CHARACTERISTICS AND CHANGES OF TRAWL FISHERY MANAGEMENT INSTITUTION IN THE GREAT BARRIER REEF, AUSTRALIA

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ABSTRACT

Fisheries management institutions vary along a continuum from centralized to self-regulation systems. Nowadays, the importance of self-regulation by fishers or co-management by the government and fishers has been emphasized. However, the centralized system is not necessarily inferior to self-regulation. If fishers' voluntary activities are induced by pressure of centralized management by the government and complement legislative rules, this new institution may become more effective in achieving its purposes. This study aims to explore this through a case study of trawl fisheries management off the eastern coast of Queensland, Australia. The Queensland east coast trawl fishery operates principally in the Great Barrier Reef (GBR), which is listed as a World Heritage Area by UNESCO. Fisheries operating in this area are managed under a typical centralized management system by the Queensland State Government and the GBR Marine Park Authority (federal authority). Fisheries management plans were drafted by the Queensland State Government, supplemented by GBRMPA and revised by stakeholders through a public consulting system in 1999 and 2000. Therefore, this system is supposed to be in a consultative stage. However, the important point is that such an exogenous regulation induces or stimulates endogenous activities of fishers. After establishing management plans, spontaneous activities to set up self-rule like codes of conduct of inshore trawl fisheries in Cairns and Morton Bay have started in places. Furthermore, "EMS" (Environmental Management System) initiative to standardize and facilitate such self-regulation has been carried out by interest groups. It is expected that such voluntary activities by fishers will provide individual fishers with necessary information and opportunity to participate in fisheries management, and make it more feasible and practical.

Keywords: fisheries management, self-regulation, co-management, Australia,

INTRODUCTION

The fisheries management system in the Great Barrier Reef (hereafter GBR) area which I look at in this paper is a typical top-down type one. The GBR area is listed as a World Heritage Area (hereafter WHA) of UNESCO because of its great natural value and is managed as the Great Barrier Reef Marine Park (hereafter GBRMP). On the other hand, as diverse and abundant fisheries resources occur within and nearby the GBR, various fisheries operate there. Both natural value as a WHA and industrial value created by fisheries are concerns of the coastal community. Therefore, striking a balance between protection and utilization becomes important. The management system in the GBR has to meet this challenge. At the same time, it becomes necessary for users to participate in the management process in order to collect the practical information and encourage users to cooperate with the management (e.g. Mikalsen and Jentoft 2001). The fisheries management plan off the east coast of Queensland including the GBR was established in 1999 through a top-down decision-making process and a public involvement system. It seems that the characteristics of fisheries management in the GBR primarily result from this top-down management style. Besides, these come from fishers' voluntary activities which have occurred by the management plan and are about to collaborate with top-down management.

This study aims firstly to examine the institutional characteristics of the fisheries management system in the GBR through the case study of the trawl fishery. Furthermore, the implication of changes caused by collaboration between the legislative regulations and fishers' self-regulations is explored. Here, an institution is defined as a rule which regulates humans' activities including not only explicit regulation but also written or unwritten self-rules, as mentioned later. Besides, a rule consists of rules to regulate human's activities and rules to constitute these rules and enforce them. Therefore, a layer structure of rules constituted through fisheries management is looked at. Furthermore, as institutions are formed by organizations, the interaction between institutions and organizations is explored.

THEORETICAL BACKGROUND

In terms of governing or managing appropriation of commonly used resources, especially Common Pool Resources (hereafter CPR), it has been shown by numerous case studies (e.g. Ostrom et al. 1994) that self-management by

users or co-management with users and government is superior to centralized management by government. Therefore, decentralization or delegation of authority becomes necessary to govern the CPRs properly. With regard to fisheries management, the concept of community-based management and co-management is proposed as a typical system of these (Jentoft 1987). The point is that users need to participate in decision-making of management or decide management schemes by themselves. This is because users can hold much information necessary for management and enforcement can be carried out effectively that users' participation is inevitable to govern CPRs. However, user-led management is not always superior to government-led management. Depending on the situation, it can be difficult for users to lead in governing CPRs. For example, when users are homogeneous or only a few, user-led management will be easy. Conversely, when users are heterogeneous or indefinite, it will become harder. Furthermore, when there is some discipline necessary for the management of the resources, it is difficult to achieve user-led management. In that case, top-down style management by government needs to be applied to the situation under proper organizational arrangement (Lane and Stephenson 2000). In regard to responsibility sharing between government and users, Sen et al. propose five stages between Government based management and user group based management: instructive, consultative, cooperative, advisory and informative (Sen and Nielsen 1996). In any case, as user participation is necessary as mentioned above, it becomes important at which process and how users participate in the management system.

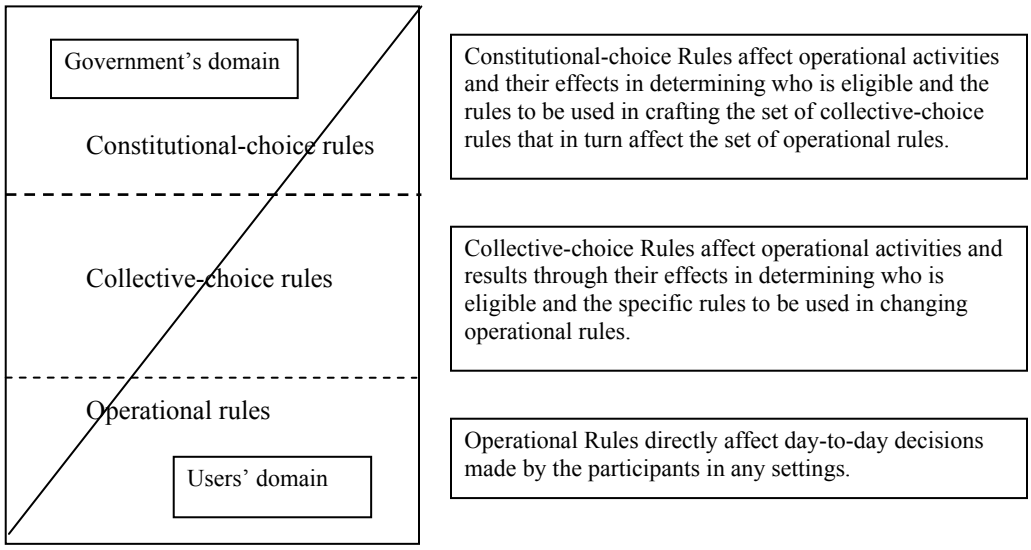

Fig. 1 Image of responsibility for sharing fisheries management
The explanations of rules of right-hand side are from Ostom et al. 1994.

Management systems consist of institutions and organizations and their interaction[1]. According to North, institutions are defined as the rules of the game in a society or the humanly devised constraints that shape human interaction. Furthermore they consist of formal written rules as well as typically unwritten codes of conduct that underlie and supplement formal rules (North 1990). Considering the level of decision-making and characters of rules, rules are separated into three levels: constitutional-choice rules, collective-choice rules and operational rules, as indicated by Ostrom et al. (1994) and illustrated in the right hand side of Fig. 1. Organizations are the players of the game and rule-makers at times and consist of government, users and other stakeholders. How each player participates in the game, especially how they take responsibility for the game, is differentiated depending on the rule level. Fig. 1 illustrates the image of responsibility sharing between government and users. The upper rule level indicates a greater proportion of government's responsibility. In turn, it appears that in the upper rule level there is a higher proportion of written rules and vice versa. Furthermore, governing process of fisheries management is divided into three monitoring processes: ante-monitoring, interim-monitoring and post-monitoring, depending on attributes of

[1] In terms of institution, there are a lot of studies and definitions from the viewpoint of fisheries management (e.g. Jentoft 2003).

management activities[2]. At each stage, interaction between institutions and organizations is different (e.g. Hidaka 2002). Presuming this structure of institutions, it will become easier to analyze management systems and further compare different systems. In a later section, the management system of trawl fishery in GBR is analyzed for each monitoring process.

THE GBR, TRAWL FISHERY and MANAGEMENT

The GBR

The Great Barrier Reef is located off the east coast of Queensland in Australia. It extends around 2,000 km along the coast and is 32 to 260 km in width, and has an area of 350,000 square km. Within that area, around 600 islands, 300 coral cays and 2,900 reefs occur (GBRMPA 1998). Also diverse flora and fauna occur within it. This abundant natural environment provides significant fishing resources.

To preserve the natural value and facilitate appropriate utilization, the GBRMP has been constituted based on the Great Barrier Reef Marin Park Act 1975. As a management body of the GBRMP, the Great Barrier Reef Marin Park Authority (hereafter GBRMPA) has been established by this act as well. The GBRMPA is the authority which is delegated by the Australian Federal Government, but has powers to some extent independent from the Federal Government. Its fundamental principle for management is ecologically sustainable development. The GBR area has been also listed as a World Heritage Area (WHA) since 1982. Criteria to be listed as a WHA involve obligations of identification, protection, conservation and presentation. The GBRMPA has to satisfy huge requirements in conserving the natural heritage and natural resources.

Jurisdiction concerning management of the GBR is shared by the Federal Government and the Queensland State Government. The jurisdiction concerning marine park management is placed on the GBRMPA as mentioned above. On the other hand, the jurisdiction of fisheries operating off the eastern coast of Queensland including the GBRMP area belongs to the Queensland State Government (Department of Primary Industry, hereafter QDPI). This jurisdiction sharing between two Governments is prescribed by the Offshore Constitutional Settlement (OCS) in 1979. Besides, practical responsibility sharing between QDPI and GBRMPA is prescribed in the Memorandum of Understanding (MOU) between two agencies.

Trawl fishery in the GBR

The fishing ground of trawl fishery exists off the eastern coast of Queensland, out of which around 70% is included within the GBRMP area. Its fishing gear is demersal otter trawling, whose nets used frequently are triple or quad-towed nets. Targeted fish are mainly tiger prawns, endeavour prawns and saucer scallops. The proportion of prawns is high and amounts to over 70% of the total catch, as indicated in Fig. 2.

[2] These monitoring processes are used proposed in Relational Financing as processes governing bank by Aoki (2001). The governing of snow crab trawl fishery management in Japan was investigated according to these processes by Hidaka (2002).

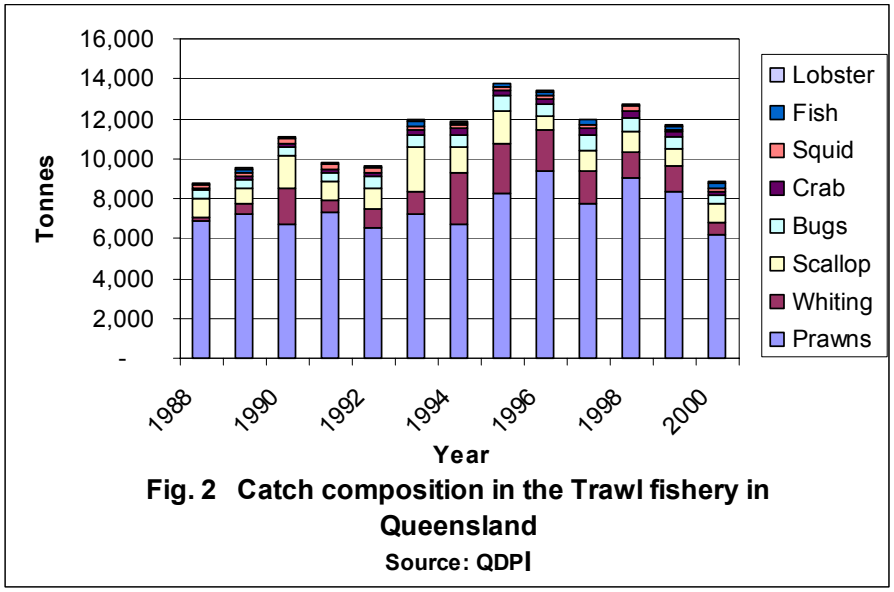

Fig. 2 Catch composition in the Trawl fishery in Queensland

Source: QDPI

In terms of the production, it had increased since it started in the 1950s and reached a peak of around 30,000 tonnes in 1964. After that, it had decreased to the lowest production of around 8,800 tonnes in 1988. After the bottom, as illustrated in Figure 1, it had gradually increased to the second peak of 13,800 tonnes in 1995. After the peak, it has been decreasing again. The present level is 8,891 tonnes in weight and AU$ 102 million in value in 2000. The number of trawl fishing companies had increased since the 1950s and reached the peak with 1,400 boats in 1980. After that, it has been decreasing and reached 538 licences and 519 boats in 2002.

The problems to be resolved in the trawl fishery management are overfishing, excess effort, over-capitalization and impacts on the environment (Huber 2003). Overfishing is indicated as long term decrease from the 1960s. The present production is less than one third of the peak. The main reason appears to be excess effort like the number of boats or fishing days. These cause unnecessary size of vessels and power of engine and so-called overcapitalization (ACIL Consulting 2000). These three factors are connected with each other. Impact on the environment means the damage to ecosystems in the GBR. These include by-catch and discard of untargeted fish, incidental catch of listed species to be protected, benthic habitat impacts and trophic level impacts.

The history of the trawl fishery management plan

Trawl fishery regulation in QLD was traditionally done to restrain or reduce the fishing effort based on the fishing licence system (Zeller 2002). The first regulation for trawl fishery was a freeze on further vessels entering the fishery in 1979 to meet rapid increase of vessels. The next ones were that unitisation and the 2:1 replacement scheme on licences in 1983, twelve month total freeze in 1988 and 2:1 unit replacement policy in 1990.

It was after the establishment of the Fishery Act in 1994 that comprehensive fisheries regulations were introduced as a management plan to trawl fishery. The Fisheries Act aims to seek to apply and balance the principles of Ecologically Sustainable Development[3] and promote it based on the precautionary principle. ESD initiative was introduced in the early 1990s by the Federal Government as national policy. The Fisheries Act is based on this ESD principle. To complement and embody the Fisheries Act, the Fisheries Regulation was set up in 1995. These two legislations provide the framework to set up fisheries management plans including trawl fishery, as mentioned later.

The trawl fishery management plan was established in 2000. Before the establishment, the Trawl Management Advisory Committee (hereafter MAC), which is set up by the Fisheries Act and consists of experts in fishing, processing, conservation, enforcement, scientific and GBRMPA, proposed a Discussion Paper in 1996 for a trawl management plan. Based on this, a Draft Management Plan was formed by QDPI and released for public comment and public port meetings in 1999. Through such public involvement process and discussion within the Trawl MAC,

[3] In the Fisheries Act, ecologically sustainable development is defined as that using, conserving and enhancing the community's fisheries resources and fish habitats so that the ecological processes on which life depends are maintained and the total quality of life, both now and in the future, can be improved.

the draft plan was amended and the Fisheries (East Coast Trawl) Amendment Management Plan 2000 (hereafter the Trawl Plan) was drawn up and put in place in 2001.

Contents of the Trawl Plan

This Trawl Plan basically aims to achieve ecologically sustainable development. Practically, the four objectives are indicated as followings:

- Managing the fisheries in a way that gives optimal, but sustainable community benefit
- Ensuring fisheries resources taken in the fishery are taken in an ecologically sustainable way
- Ensuring the sustainability of the fishery's ecological systems
- Providing an economically viable, but ecologically sustainable, trawl fishery

Main points are ecological sustainability and economic viability, but the former seems to be prior to the latter. Measures to achieve these objectives and review events are also listed in the Trawl Plan.

Regulation methods include effort regulation, spatial closures, gear restrictions and products limits. Effort regulation includes capping and reducing effort to the 1996 level and a voluntary licence buyback and licence surrender removing about 260 boats. Spatial closures are permanent closures to trawling, seasonal closures, a complex array of closures and rotational closures. These closures are closely connected with GBRPA management. Concerning these closures, to allow automated monitoring of fishing vessel operation, installation of vessel monitoring system (VMS) technology using the satellite system is mandated to all vessels. Gear restrictions mean limits on fishing gear and maximum engine power of fishing vessels. Specifically, Bycatch Reduction Device (BRD) and Turtle Exclusion Device (TED) are required on all nets. Products limits cover designated targeted species, and possession and size limits on several by-product species. Targeted species are crustaceans like prawns, crabs and bugs, mollusc like squid and scallop. To monitor fishing activities, specifically use of fishing grounds and the products caught there, a logbook program is introduced.

TRAWL FISHERY GOVERNING PROCESS

Ante-monitoring process

The ante-monitoring process involves checking the contents of a management while it is formed or before it is implemented. The basic procedures to be followed in drawing up the fisheries management plan (including making and checking) are provided for by the Fisheries Act. The QDPI is designated for the authority of trawl fishery management by this act. The basic principle of fisheries management: Ecologically Sustainable Development of Fisheries, is also prescribed in it. Besides, the Fisheries Regulation provides complementary provisions for this act. According to these procedures, the management plan is to be drafted by QDPI and checked by relevant organizations and stakeholders.

On the other hand, as a premise for QDPI to make up the draft plan, there are two important requirements which have to be taken account as basic principle relating to fisheries management. One is the preservation of the environmental value as the GBRMP and a WHA. The basic management principle of GBRMPA is ESD. That is achieved through adjustment and negotiation between the QDPI and the GBRMPA as will be mentioned briefly later. Another is the Guidelines for the Ecologically Sustainable Management of Fisheries (the ESD Guideline) by the Environment Protection and Biodiversity Conservation (EPBC) Act 1999. This act prescribes the guideline for exporting component. Industries which export their products have to clear criteria indicated by this guideline. Furthermore, this burdens the authority with the obligation to assess the status, and provides the criteria to be assessed. This will be mentioned at post-monitoring. Through whole process, ESD becomes the important discipline of fisheries management.

Checking of the trawl fishery management plan is carried out by the MAC, the Zonal Advisory Committee (ZAC) [4], and public consultation against the Draft Plan made by the QDPI. The MAC consisting of relevant organizations and a range of stakeholders checks the draft plan from a specialist viewpoint. The ZAC, which was set up for 10 regions and consisted of representatives of related interest groups in each region, checked the draft from the regional viewpoint. Within this process, adjustment between the QDPI and the GBRMPA and participation of the public are important. As the QDPI has a management authority concerning fisheries within the GBRMP area prior to the GBRMPA, the QDOI makes the plan and GBRMPA checks the contents. Basically, the QDPI provides

[4] The ZACs were dissolved after establishment of the Trawl Plan.

the contents of input-control such as effort reduction and gear restriction and the GBRMPA does spatial closures. The adjustment and negotiation between two authorities is carried out mainly through the MAC. Other than this, sharing information about fisheries and the environment and exchanging staff members between them are institutionalized (Tanzer et al. 1996). Their different disciplines: managing fisheries and protecting the environment, are adjusted through these processes. Public involvement is one of the most important policies of the Queensland State Government (The Queensland Policy Handbook). With regard to the Draft Management Plan, 252 written public comments were collected and 555 people attended at ten public port meetings in 1999 (Zeller 2002). Their comments were reflected in the Draft Plan through the MAC.

The Trawl Plan established through these procedures provides various provisions to restrict the day-to-day operation of fishery. A lot of new restrictions against fishers have been introduced and their activities have ended up being restricted to a large extent. In particular, reduced fishing effort seems to have had a huge influence on the industry. Therefore, Governments prepared an AU$ 30 million assistance fund for structural adjustment of fishery[5]. Besides, introduction of new devices (BRD and TED) and VMA forced fishers to bear additional costs. Thus transformation costs including information costs to seem to be high.

At the ante-monitoring process, it is characteristic that Governments' principles have a huge influence on the contents of the management plan. That is not to say, the principle is ESD. By strong requirement by the GBRMP and a WHA and the ESD guideline, ESD consistently penetrates through whole process of ante-monitoring and the Trawl Plan is considerably influenced by it. On the one hand, the common principle between the QDPI and the GBRMPA makes adjusting between them easier, in addition to exchanging system between two organizations. On the other hand, the Trawl Plan extremely emphasizes the ecological aspect, out of three aspects (ecological, economic and social), which compose fisheries management

The problems are that most of rules determined by the Trawl Plan only constitute prohibitions of some activities. It composes a part of the day-to-day operational rules. Practically, the day-to-day operational rules at sea or on vessels are constituted from more detailed rules as rule configuration, including not only prohibition but also induction of some ideal activities and not only written rules but unwritten rules, which constitute a significant part of operational rules and usually are formed by fishers. In the Trawl Plan, as unwritten rules are not taken into account by both Governments and fishers[6], the operational rules have become incomplete. Therefore, it appears that rules provided by the Trawl Plan comprise a part of whole operational rules as written rules. Consequently, it is thought that fishers have initiated voluntary activities to complement the operational rules by Eco-Fish and Environmental Management System (EMS) activities. These two voluntary activities will be mentioned in the next section.

Interim-monitoring process

Interim-monitoring means checking performance of the plan by examining compliance with operational rules and the status of fisheries resources and the environment. If rules are not complied with, offenders are punished. And education for enforcement is provided if necessary. So it is mainly operational rules to be monitored by this process.

Inspection and enforcement are mainly undertaken by QDPI (Queensland Boating and Fisheries Patrol; QBFP), targeting prohibitions determined by the Trawl Plan. As these prohibitions are legally binding, violation of rules detected by QBFP is judicially sanctioned. In QBFP, there are 120 of staff members and patrol boats ranging from 3 to 25 meters and 22 stations are dispersed along the Queensland coast. The number of convictions was 58 in 2001 and 51 in 2002 (QFS 2002, 2003). Most offences are closed waters offences (67% in 2001, 75% in 2002). Specifying the position of fishing vessels is also carried out by QDPI through the VMS and logbook system, other than patrol at sea. The location of every fishing vessel is immediately pursued by the VMS and confirmed through the logbook system.

The characteristic of this stage is that main operational rules to be checked are spatial closures linked with the VMS and installation of BRD and TED. As both of them are easily detected by the QDPI, effective enforcement becomes possible. More important, compliance with these rules doesn't necessarily depend on the fisher's willingness to comply with them. If only these devices are installed to fishing vessels, these make cheating activities difficult. As breaching spatial closures are quickly and accurately detected by the VMS, spatial closures seem to be very coercive. The BRD and TED automatically exclude targeted bycatch. The efficiency of BRD and TED has been previously proved by researches (Robins et al. 1999). Enforcement and compliance with rules is one of the most important issues of fisheries management (Nelsen 2003). Given the huge area of fishing ground to be covered

[5] This structure asjustment scheme consisted of contribution from the Federal Government, the State Government and industry group.

[6] At the moment when the Trawl Plan was established, there seems to have been little fishers' self-regulation.

in GBR and limited resources for patrol, these rules which are enforced regardless of fishers' compliance willingness are considered to be rational and effective.

On the other hand, other rules like catch limits are practically difficult to detect at sea. In addition, unwritten rules are not a target of interim-monitoring, because these are not legislation (at this moment as unwritten rules don't exist, this point doesn't matter. However, when fisher's voluntary rules are constituted later, it becomes important). The effectiveness of management measures easily enforced including effort reduction has to be examined later.

Post-monitoring process

This process evaluates the results of the management plan and then adjusts the plan or rules if necessary. To do so, it is necessary to collect information about the results, analyse them and compare them with objectives and any given criteria. Primarily operational rules are evaluated, but collective-choice rules are also examined.

From this viewpoint, this post-monitoring process is supposed to be well organized. As mentioned in ante-monitoring process, there are some requirements concerning fisheries management and the environment preservation. These also force authorities to audit and report the status of fisheries management and its achievement. One is the requirements by the Great Barrier Reef Ministerial Council. The GBRMPA evaluate the performance of the Trawl Plan according to the objectives, measures and review events designated in the Trawl Plan[7]. Also the QDPI reports annually the status of the performance of the fishery against these objectives[8]. Furthermore, the QDPI has to evaluate the status of fisheries and the Trawl Plan against the criteria provided by the ESD Guideline, and report it to the Federal Government[9]. Like these ways, the result is doubly checked against the explicit criteria.

Resources and environmental monitoring are carried out by some research institutes. Main research institutes are QDPI (Food and Fibre Science; FFS)[10], the GBRMPA and the Collaborative Research Centre Reef (CRC Reef)[11]. They have extensive projects to monitor the ecological situation of the GBR and influence of fishing activities to it. The logbook system provides fisheries information to monitor the resource level like catch, fishing effort to the research institutes. The FFS has the fishery independent long-term monitoring program, excluding bias caused by fishery.

The characteristic is that post-monitoring is carried out from the ecological viewpoint, as given criteria are constituted based on the ESD discipline. According to a range of information provided by research institutes, the authorities evaluate the status of resources and the environment. Although the objectives of the Trawl Plan pick up not only ecologically sustainable development but also economic viability of the fishery, the former is mainly evaluated and the latter is very little mentioned by these audits. It is thought that this is because of the intense requirement of GBR preservation and ESD by the Federal Government. Also it is likely because the definition of economically viable fishery, measures to achieve them and criteria to be evaluated are vague in the Trawl Plan.

Fig. 3 illustrates three monitoring processes and major parameters as mentioned above.

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[7] This is 'Audit of the Management of the Queensland East Coast Trawl Fishery in the Great Barrier Reef Marine Park' (Huber 2002)

[8] This is 'Status of the Queensland East Coast Otter Trawl Fishery 2002' (QDPI 2003).

[9] This is 'Ecological assessment of the Queensland East Coast Otter Trawl Fishery: a report to Environment Australia on sustainable management of multi species macro-scale fishery ecosystem' (Zeller 2002).

[10] The FFS has two research centres along the Queensland east coast.

[11] The CRC Reef is the research organization, initiated by the Federal Government, which integrates related research institutes.

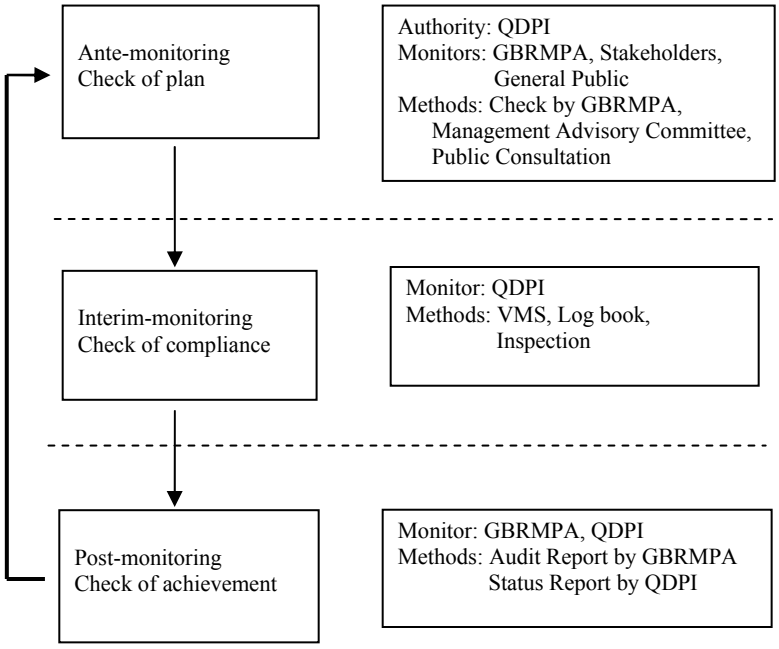

Fig. 3 Governing process of fisheries management in the GBR

The problem is that there is a time lag between these assessments and population dynamics of existing resources. As almost all targeted resources have a short life span, to manage appropriating the resources, the results of assessments should be immediately reflected to the management measures. This system, however, doesn't include such feedback. So it will take several years to amend rules, because amending rules means amending legislation. It follows that this post-monitoring system has little effectiveness concerning short-term management of existing resources, even if effective for long-term management.

FISHERS' RESPONSES AND ACTIVITIES

Participation in the monitoring processes by fishers is not positive. In the ante-monitoring process, trawl fishers participate in it through the ZAC and port public meetings. Besides, the Queensland Seafood Industry Association, which is a peak body of commercial fishers in Queensland, mediates between QDPI and fishers through lobbying activities and meetings. However, although fishers provide practical information to the government, they don't necessarily participate in a decision-making of the Trawl Plan. As for the other monitoring processes, these are carried out independently from fishers at all. The problem is that in the operational rule level how fishers relate to it.

Operational rules provided by the Trawl Plan don't involve fisher's practical activities, but do strongly affect them. Being stimulated by the Trawl Plan, outstanding two fishers' activities have occurred: Ecofish activities and Seafood EMS initiative. These have not been completely carried out independently of Governments, but constituted by mainly voluntary activities by fishers. So fishers participate in the decision-making positively. Therefore, we can say these are voluntary activities.

Ecofish Activities

Ecofish is a non-profit organization which was formed in 1999 as one of the industry clusters established in Cairns (north eastern part of Queensland) under the umbrella of the Cairns Region Economic Development Corporation. Ecofish consists of a variety of members; commercial fishers, related industries like fish processors, wholesalers, retailers, slipways, engineers and other supporting services located in Cairns. In terms of commercial fishing, fishers of trawl fishery, net fishery, line fishery, aquarium fishery and others participate individually. Out of them, one of trawl fishery is predominant. The number of members was 148 in 2003.

The direct trigger for establishing this organization was the new fisheries management plan by the QDPI including the Trawl Plan. According to Strategic Plan of Ecofish, it has been established to protect their position against the threat of expanding restrictions by Governments, by a taking pro-active approach and establishing the sustainable Environmental Management Systems (EMS) (Eocofish 2002). The purpose of this cluster is to ensure the industry's long term survival and ecological sustainability whilst maximizing the economic benefits to the region. Then the goals are as follows:

- Securing long-term industry participation in Far North Queensland fisheries
- Increasing community and political support for the fishing industry
- Ensuring ecologically sustainable fishing practices
- Facilitating communication and involvement with relevant governments
- Improving industry training to develop attractive career opportunities and a skilled workforce
- Establishing greater national and international market profits for local seafood industries

As one of the main activities to achieve these objectives, establishing the EMS is important relating to the fisheries management. Ecofish is trying to establish the EMS and to have it accredited by the Marine Stewardship Council (MSC). The EMS is an international standard relating to quality of management based on ISO14001. By this accreditation, it is expecting to show the environmental accountability of this industry against public and expand economic benefits. To do so, Ecofish is hoping to set up some self-regulations as a Code of Practice.

So far Ecofish has tried to get an accreditation of the MSC targeting inshore trawl fishery self-management in Cairns. This scheme includes three factors: creation of a gear restriction area, changes to trawl gear and trawling time and the introduction of an industry code of conduct to be used while trawling in the gear restriction area. These practices have already received pre-assessment for the MSC accreditation. Ecofish is planning to expand these activities to offshore trawl fishery and further other fisheries.

It can be recognized that fishers are trying to establish a countervailing force against Governments by the inception of Ecofish. As mentioned above, the trigger for establishing it was the threat of increasing restrictions by Governments and they have tried to protect their position through Ecofish's activities. Here, there seems to be two factors relating its establishment. One is that because representativeness by the QSIA was insufficient they desired to make further representations to Governments as a powerful lobby group to show their opinion. The QSIA has 26 branch offices along the coast of Queensland, but as Cairns branch is only one of these, fishers thought that their area-specific conditions hardly influenced to Governments. Another is that there was necessity of autonomous activities to some extent depending on their particular situations. To respond to the local community's demand as an environment-oriented fishery, they had to control their fishing activities flexibly and independently from Governmental management. In turn, they tried to get accreditation of the MSC in advance of other fishery and take an advantage of that to expand business chance. As the measure to manage their fishing activities, the EMS initiative has been employed by Ecofish.

Seafood EMS Initiative

The Seafood EMS Initiative has been initiated by the Seafood Service Australia (SSA), a non-profit organization relating to the fishing industry, acting Australia-wide, associated with fishing industry associations. The original idea of the EMS is based on ISO14001 Environmental Management System and developed specific to fisheries by SSA. Seafood EMS Pilot Projects were started in 6 sectors in 6 states of Australia in 2003 and the various EMS initiatives have been penetrating into fisheries in 2004. In Queensland, at two regions: Cairns (Ecofish) and Morton Bay (South Queensland), the EMS of trawl fishery has been progressing in advance.

The procedures of the Seafood EMS consist of eight steps: vision, current assessment, scope, environment policy, action plan, implement, audit/certify/review and report. According to these procedures, participant fishers assess their present fishery referring to relevant legislation like the Fisheries Act, the fisheries management plan and the GBR regulations. Then they set up an action plan to control their activities to meet these regulations and criteria. In the case of trawl fishery, the Trawl Plan becomes the most important criteria. For example, bycatch and discarding is the critical problem of trawl fishery and there are some related restrictions to reduce it. Fishers look at their practical situations and advocate necessary actions to meet these criteria according to the method of risk assessment. Such advocates are organized as a plan (the EMS Plan) and supposed to be accredited by a third party. It means that such procedures constitute three monitoring processes (ante, interim and post) like legislative frameworks.

The ESD frameworks such as the procedures for the Trawl Plan are a top down approach designed to meet the legislative needs of Government Acts/Regulation. On the other hand, EMSs are a bottom up approach designed to

assist individuals or organizations to manage the way they conduct their operations, generally to reduce their impact on the environment. In other words, EMSs controls individuals' or organizations' behaviour to meet objectives determined through the ESD framework. Therefore, it is said that these two concepts and activities are complementary (FRDC 2004). At the practical level, management plans organized by the Seafood EMS procedures are strongly connected to Governmental regulations. The Trawl Plan designates basic regulations like size restriction and in turn the EMS Plan constituted by the Seafood EMS provides guidelines on how to comply with regulations.

It is clear that this complementarity occurs at the level of operational rules. Operational rules determined by Governmental regulations through the ESD framework are complemented by the EMS Plan chosen by fishers through the Seafood EMS initiative. The EMS Plan supplements operational rules which the Trawl Plan doesn't touch, and provides the way to comply with them. This is related to ante and interim-monitoring. Furthermore, the plans and actions are to be audited and reviewed. It means that enforcement of operational rules composed of the Trawl Plan and the EMS Plans are checked by this process. These processes are carried out independently from legislative monitoring, but end up to complementing it. The EMS Plan complements the Trawl Plan at not only operational rules level but also monitoring processes.

CHARACTERISTICS OF THE TRAWL FISHERY MANAGEMENT SYSTEM

The trawl fishery management system in the GBR consists of a legislative process by Governments and a voluntary process by fishers. Firstly, let us evaluate the legislative process and in turn the voluntary process in the next section.

The characteristic of the trawl fishery management system in the GBR as legislative framework is that the monitoring system is rationally organized through three monitoring processes (ante, interim and post), based on strong power by Governments. A well organized monitoring system means that monitoring process is explicitly organized and relevant organizations connect to it at each process under function sharing. At ante-monitoring process, function sharing between the QDPI and the GBRMPA, and public consultation system are well developed. At interim-monitoring, rational and scientific regulation measures easy to enforce are introduced. At post-monitoring, compulsory audits by the Federal Government are prepared. In particular, function sharing between the QDPI and the GBRMPA is important. The QDPI manages the trawl fishery operating in the GBR through these monitoring processes as a management authority and the GBRMPA checks it as an auditor. Through this function sharing, balance between use and protection of the GBR is to be struck. To support or supplement public and users' opinion and relevant information, consultation system with related organizations is well developed. Rational and scientific management tools means coupling of the VMS and spatial regulations and new devices to reduce bycatch (BRD and TED). The former is employed to cover wide areas by limited inspection resources. The latter is introduced based on deliberate research results (Robins et al. 1999). The advantage of these measures is that these don't necessarily need fishers' motivation to comply with rules. If only necessary devices are installed, even few inspectors can police the compliance within a wide area. Government's strong power seems to originate in urgent requirements to protect the GBR environment and meet the ESD guideline. The ESD requirement is common among all states in Australia. Further, in Queensland there is additional requirement from the GBRMP. Government legislates for facilitating to achieve relevant rules steadily. In legislative framework, almost all rules are fixed as a law.

On the other hand, there are some shortcomings. The first is that there is no flexibility to adapt to changing situations of existing resources. The reason is that rules are fixed as legislation and there is no feedback system to reflect the resource situation. As targeted resources have a short life span and are easily affected by sea conditions, it seems to be necessary for adaptive management scheme contingent on the situation of targeted resources to be employed in short-term. However, it will take some years to change existing legislation. It seems to be difficult to carry out flexible management by laws.

The second is that economic and industrial perspectives are lacking in the management principles. Although economic aspects are picked up as one of management objectives, measures to achieve these and criteria to assess the performance are not included in the management plan. Even in research projects by the QDPI, there is no project in relating to measures for the economic status of trawl fishery. It appears that increase of economic benefits by long-term resource recovery passively is anticipated. Restructuring scheme to compensate the damage caused by effort reduction was introduced. These are also not positive measure to increase fisher's economic benefit.

The third is that there is little connection between legislative operational rules by Government and practical day-to-day operational rules by fishers. There are few practical measures to achieve written rules, except for physical rules like VMS and BRD, and to lead fishers' activities toward ideal situations. The latter relates to the first shortcoming. As fishery is a commercial activity, such aspect is crucial for fisheries management.

Putting these shortcomings together, it appears that this trawl fishery management system in the GBR is an excellent one as a system to protect or preserve the environment. However, from the practical viewpoint of leading fishery toward desirable stage, it seems to be insufficient. That is, this system is sophisticated as an environmental management system, but inferior as a fishery management one. Even if the environment or fisheries resources recover or maintain by the Trawl Plan, it doesn't necessarily mean the economic situation of fisheries recovers or is maintained well.

IMPLICATION OF THE COLLABORATION BETWEEN GOVERNMENT AND FISHERS

It is thought that recent fishers' voluntary activities of Ecofish activities and the Seafood EMS initiative complement shortcomings of the legislative fisheries management system. This collaboration between such endogenous and exogenous rules, more practically the ESD framework and EMS initiative, occurs at the stage of operational rules. Originally, the practical operational rules consist of written rules by Government and unwritten rules by fishers. Fishers translate written rules indicated by Governments into practical procedures which indicate to fishers how to behave at sea and on vessels. Furthermore, they add their tacit or conventional rules to written rules. The Trawl Plan as legislative management scheme has the shortcoming that operational rules determined by the Trawl Plan don't connect to practical behavioral rules by fishers: that is, how to carry out these rules is not indicated. Ecofish activities and the Seafood EMS initiative prescribe it and connect regulations with practical behaviors. Briefly, the ESD framework is completed as complex of rules by being complemented by the EMS initiative, as illustrated in Fig. 4. It is thought that this is one type of collaboration between Governments and fishers.

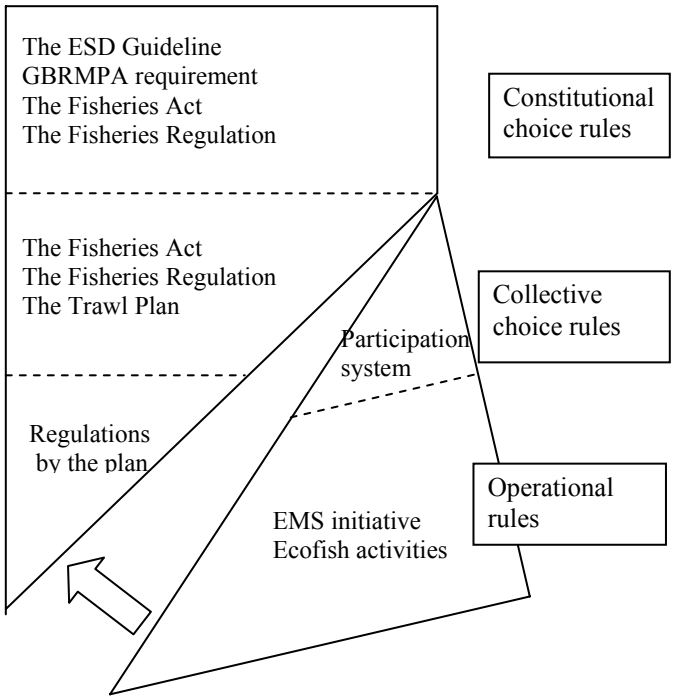

Fig. 4 The structure of the Trawl Fishery Management Scheme.
Lower triangle shows the separation between Government-led rules and fishers' practical rules. Then, arrow means that fishers' activities are trying to combine them.

To make this collaboration effective or feasible, the fisheries management authority needs to recognize these activities positively and internalize them into fisheries management scheme. In this case study, these voluntary activities to form endogenous rules were induced by Governments' top-down approach. It resulted in countervailing action by fishers to protect their position or complementary activities to supplement the shortcoming by fishers. However, these activities were not led intentionally by the management authority. Both activities are to an extent subsidized by Governments, but these are not connected to the management authority. Fishers have behaved

independently from the management authority and as a result such collaboration has been constituted. At the moment, the QDPI doesn't connect to these voluntary activities positively. In other words, regardless of intention of the authority, such fishers' activities have occurred and complemented legislative management. However, given that such complementarily is indispensable for effective management, it is clear that the management authority needs to encourage these complementary activities by fishers and combine them with legislative regulations.

The challenge is how to resolve shortcomings of the lack of an economic aspect and inflexible management. Even if the collaboration of the ESD and EMS initiative is formed, these shortcomings remain being unresolved. Because the Trawl Plan formed under the ESD frameworks appear to have little discipline and function about these aspects. At this point, functions of Ecofish have to be looked at. As Ecofish has been established as an industry cluster, it originally has economic objectives and functions to improve the position of fishing industries. In addition, it has drawn of area-specific fishery management plan as codes of practice. It plans to introduce eco-labeling to differentiate products caught under the ESD scheme and increase their prices has been being developed. These activities are in progress and their effectiveness has not been clear yet. However, considering a range of its activities, its implication for fisheries management seems to be significant.

Briefly, it is though that centralized fisheries management system can be possibly transformed to effective system, involving a combination of legislative regulations by Government such as the ESD, complementary voluntary activities by fishers such as EMS initiative, and countervailing activities by fishers such as Ecofish activities.

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