Potential for Eco-Label Certification: The Case of the Campeche Shrimp Fishery, Mexico

El Potencial Para Certificación Ecológica: El Caso de la Pesquería de Camarón en Campeche, México

Le Potentiel pour Label Écologique: Le Cas de la Pêche de la Crevette de Campeche, Mexique

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ABSTRACT

The Marine Stewardship Council (MSC) eco-label certifies that seafood comes from a sustainable source. This eco-label is becoming an important market-driven management tool in developed world fisheries, but its use lags behind in the developing world, where ecosystem approaches to fishery management have not yet been widely implemented. However, the Food and Agriculture Organization (FAO) under its REBYC-II LAC project is helping to address ecosystem concerns within the shrimp trawl fisheries of a number of developing countries within Latin America and the Caribbean by helping to reduce the negative ecosystem impact of the gear through bycatch reduction and improved habitat impact management. This study investigates how the potential improvements achieved under the REBYC-II LAC project could help in satisfying requirements for obtaining a MSC certification in Campeche shrimp fishery in Mexico. Both the feasibility and desirability of obtaining MSC certification in this fishery is assessed. This is done through on-site surveys and interviews with managers, fishers, processors and other relevant stakeholders. The results will highlight the data gaps and shortfalls for obtaining this prestigious eco-label in the Campeche shrimp fishery and should help guide the industry and fishery managers towards necessary steps for achieving sustainability.

KEYWORDS: Eco-labelling, Marine Stewardship Council, FAO, REBYC-II LAC, shrimp, Campeche

INTRODUCTION

Background Information

Eco-labelling is a market-based incentive that can be used to support fisheries management and contribute to the promotion of sustainable fisheries worldwide (Wessels et al. 2001). One of the most successful certified eco-labels is that of the Marine Stewardship Council (MSC). The MSC is an independent non-profit organization setting principles and standards for sustainable fishing practices. As of today, 229 marine and five inland fisheries across the world are certified to carry the MSC eco-label, and a further 47 others are currently under assessment. Of the 234 certified fisheries, 24 are shrimp fisheries, all of which use trawling as the harvesting technique (MSC 2016a).

The potential contribution of eco-labelling to the promotion of sustainable fisheries is constrained by a number of factors. Among them, the general lack of concern for sustainable fisheries by the market, an absence of tangible, continued financial benefits to participating fishers, and finally, difficulties of quality assurance mainly related to monitoring compliance (Kaiser and Edwards-Jones 2006).

There are specific issues related to the certification of shrimp fisheries. These arise mainly over concern about the habitat damage and the indiscriminate multispecies nature of the catch resulting in extremely high bycatch rates that are typically associated with benthic trawling, compared to other fishing techniques. Tropical and subtropical shrimp-bottom trawl fishing is characterized by bycatch levels representing up to 10 - 15 times the quantity of the targeted (shrimp) catch, and often comprising juveniles of targeted and bycatch species, as well as small-sized fish species and endangered turtles and elasmobranchs (FAO 2015). This generally means that significant reductions in bycatch and discard rates in these fisheries should be pursued, if the fishery is to become sustainable.

Research Context

Environmental and economic sustainability of shrimp fisheries in Latin America and Caribbean countries is hampered by overcapitalization, irresponsible fishing practices, and real and potential adoption of non-tariff barriers and trade embargos from developed countries (Salas et al. 2011). In light of this, the Food and Agriculture Organization (FAO) REBYC-II LAC project (Reduction of Environmental Impact from Tropical Shrimp Trawling, through the Introduction of Bycatch Reduction Technologies and Change of Management – Phase 2 of Latin America and the Caribbean) wants to improve the condition of shrimp fisheries for its participating countries.

This is expected to be achieved mainly through the promotion of better institutional and regulatory arrangements for bycatch management and utilization of bycatch discards within an ecosystem approach to fisheries (EAF) framework. If this goal was to be achieved, it is fair to assume that some of the requirements for obtaining MSC certification would be fulfilled, at least partially. As such, this paper investigates what would be the remaining steps to take in order to achieve such a certification and what is the level of interest in so doing.

Research Objectives

This paper aims to investigate to what extent the improvements achieved under the REBYC-II LAC project (mainly in terms of bycatch reduction, sustainable fishing, and improved management) could lead the way to obtaining MSC certification in the Campeche shrimp fishery. Specific objectives include:

i) Investigating the general environmental, economic, social and cultural issues related to shrimp fisheries along the Eastern Coast of Mexico, to spot constraints and opportunities that may support or prevent the desirability *and* feasibility of MSC certification for the Campeche shrimp fishery,
ii) Examining the MSC certification process,
iii) Analysing the main implications of the REBYC-II LAC project for the Campeche shrimp fishery in order to understand to what extent these can lead the way towards the obtainment of MSC certification for the same fishery, and
iv) Investigating the interest of both the private and public sector of the Campeche shrimp fishery in pursuing a MSC certification.

METHODS

Relevant information for achieving the objectives of the research was gathered following different methodologies. The first objective was pursued by analysing secondary data from research papers as well as official documents and yearly reports from the Mexican Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA). Following this preliminary analysis, further information was gathered by attending the REBYC-II LAC Meeting in Campeche on the 27th and 28th September 2016. Additionally, primary data was sourced by personally interviewing key informants of the Campeche shrimp fishery. Namely:

i) Members of fisheries research institutions such as the National Fisheries Institute (INAPESCA) and the Lerma-Campeche Regional Centre of Fisheries Research (CRIP),
ii) Academics from the Gulf of Mexico Institute of Ecology, Fishery and Oceanography (EPOMEX),
iii) Private sector representatives from the National Chamber of Fishing Industry (CANAINPESCA), and
iv) REBYC-II LAC project staff.

The second objective of my research was instead pursued by analysing the existing documentation about the MSC assessment process. The third objective was mainly achieved by analysing the FAO/Global Environment Facility REBYC-II LAC Project Document. Relevant information was also obtained by attending the project meeting in Campeche as well as by interviewing the FAO representatives in charge of the project. Finally, relevant information for addressing the last objective of the research was gathered during the project meeting. Personal interviews with members of CANAINPESCA were also implemented.

RESULTS

The Campeche, Tamaulipas and Veracruz Shrimp Fishery

Shrimp fishery is the most relevant fishery in Mexico in economic terms, and the fourth most relevant in terms of production from fishing and aquaculture (SAGARPA 2013). Three main shrimp fishing grounds are identified along the east coast of Mexico (SAGARPA 2014a): the north-east Gulf of Mexico (Tamaulipas and Veracruz), the Campeche Sound (Tabasco and Campeche), and the Mexican Caribbean (Quintana Roo).

Shrimp fishing grounds in Campeche, Tamaulipas and Veracruz differ under several aspects, the most relevant being: the shrimp species provided, the exploitation rate of the stock and the revenues deriving from fishing activities. However, due to the high mobility experienced within the Gulf of Mexico, the fleets of these three States often fish the same shrimp species and on the same fishing ground SAGARPA 2014a).

Shrimp fishery in Campeche is mainly represented by capture, as aquaculture still does not develop at competitive levels (SAGARPA 2014c). Campeche is the main shrimp producer in the Gulf and Caribbean Mexican coast after Tamaulipas, whose production is around twice as large. Shrimp fishery is the most important fishery in Tamaulipas, and it is mainly represented by capture, occurring in estuaries and lagoons and the high sea (SAGARPA 2014a).

In Veracruz, shrimp production only accounts for a very small part of the total fish production, as compared to Campeche and Tamaulipas. Captures represent by far the majority of shrimp production in the State. In general terms, catches from coastal areas constitute a significant part of the total (SAGARPA 2014a).

Species Caught and Fishing Fleet

The most important shrimp species caught in the Gulf of Mexico in terms of catches are the brown shrimp (*Farfantepenaeus aztecus)*, pink shrimp (*Farfantepenaeus duorarum*), and white shrimp (*Litopenaeus setiferus*). Other species include the seabob shrimp (*Xiphopenaeus kroyeri*), red shrimp (*Farfantepenaeus brasiliensis*), and brown rock shrimp (*Sicyonia brevirostris*) (SAGARPA 2012).

Brown shrimp is mainly caught in waters outside Tamaulipas and Veracruz. In contrast, the main species caught in Campeche is the pink shrimp, as brown and white shrimp are present in much smaller amounts (SAGARPA 2014c). Other species of minor importance for the Campeche are the seabob shrimp, which is fished in coastal areas by smaller boats and *camarón sintético* (*Trachypenaeus similis)* (Ramírez-Rodríguez 2015). Brown shrimp currently composes 90% of the total shrimp catch in the Gulf of Mexico (SAGARPA 2014b, Rojas Gonzales, CRIP Lerma-Campeche, personal communication).

Shrimp fishing in Mexico is implemented by both artisanal and industrial fleets. As of today, 338 industrial trawlers (21 - 25 m length) and 2,540 artisanal vessels (*charangas*) operate in the Gulf of Mexico and Caribbean Sea shrimp fishery (FAO 2015). The largest fleets are registered in the States of Tamaulipas and Campeche. The

decline of the fleet in Campeche has been more marked than that in the rest of the Gulf and Caribbean: of 725 boats operating in 1980, only 120 are fishing today.

Shrimp fishery is sequential, happening both in lagoons and high seas, with industrial high sea captures based on individuals in their pre-adult and adult phase, and artisanal captures composed of juveniles (Ramírez-Rodríguez 2015). A high level of competition is experienced between artisanal and industrial fishermen in Campeche, Veracruz and Tamaulipas (SAGARPA 2014a, Ramírez-Rodríguez 2015). Artisanal fishing is legal in the latter two States, but illegal in Campeche (Rojas Gonzales, CRIP Lerma-Campeche, personal communication).

The majority of artisanal catches in the Gulf of Mexico are represented by small size brown shrimp, which is caught in the lagoons of the state of Tamaulipas. A significant amount of illegal fishing of pink shrimp juveniles occurs in the state of Campeche. Being illegal, it is not quantifiable, but it is known to occur in very significant amounts (Rojas Gonzales, CRIP Lerma-Campeche, personal communication). The development of an illegal artisanal fishery in Campeche generated growth overfishing (targeting individuals from 12 to 115 mm) and was calculated to have possibly reduced 10 - 20% of high seas catches (Gracia 1995).

Bycatch and Discards

The FAO (2015) complains about the general lack of relevant information on bycatch and discards in REBYC-II LAC member countries. The FAO (2014) reports that 19,000 metric tons of discards are generated in the Gulf of Mexico, with a shrimp:bycatch relation of 1:3 to 1:19. Fish bycatch is usually discarded (SAGARPA 2014c).

The fish bycatch:shrimp ratio in the high sea fishery of Campeche Sound is 12:1, and the bycatch is mainly composed of fish. A portion of the commercial bycatch is kept for direct consumption of fishermen and boat owners (SAGARPA 2014c). In Tamaulipas and Veracruz, bycatch is composed of 80% fish and crustaceans, while the rest are molluscs, equinoderms, algae, sponges, and others (SAGARPA 2014a). Acosta (1994) reported that, given that these species do not have a specific and defined market, these are in most cases discarded at sea.

Fishery Sector and Sale Market

With the exception of 2013, fishery exports in Mexico showed a generally increasing trend in recent years. The amount of export represented by shrimp is rather limited in terms of live weight, but more important in terms of export value (SAGARPA 2013). The international exports are essentially oriented towards the United States. More than 99% of the shrimp was exported from Mexico as frozen (SAGARPA 2013).

No exact data about export of Campeche shrimp are currently available to the Regional Centre of Fishery Research (*Centro Regionale de Investigación Pesquera*, CRIP) in Lerma, Campeche. It is known that due to the crisis of the fishery, shrimp exports (mainly pink shrimp) from Campeche to the United States have significantly decreased in recent years, due to the reduced size of the individuals caught that are caught (Romellón Pérez, CANAINPESCA, personal communication). Brown shrimp exports have reduced slightly, but continue to take place on a significant flow (Rojas Gonzales, CRIP Lerma-Campeche, personal communication).

The reduction in export is also due to the loss of competitiveness in the international markets, caused by the increase in shrimp supply from aquaculture, which has reduced the market prices, and by the fact that the shrimp price in Mexico is approximately the same than the price in the United States, despite the strong difference in the values of the two currencies. This is due to the: higher cost of electric energy in Mexico as compared to the United States; high fuel prices due to taxes; and finally, low catches not allowing for adequate benefit from economies of scale. All these factors played a prominent role in hampering the competitiveness of the Mexican shrimp fishery (Romellón Pérez, CANAINPESCA, and Flores Hernández, EPOMEX, personal communications).

Despite this, Mexico is comfortably part of the 7 main global shrimp exporters to the United States. Others are: China, Ecuador, Viet Nam, Thailand, Indonesia and India. Together with Ecuador, Mexico represents the only non-Asiatic country in the group.

Current Condition of the Stocks and Fisheries

Ramírez-Rodríguez (2015) argues that by 2013 the shrimp fishery in Campeche was operating at bankruptcy levels. Examples of a few of these aspects are: low catches and prices, low profitability, and overcapitalized fleet and industrial plants. Many are the causes that can explain this situation. Namely:

i) Growth and recruitment overfishing,
ii) Illegal fishing of juveniles in coastal areas,
iii) Reduction of fishing grounds due to the development of security areas around oil platforms (these were introduced in the areas where historically the highest shrimp population densities were encountered; SAGARPA 2014c),
iv) Modification of breeding areas due to urban development and pollution,
v) Reduction in recruitment patterns due to environmental changes: Ramírez-Rodríguez and Arreguín-Sánchez (2003) calculated recruitment abundance in 2003 to be around 10% of that estimated at the beginning of 1970s, due to increase in water temperature and reduction in water salinity), and
vi) Technological improvement and uncontrolled fishing effort, which caused overcapitalization and decreased the profitability of the fishery (Ramírez-Rodríguez 2015).

Summarising the contributions from Arreguín-Sánchez et al. (1997), Gracia et al. (1997), Gracia (1997) and Arreguín Sánchez (2006), SAGARPA (2014c) reports that the influence of environmental factors such as water temperature and salinity resulted in a reduction of catches in the Campeche Sound much larger than that exerted by intense fishing activity. The latter, according to the authors, only played a marginal role.

Management Measures

The most important piece of legislation for fishery and aquaculture in Mexico is the General Law on Sustainable Fishery and Aquaculture (*Ley General de Pesca y Acuacultura Sustentables*). The statue sets out three public policy instruments for the management of fishery resources. First, the framework of fishing licenses and concessions (*permisos y concesiones de pesca*). Second, the Fisheries Management Plan (*Plan de Manejo Pesquero*, PMP). Third, the Fishery Code Programmes (*Programas de Ordenamiento Pesquero*, POPs).

The General Law acknowledges PMPs as instruments of public policy. PMPs are produced by INAPESCA, which is an institution without mandatory powers. The POPs are instead a product of the National Commission of Fishery and Aquaculture (CONAPESCA). These include compulsory regulations of fisheries management, which are based on the recommendations dictated by the PMPs (Quiroga Brahms, FAO, personal communication).

The Sustainable Management of Bycatch in Latin America and Caribbean Trawl Fisheries (REBYC-II LAC) Project

The REBYC-II LAC project aims to contain the negative ecosystem impact and achieve more sustainable shrimp/bottom trawl fisheries in the Latin American and Caribbean region through the implementation of an EAF, also involving bycatch and habitat impact management (FAO 2015). The project is based on four main Components. Namely (GEF 2013):

i) Improving collaborative institutional and regulatory arrangements for bycatch management,
ii) Strengthening management and optimizing utilization of bycatch within an EAF framework,
iii) Promoting sustainable livelihoods, diversification and alternatives, and
iv) Monitoring the progress of the project and disseminating information.

Private sector involvement — The project is expected to produce an effective public and private sector partnership (GEF 2013). Campeche fishermen will play a prominent role in achieving two of the main objectives of the project reported under Component 2 i.e. catch data gathering, and changes to fishing technology. Concerning data gathering, an onboard observers program will be launched during the fishing season to study capture amount, composition and its spatial and temporal variation. For modifications to fishing technology, the changes will be proposed and tested on fishing boats, in cooperation with fishermen. These changes will mainly relate to: reduction in size and weight of nets, change in net materials, and change in net design for increasing escapement (FAO 2015).

Improvements in data collection and fishing technology will be implemented on industrial vessels only (Quiroga Brahms, FAO, personal communication.). Experiments on nets are planned to start in November 2016 (Aguilar Ramirez, INAPESCA, personal communication). However, the cooperation of the shrimp-fishing private sector should not be taken for granted. During the REBYC-II LAC meeting in Campeche, representatives of the CANAINPESCA expressed their concern about several of the project objectives. This is mostly due to the fact that the private sector views reducing bycatch rates only as a secondary problem, if compared to the urgency of halting illegal coastal fishing.

The Potential MSC Certification for the Campeche Shrimp Fishery

The MSC assesses every fishery seeking a certification against the same pre-defined Standards, which are based on three core principles (MSC 2014):

i) Sustainable target fish stocks. Operations in a fishery must be carried out in a manner that does not lead to stock over-fishing or depletion. Similarly, for depleted stocks, the fishery must be conducted in a way that demonstrably leads to their recovery;
ii) Environmental impact of fishing. Fishing operations should be carried out without hampering the structure, productivity, function and diversity of the ecosystem on which the fishery depends. This also includes habitat and associated species dependent and ecologically related to the targeted stock;
iii) Effective management. The fishery needs to be subject to an effective management system compatible with local, national and international laws and standards, and includes institutional and operational frameworks that require a responsible and sustainable use of the resource.

Assessment process — At the core of the assessment process lie three Principles of the MSC Fisheries Standards listed above. These Standards are composed of 28 performance indicators (PIs), each of which is composed of several scoring issues against which the fishery is assessed at the 60, 80, and 100 scoring guidepost levels (SG60, SG80, SG100) (MSC 2014).

The fishery is assigned a score for each PI, in which 60 is the minimum acceptable performance, 80 is global best practice, and 100 is near perfect performance. To obtain the certification, the fishery is required to score a minimum of 60 in each of the 28 PI, *and* an average of 80 across all PIs composing each of the three MSC Principles (MSC 2015). If the fishery obtains a score between 60 and 79 for any PI, the MSC requires the fishery to take appropriate measures to enhance the performance against the indicator into account, in order to reach a score of 80 or above within a pre-set time interval, usually five years (MSC 2015).

Before the effective assessment process starts, an optional pre-assessment phase can take place. This is mainly aimed at enabling both the certification body and client planning for a full assessment, as well as informing the client of the likelihood of achieving certification (MSC 2014). Once the pre-assessment is concluded, the actual assessment process follows. This is based on the identification of the Unit(s) of Assessment (UoA) and Unit(s) of Certificaton (UoC). The UoA and UoC both include (MSC 2014): the target stock; the fishing method or gear types, vessel types and practices; and the fishing fleets or groups of vessels (or individual fishing operators) pursuing the

stock, including any other eligible fishers that are outside the UoC.

The main difference between the UoA and the UoC is that the former summarises all the elements that will need to be assessed. On the other hand, the UoC only include the elements that will be able to benefit from a MSC eco-label (MSC 2014). It follows that all the aspects included in the UoC are also part of the UoA. The opposite, however, is not true. Table 1 below reports the UoA and UoC for the Campeche shrimp fishery.

Scoring the Campeche shrimp fishery — Scoring issues and guideposts for each PI composing the MSC default assessment tree are reported in full in MSC (2014). Analysing the scoring guidepost and issues of the Campeche shrimp fishery for each of the 28 MSC PIs is beyond the scope of this paper. This research instead focuses on some key PIs from each of the three MSC Principles. The remainder of this section summarises the scores that could be obtained for each of the selected PIs with and without the improvements achieved under the REBYC-II LAC project, as well as the rationale behind the hypothetical score achieved. Selected PIs are:

Principle 1:
- PI 1.1.1 Stock status;
- PI 1.2.2 Harvest control rules and tools;

Principle 2:
- PI 2.1.1 Primary species outcome;
- PI 2.1.3 Primary species information;
- PI 2.5.1 Ecosystem outcome;

Principle 3:
- PI 3.2.1 Fishery specific objectives;
- PI 3.2.3 Compliance and enforcement.

PI 1.1.1: Stock status — To obtain a score of 80 for PI 1.1.1, the MSC (2014) requires the existence of a condition in which it is highly likely that the stock lies above the point where recruitment would be impaired (PRI), and that it is at – or around – a level consistent with the biomass of the stock in presence of maximum sustainable yield (B_{MSY}). The MSC (2014) also argues that, if a consistent downward trend to level below B_{MSY} is experienced, estimates shall be available of forthcoming inversions of the trend due to e.g. significant reduction in fishing efforts.

The current condition of the pink shrimp stock in Campeche does not seem to be adequate to obtain a score of 80 for PI 1.1.1. On the other hand, indicators of fishery productivity suggest that brown shrimp stock in Tamaulipas and Veracruz is stable, despite the contrasting opinion of CANAINPESCA on this issue (SAGARPA 2014c, Romellón Pérez, CANAINPESCA, personal communication). As such, maybe a score of 80 for PI 1.1.1 could be achieved for this stock. The REBYC-II LAC project does not seem to be helpful in this sense, as it will only focus on bycaught stocks, and not on target ones. The only exception is represented by the proposed increase in mesh size to promote escapement of shrimp juveniles.

PI 1.2.2: Harvest control rules and tools — In order to score 80 for this PI, the MSC (2015) dictates that well defined harvest control rules shall be in place, guaranteeing that the exploitation rate is reduced as the PRI is approached. These measures are also expected to maintain the stock biomass around a target level consistent with, or above, the MSY.

It is evident that the pink shrimp stock in Campeche has seen its reproductive potential severely impacted over the years, and that the PRI was surely reached. As such, it is highly unlikely that a score of 80 for PI 1.2.2 would be

Table 1. Unit of Assessment for the MSC certification of Campeche shrimp fishery. The underlined elements compose the Unit of Certification as well.

Unit of Assessment requirements/Unit of Certification requirements	
Target stock	Pink shrimp Brown shrimp White shrimp
Fishing method or gear type/s, vessel type/s and/or practices	High sea bottom trawling with tween nets implemented by industrial fishing vessels of 20-25 m length Estuaries and bays trawling by artisanal boats measuring less than 10 meters
Fishing fleets or groups of vessels (or individual fishing operators) pursuing the stock[1]	Campeche industrial and artisanal fishing fleet (120 industrial and 3,776 artisanal vessels in 2013) Tamaulipas industrial fishing fleet (166 industrial and 3,029 artisanal vessels in 2013) Veracruz industrial fishing fleet (28 industrial and 11,549 artisanal vessels in 2013) Quintana Roo industrial fishing fleet (10 industrial and 773 artisanal vessels in 2013) Yucatan industrial fishing fleet (5 industrial and 2,564 artisanal vessels in 2013) Tabasco industrial fishing fleet (1industrial and 6,279 artisanal vessels in 2013)

[1]*The number of industrial boats reported includes shrimp boats only. No data are instead available about the exact amount of artisanal shrimp boats. As such, in order to offer an approximation of the latter, the table reports the total number of artisanal boats present in each State. This is done because it is known that the same artisanal boat goes fishing for different species in different periods of the year (Flores Hernández, EPOMEX, personal communication).*

achieved. On the other hand, management rules seem to have been more adequate to protect recruitment patterns of brown shrimp in Tamaulipas. As such, this fishery could have more chance to achieve an 80 score for this PI.

The REBYC-II LAC project could help the two fisheries to increase the score achieved for PI 1.2.2. This is because of the proposed increase in mesh size that could generate improvements in the spawning stock biomass and, as a consequence, improve the recruitment potential of the stock, as juveniles would be given the chance of reproducing before being caught by the trawl nets. Another contribution would derive from the implementation of the pink shrimp PMP, which has as its goals those of establishing appropriate seasonal closures, determining the right level of fishing effort and adapting the fleet size accordingly, and increasing monitoring over illegal coastal fishing (SAGARPA 2014c).

PI 2.1.1: Primary species outcome — The MSC defines "primary species" as species whose catch amounts to 5% or more by weight of the total catch of all species in the UoA (MSC 2014). The SG 80 for the PI 2.1.1 indicates a condition in which: the main primary species are highly likely to be above the point where recruitment is impaired; or, if the species is below that point, evidence of recovery is available or a "demonstrably effective strategy" is in place within all the UoAs of which the species being evaluated is considered as main species, aimed at ensuring that all the UoAs do not impair stock recovery and rebuilding (MSC 2014).

For the pink shrimp fishery, primary species are red, white, brown rock and synthetic shrimp. Red, white and brown rock shrimp captures showed a decreasing trend in the last decades, and the stock is deteriorated (SAGARPA 2012). Therefore, it seems like red and brown rock shrimp recruitment has been impaired i.e. obtaining a score of 80 for this PI would be difficult. For the brown shrimp fishery in Tamaulipas and Veracruz, SAGARPA (2012) reports the white and pink shrimp as associated species. The current status of these two species' stocks suggests that a score of 80 would unlikely be obtained.

Bycatch is not only composed of other shrimp species. It was argued that the bycatch:shrimp ratio in the high sea fishery of Campeche Sound is 12:1, and the that bycatch is mainly composed of fish. Similarly, in Tamaulipas and Veracruz, bycatch is composed of 80% fish and crustaceans (Yáñez-Arancibia and Sánchez-Gil 1985, SAGARPA 2014a). Given that no exact data are available about the contribution of each species to the bycatch, it is not possible to assess with certainty what the primary species for the Campeche shrimp fishery are.

An important component of the REBYC-II LAC project will focus on the process of gathering data about catch amounts and composition. Data obtained under this phase of the project will clarify what species compose the catch of the Campeche shrimp fishery. The expected increase in catch selectivity would likely improve the conditions of primary species stocks.

PI 2.1.3: Primary species information — The MSC (2014) reports that, in order to reach a score of 80 for this PI, adequate quantitative information needs to be available to assess the impact of the UoA on the main primary species of the fishery. A score of 80 would not be reached, as the FAO (2015) reports that only limited and patchy data on bycatch are available in Mexico, and that these come from earlier surveys or projects (e.g. REBYC-I) and not from systematic monitoring. Data gathering from the REBYC-II LAC project will be useful in achieving a higher score for the fishery.

PI 2.5.1: Ecosystem outcome — Trawling in Campeche is causing serious and irreversible damage to animals, plants and the marine ecosystem's general structure and functioning (Flores Hernández, EPOMEX, personal communication). As such, a score of 80 would be hard to obtain for this fishery in this PI. The REBYC-II LAC project will help in this sense by introducing a change in fishing techniques and a modification of the existing legislation to make it embrace EAF principles.

PI 3.2.1: Fishery specific objectives — For achieving a score of 80 in the PI 3.2.1, the MSC (2014) dictates that short and long term objectives shall be in place within the fishery-specific management system. These have to be consistent with realizing the goals of MSC's Principles 1 and 2. The REBYC-II LAC project could improve this situation through the implementation of the PMPs. However, this amelioration would mainly relate to the MSC Principle 1, as no explicit references are available in the PMPs about the effective desire of the Mexican authorities to implement management measures to reduce bycatch rates (proposed solutions are more oriented towards research and data collection, rather than on effective management through specific objectives).

PI 3.2.3: Compliance and enforcement — The lack of enforcement capacity of fisheries authorities in the Gulf of Mexico has led to generally poor levels of compliance to existing legislation, especially for what concerns artisanal fishing exerted in coastal and estuarine areas (Palleiro, INAPESCA, and Flores Hernández, EPOMEX, personal communication). The REBYC-II LAC project will not work to promote better level of enforcement of existing management measures. Particularly, the issue of illegal artisanal fishing will not be addressed.

DISCUSSION

Implications of Eco-labelling of the Campeche Shrimp Fishery

The paper offered a thorough analysis of the MSC certification, the REBYC-II LAC project components, as well as the Campeche shrimp fishery legislation. This has identified three main reasons suggesting that real efforts should be implemented towards the obtainment of a MSC certification for the Campeche shrimp fishery. Namely:

i) The desire expressed by the CANAINPESCA as well as Mexican authorities – through the PMPs – to obtain a certification for their main shrimp fisheries,

ii) The objective (included in Output 2.2.1) of the REBYC-II LAC project to introduce certification schemes (the MSC is here mentioned) and/or other incentive packages (FAO 2015), and
iii) The vital importance for Mexico of the shrimp exports towards the United States, and the protection that a MSC certification could promote to these.

There are many advantages a MSC eco-label can provide to a fishery, both in terms of market opportunities and reputation. Whether or not a MSC eco-label would be of any benefit for the Campeche shrimp fishery is not clear. The main issues are related to whether an eco-label could increase the profitability of the fishery, and to whether or not any of the price premiums will reach the fishermen.

The answer to the first issue is strongly linked to the shrimp market dynamics in Mexico. Consumer awareness about the issue addressed by the eco-label is crucial for determining the success of eco-labelled fish products (Johnston et al. 2001, Blomquist et al. 2014, Kaiser and Edwards-Jones 2006). Due to a higher consumer awareness, the demand for certified products is higher in the United States than in Mexico. In these circumstances, for the success of the Campeche eco-labelled shrimp, it is vital that the exports flow towards the United States is restored.

Whether or not the benefits will be transferred down to the fishermen will depend on the structure of the supply chain of the Campeche shrimp fishery. Fishermen are paid according to the amount of shrimp they manage to land; meaning higher catches will result in higher revenues (Romellón Pérez, CANAINPESCA, personal communication). Given that revenues are related to shrimp quantity, and not to its price, a higher shrimp selling price will likely not generate improvements in the remuneration of fishermen.

Business Perspective for Certified Products

The low level of catches suggests that probably the only successful strategy would be that of creating a niche market of MSC-certified shrimp, characterized by relatively little production and high prices. Products of the certified line could be destined to restaurants, hotels, and top supermarkets, both in Mexico and the United States.

Mexico is among the seven main global shrimp exporters to the United States, and it is only one of two non-Asian countries in the list. With the exception of India, shrimp production in these countries is in majority represented by aquaculture. As of today, only Ecuador and Viet Nam have an adequate number of shrimp farms certified by the Aquaculture Stewardship Council, and none of these countries has a MSC certification for shrimp (ASC 2016). A MSC certification could represent a great tool for ensuring exports against the adoption of non-tariff barriers and trade embargos. These are two instruments that have been used on several occasions by the United States, which in the past have banned shrimp imports from countries such as Trinidad and Tobago, India, Malaysia, Pakistan and Thailand because TEDs were not used during shrimp fishing operations in these countries (Gillett 2008, WTO 2016).

Potential Contribution of the REBYC-II LAC Project to Certification

The analysis implemented throughout the paper has shown that the Campeche shrimp fishery is currently not certifiable. The REBYC-II LAC will help in terms of:

i) Data availability about target and bycaught stocks,
ii) High bycatch rates and damages to ecosystem structures,
iii) Catch of small size individuals that have not yet reached reproductive maturity, and
iv) Inadequate fisheries legislation.

This paper has also shown that the REBYC-II LAC project will not address:

i) The presence of illegal artisanal fishing in coastal areas,
ii) The change in environmental conditions in the waters of the Gulf of Mexico, and
iii) The prolonged overfishing from industrial vessels.

The Mexican fisheries authorities and stakeholders will need to implement measures to address these issues, if a MSC certification is sought. Special concern is raised by the issue of illegal fishing, which, due to its nature, generates consequences and impacts that are hard to quantify.

A significant achievement towards the certification of the Campeche shrimp fishery was reached when the public and private sector (INAPESCA and CANAINPESCA) agreed on engaging into the MSC pre-assessment process within the year 2017. This perhaps represents the main achievement of this research project, through which the Mexican fisheries managers, the Campeche shrimp fishery private sector, and the MSC staff were induced to work together for the achievement of a common goal. The pre-assessment will help the fisheries stakeholders identify the areas that will require the largest efforts to meet the MSC certification Standards. It is significant that both the private and public sector representatives showed great interest in obtaining a certification for the Campeche shrimp fishery.

Final Remarks

Pink shrimp fishery is source of employment and revenues for the State of Campeche, and its decline is a cause of social and economic problems. Measures are needed to change this trend. The MSC eco-label could possibly represent a solution to address these issues. The correspondence among the objectives of the current Mexican shrimp management legislation, the REBYC-II LAC project, and the MSC certification gives further strength to the need of investigating the feasibility of achieving a MSC certification for the Campeche shrimp fishery.

The agreement of both the public and private sector in cooperating for engaging in a MSC pre-assessment process for the Campeche shrimp fishery gives space for hope. Funds will be sourced by the same MSC (Bourillon, MSC, personal communication). This process will indicate where the largest efforts will need to be spent for leading the fishery towards sustainability. Once the pre-assessment process will be completed, a Chain of Custody analysis will

have to be implemented, to ensure that the shrimp carrying the MSC eco-label are actually sourced through sustainable fishing practices.

A thorough process of assessment should be implemented in conjunction between the public and private sector of the Campeche shrimp fishery. The demand for eco-labelled fishery products is growing rapidly, and many indicators suggest this will continue to increase (Washington and Ababouch 2011). As such, the advantages deriving from the obtainment of a MSC certification for the Campeche shrimp fishery should not be overlooked, especially in the light of the importance that this could have in terms of securing exports and inflow of foreign currency to Mexico.

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