implementation of MSE in the international fisheries management is limited. In this study, the development of MSE in various (five tuna related and eight other) regional fisheries management organizations (RFMOs) is reviewed and common features among RFMOs that have been either successful or not so successful are studied, mainly from the viewpoint of a decision-maker. Furthermore, challenges specific to RFMOs to implement MSE are discussed. It is found that the complex nature of the governance by RFMOs as an international institute poses unique challenges for implementing MSE, which is not easy even in much simpler domestic fisheries. In addition to further efforts to improve communication with stakeholders to obtain their understanding and commitment to the MSE process, it is suggested that RFMOs take a more practical approach to advance work on MSE, which is to discuss and decide the elements of MSE such as management objectives, their associated performance indicators and the harvest control rules as a package which includes examples of practical options and their differences in performance, rather than having an initial focus on conceptual aspects such as early clarification of objectives, to improve management as soon as practicable.

1. Introduction

In fisheries management, specific control measures for fishing activities ("management measures") need to be developed based on scientific evaluations such as stock assessments and future projections (Hilborn and Walters, 1992). In the traditional approach for the provision of scientific advice, scientists will develop their best estimate of stock status using a base-case model among numerous possible model settings, and build their scientific advice to fisheries managers, such as recommended total allowable catch (TAC) or total allowable effort, based on the results of their best estimate (Butterworth, 2007). Fisheries managers will then decide management measures based on such advice from the scientists. Butterworth (2007) noted several disadvantages associated with the traditional approach, such as variability of best assessments from year to year, lengthy discussions for deciding management measures and the risk of the best assessment being wrong.

Fueled by the wider acceptance of precautionary approach in fisheries management as manifested in the United Nations FAO Code of Conduct for Responsible Fisheries (FAO, 1995), and to overcome the challenges related to the traditional approach for providing scientific advices, management strategy evaluation (MSE, synonym of "management procedure approach"; Rademeyer et al., 2007), is now considered a more robust approach for establishing management strategies for fisheries. This involves identification of management objectives, simulation testing of various candidate management strategies to understand the trade-offs possible among the management objectives, selection of a management strategy and its implementation, and feedback of monitoring data to the simulation model (e.g. Punt, 2006). This approach treats uncertainties effectively and involves all the stakeholders in decision-making. In fact, MSE is now widely acknowledged as the most appropriate way to compare different management strategies (Punt et al., 2016) and has been widely used in either or both a broad strategic sense or to provide specific tactical advice for individual fisheries domestically in countries such as South Africa, the U.S.A, New Zealand, Australia (Punt, 2006) and European Union (ICES,

E-mail address: snakatsuka@affrc.go.jp

http://dx.doi.org/10.1016/j.fishres.2016.11.018
0165-7836/

2013). As Schnute et al. (2007) suggested, MSE is revolutionizing fisheries management in some areas.

The application of MSE is not confined to domestic fisheries but it has also been used in international fisheries management by regional fisheries management organizations (RFMOs); indeed the first practical application of a MSE to resource management was the development of the Revised Management Procedure by the International Whaling Commission (IWC), where the problems of management decisions relying only on the "best" assessment of a stock at a particular time had become particularly evident (Punt and Donovan, 2007). In addition to IWC, an MSE has been successfully used for southern Bluefin tuna (*Thunnus maccoyii*) in the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) (Kurota et al., 2010) and Greenland halibut (*Reinhardtius hippoglossoides*) in the Northwest Atlantic Fisheries Organization (NAFO) (NAFO, 2010d). Further to those two examples, participants to the tuna RFMOs recognized that MSE needs to be widely implemented in the tuna RFMOs to implement a precautionary approach for tuna fisheries management at the third meeting of Kobe Process (Anon., 2011), which was initiated with an intention to better coordinate conservation efforts among the five tuna RFMOs (Inter-American Tropical Tuna Commission (IATTC), International Commission for the Conservation of Atlantic Tunas (ICCAT), Indian Ocean Tuna Commission (IOTC), CCSBT, and Western and Central Pacific Fisheries Commission (WCPFC)) (Anon., 2007). However, after more than five years since the Kobe III meeting in 2011, and despite the widely recognized benefits of MSE and many successful examples, particularly in domestic fisheries, the application of MSE in RFMOs are limited to above three examples including IWC, which contrasts with the more rapid progress in domestic fisheries globally.

The objective of this study is, therefore, to review, from the viewpoint of a decision-maker, the successful examples of MSEs in the RFMOs, namely, in CCSBT and NAFO (the case of IWC is not considered in detail here since that organization is different from a typical RFMO due to its highly political nature as well as very simple structure of harvesting stakeholders compared to RFMOs), and the progress of MSE application in other RFMOs to investigate challenges to implement MSE in the RFMOs. Then, possible approaches to deal with those challenges are discussed. The study focuses on how to improve governance processes to advance MSE in international settings primarily from manager's perspective, rather than to discuss technical aspects of MSE, which has been done in many studies (e.g. Butterworth, 2007; Punt et al., 2016; ICES, 2013).

2. Materials and methods

The principles of management of fish stocks that occur in or migrate through the EEZs of multiple countries and/or high seas are stipulated in United Nations Convention on the Law of the Sea and more specifically United Nations Fish Stock Agreement. Based on those principles, many RFMOs were established to manage international fisheries regionally. They can be conveniently divided into the tuna RFMOs managing highly migratory species and the RFMOs managing other species. These RFMOs usually have Commission meetings to make decisions and a subordinate scientific body to provide scientific advice to the Commission, as necessary for their decision-making.

For this study, the reports of the Commission meetings, scientific committee meetings and other relevant meetings of all of the five tuna RFMOs (IATTC, ICCAT, IOTC, CCSBT and WCPFC) and the other eight major RFMOs (Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR),[1] International Pacific Halibut Commission (IPHC), NAFO, North East Atlantic Fisheries Commission (NEAFC), North Pacific Fisheries Commission (NPFC), South East Atlantic Fisheries Organization (SEAFO), South Indian Ocean Fisheries Agreement (SIOFA) and South Pacific Regional Fisheries Management Organization (SPRFMO)) were reviewed, and discussions related to MSE development were extracted and then compared to find common aspects.

3. Results

3.1. Current status of MSE development in the RFMOs

A summary of the MSE development in the RFMOs is provided in Table 1. At least some work related to MSE has been in progress in all the tuna RFMOs, CCAMLR, IPHC, NAFO, and SPRFMO. On the other hand, no MSE-related progress was found for NEAFC, NPFC, SEAFO and SIOFA from the literature search.

3.2. Review of the two RFMOs which had successfully completed an MSE (CCSBT and NAFO; Table 1a and b, respectively)

Both of the two fish stocks for which an RFMO had completed MSE, namely, southern bluefin tuna and Greenland halibut, had faced a severe challenge of international fisheries management before the development of an MSE commenced. In case of CCSBT, a difference of views on the interpretation of indices of abundance which were key to the stock assessment and estimated stock status resulted in a failure to agree on the catch limit for many years, eventually rendering the matter an international legal dispute to be handled at the International Tribunal of the Law of the Sea and then an Arbitral Tribunal (Kurota et al., 2010). As a result of the ruling by the Tribunal that the matter should be resolved within CCSBT, the members of CCSBT (guided particularly by an independent scientific panel they had appointed to assist their scientific committee in achieving consensus) decided to start the process of developing management procedure (CCSBT, 2000a),[2] which was in effect an MSE. In case of Greenland halibut in NAFO,[3] the Commission had adopted a rebuilding plan for the stock because its status had reached a historic low level (NAFO, 2003). However, the TAC for this stock had been exceeded substantially thereafter for many years although fishing effort had been reduced (NAFO, 2007b). NAFO consequently decided to use MSE for Greenland halibut to conduct a comprehensive analysis of the performance of rebuilding strategies for the stock, including the one in place at the time (NAFO, 2008). Therefore, in case of those two RFMOs which were confronted with major challenges in international fisheries management, it can be said that the decision-making body of the RFMO (the Commission), needed a novel way to overcome such challenges, which resulted in the implementation of a MSE.

Another shared aspect of the MSE in CCSBT and NAFO is that the both MSEs were conducted to evaluate various management strategies to achieve a stock rebuilding program (Kurota et al., 2010; Butterworth and Rademeyer, 2010). As discussed further later, determination and operationalization of management objectives is a critical part of an MSE but it can be a difficult task particularly in the RFMOs. In the case of the two successful examples, how-

[1] According to its website, CCAMLR's objective is to conserve Antarctic marine life and its characteristics may be different from other RFMOs. However, considering its role for the management of fisheries activities in the Antarctic, in this study it is treated as an RFMO.

[2] "Management strategy", "management procedure" and "harvest strategy" are treated as inter-changeable in this study. The term "management strategy" is used primarily but the other terms are also used if that is the specific term used in a particular organization.

[3] In Subarea 2 and Divisions 3KLMNO.