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**Women's participation appraisal through commodity chains:
the case of Mexican fisheries****Neyra Solano¹, Inés López-Ercilla¹, Maria José Espinosa-Romero¹, Sergio Marcos¹,
Jorge Torre-Cosío¹**¹ Comunidad y Biodiversidad, A.C. Guaymas, Sonora (Mexico)**Abstract**

Women's contribution in fisheries is often overlooked, underestimated, undervalued and unpaid (Harper, et al., 2017), even though they represent 47% of the global fisheries workforce (World Bank, 2012), with pre and post harvesting activities being the most common working areas of contribution. Studies show that overlooking women's fishing practices can lead to data gaps, inaccurate assumptions about gender division of labor in fisheries, as well as underestimates of the total human pressure on the ecosystem (Kleiber, et al., 2014).

To examine women's participation throughout the commodity chain, COBI tested a participatory methodology to in three highly-valued Mexican fisheries: penshell (*Atrina maura*) from the Gulf of California, red lobster (*Panulirus interruptus*) from the northern Pacific, and spiny lobster (*Panulirus argus*) from the Mesoamerican Reef. Participation of men and women in the application of the methodology was similar: 53% man and 47% women. Results show an uneven participation of man and women in fishing cooperatives and very low for women (on average 10.1%). These percentages increased dramatically when looking at indirect jobs: 48.5% were women in the penshell fishery, 21.9% in the red lobster fishery and 34% in the spiny lobster fishery. The analysis of the commodity chain provided a more realistic picture of the contribution of women to fisheries than the analysis focused on harvest (extraction) *per se*. This work is further analyzing the importance and degree of participation of women itself (in fishing cooperatives and decision-making processes) for further reflection to find strategies to reduce gender disparity and encourage women inclusion in decision-making processes.

Key Words: gender equality, governance, gender division of labor in fisheries.

Introduction

In Mexico, women play an important role in aquaculture and small-scale fisheries, which represents one of the main productive activities and of which coastal families subsist (Perea Blázquez & Flores Palacios, 2016). Their involvement in extractive dynamics is often described as complementary to that of men and is part of a domestic subsistence strategy, as it intervenes in food security and family and community nutrition.

Although women do not usually get involved in the extraction of the product, they participate to a greater extent in the previous tasks (preparation and repair of gear and fishing gear, obtaining bait, etc.) and after capture (product cleaning, classification by size and weight, preparation and canning, etc.) that are commonly developed in the private sector and with little or no economic remuneration in exchange; considering this way as an extension of the domestic work, which tarnishes the recognition of its effort in the fishing sector. Additionally,

the conditions in which they carry out this task tend to suffer from the necessary safety measures and even health and salubrity (Siegert, 2017).

The World Bank indicates (2012) 47% of the global fisheries workforce correspond to women; the Food and Agriculture Organization (2016) points that women account for 19% of all people employed directly in the primary sector in 2014, but when the secondary sector is included (for example, processing and trade), women constitute approximately half of the workforce. Despite the substantial presence of women in the sector, most countries' fishery data collection systems fail to capture the real contributions of small-scale fisheries and aquaculture to employment, production and consumption (FAO, 2013).

In Mexico, reliable data does not exist, partially due to their informal nature, biases and deficient processes in the capture of information (Lopez & Lopez-Sagastegui, 2018). Official statistics often differ in the number of people employed in fisheries -e.g., 270,000 (CONAPESCA, 2013) to 170,000 (INEGI, 2014)- and sex-disaggregated data is not available. Around 14,000 women have been registered as employed in fisheries at national level (vs. 92% of men).

This fact, associated with other factors, contributes to making invisible women's contribution to the fishing sector. As a result, the lack of data disaggregated by gender leads to the formulation of gender-blind policies, which in turn results in inadequate funding for the economic sectors in which women are concentrated (FAO, 2017), impacting in the social, economic and environmental aspects of the fishing communities.

The objective of this research is to assess the participation of women along the commodity chain of three small-scale fisheries in Mexico, to contribute to the generation of information on their contribution to the fishing sector, as well as to raise awareness among coastal communities about the importance of gender equality in the conservation and management of fisheries.

Methodology

This research was structured in three phases:

1. Description of the organizations and their main fisheries. The pen shell fishery (*Atrina Maura*) from the Gulf of California, red lobster fishery (*Panulirus interruptus*) from North Pacific and spiny lobster fishery (*Panulirus argus*) from the Mexican Caribbean were selected as the object of study through a multicriteria analysis carried out in Delphos 0.4 software; including both ecological and social variables. Data was gathered through interviews with different members of fishing organizations.
2. Participatory validation and construction of information. Six participatory workshops were held, two for each fishery (three for the construction of commodity chains, three for validation and return of results). Contribution of women and men involved in each fishery was quantified.
3. Description of the historical perception of the role of women in small-scale fisheries. In the last phase, a historical monography captured, through photographs, the perception of community members about the role women have played in their fishing

communities. This information was related to the fishery dynamics and commercialization of the resources.

Results

Leadership positions and temporary jobs

Results show an uneven participation of man and women in fishing cooperatives. Women's participation was only of 10.2% out of 196 people counted (Fig. 1), average female participation being higher in temporary jobs (15.3%). Results show a low possibility for women to participate in decision-making of the fishing cooperative, hence influencing the fishing sector. If women's role is not recognized as contributing to the overall fishery system, they cannot become members of the cooperative and therefore, won't participate in decision-making bodies, access resources or enjoy the benefits and obligations that this type of organization implies. In this study, only 8.7% of women participate in decision-making bodies, with pen shell being the only one of the fisheries studied that includes women on its board of directives (Table 1).

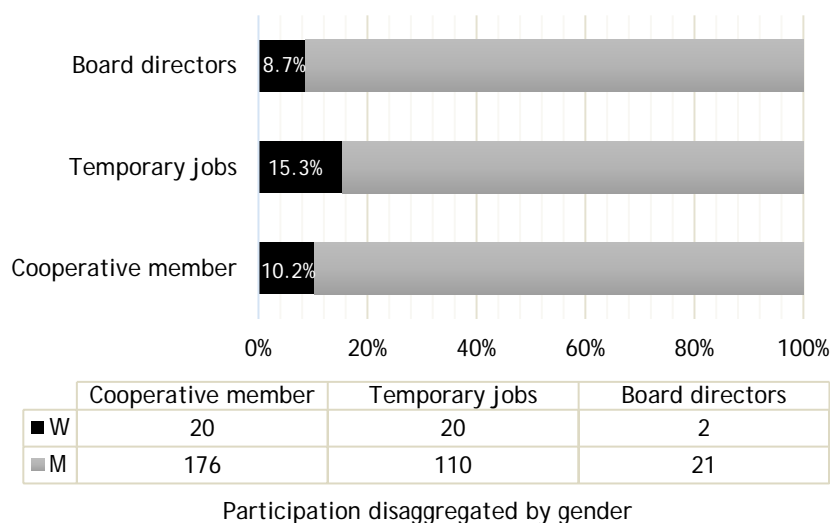


Figure 1 Level of participation of women and men in leadership positions and temporary jobs. Averages from three small-scale fisheries: members of organizations (n=196), temporary jobs (n=130), board directors (n=23). Letters "W" and "M" correspond to the women and men.

Table 1 Number of women and men in three fisheries studied (n = 326). The board is also part of the cooperative. Data disaggregated by gender. Board directors are also members of the cooperative; their participation is already included in the summation.

Fishery	Cooperative members		Temporary jobs		Board directors		Participants for fishery
	W	M	W	M	W	M	
Red lobster	4	75	15	55	0	6	149
Pen shell	14	54	0	10	2	7	78
Caribbean lobster	2	47	5	45	0	8	99
Participants for activity	20	176	20	110	2	21	326
	10.2%	89.8%	15.3%	84.7%	8.7%	91.3%	100%

Direct and indirect jobs

The fisheries analyzed include 5.6 men per woman in direct jobs¹ (Table 2), assuming 15% of the labor force. In other hand, in indirect jobs² different results are observed for each cooperative. For the pen shell, in contrast to the rest of the fisheries, there is close to equal participation (46% women, 54% men). This is due to the particularities of the fishery (proximity to the work areas, history of collaboration since its inception, family-based). However, when looking at both direct and indirect jobs, for all fisheries participation on average was more equitable with a ratio of 1: 1.

Table 2 Level of participation in direct and indirect activities of three fisheries studied. Number of men for each woman involved. The letter "n" corresponds to the total of people involved in the activities.

Fishery	Ratio	n	Ratio	n
	Direct jobs	Direct jobs	Indirect jobs	Indirect jobs
Red lobster	6.9	95	2.6	147
Pen shell	1.7	91	1.1	37
Spiny lobster	24.5	153	35.5	73
Average	5.6	339	1	257

These percentages increased dramatically when indirect jobs are included: in the red lobster fishery, it increased from 12 to 52 the number of women who directly and indirectly contribute to this fishery (21.4% of the total of participants). In pen shell an increase of 33 to 50 women involved at some stage of the commodity chain was detected; this corresponds to 48.5% of the total involved (n = 103). The number of women participating in the spiny lobster fishery significantly increased, from 6 to 77 (Fig. 2.); that is to say when considering all the women who participate along this commodity chain, their presence increased 12.8 times.

¹ Work that directly influence each stage in the supply chain and that are accounted for in a contractual, fixed or periodical way in the cooperative. e.g. production, shipping, storage, processing, marketing and administration.

² Tasks are developed in the domestic sphere or/and are not economically remunerated, but has an indirect influence in fisheries. e.g. household work such as cleaning and maintenance, child-care, buying and paying for services. Work in the community as beach cleaning, programs to improve health and well-being of children and community surveillance. Work in the cooperative refers to repairing engines, boats, fishing gear, surveillance of priority fishing sites, protection or monitoring of fishing refuges (no-take fishing zones).

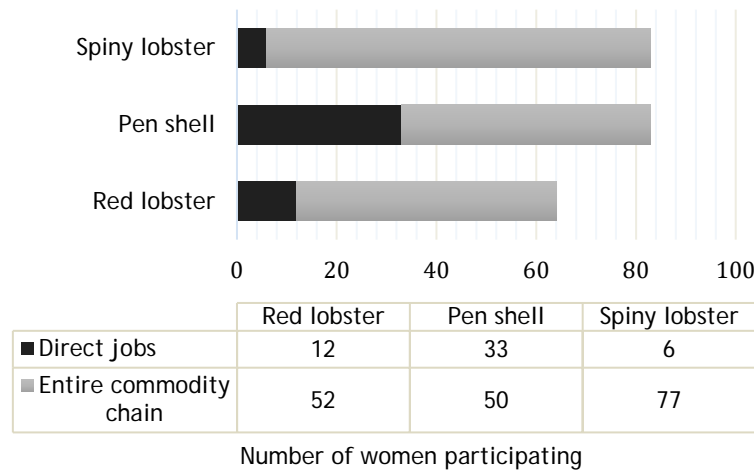


Figure 2 Increase in the participation of women in the commodity chain of three fisheries studied, when considering indirect activities.

The total number of participants in the fishery, increased from 339 to 571. There was an increase in the proportion of women participants, representing now 31% of the workforce; although women continued to have a lower presence than men in the fishing sector, since men's participation also increased to 69% (Fig. 3).

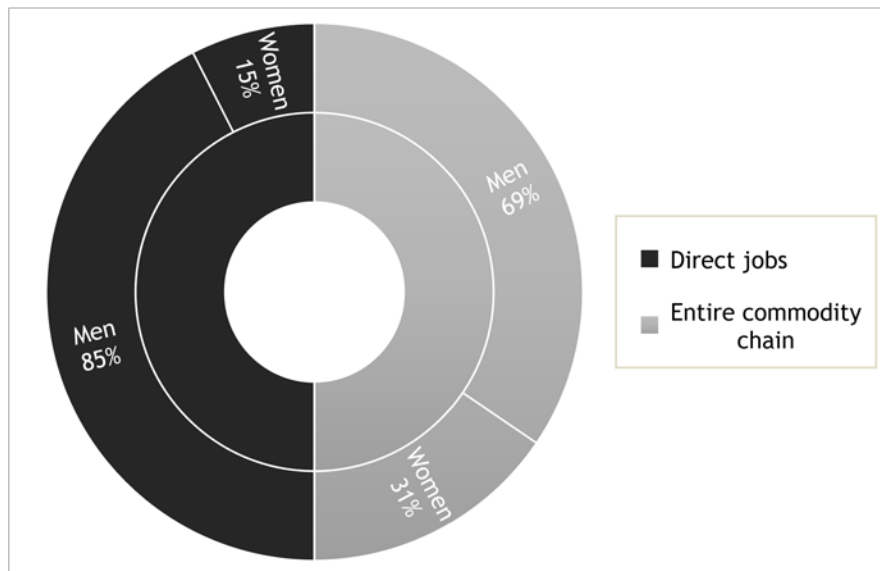


Figure 3 Total participation in the entire commodity chain of three fisheries studied (n = 571). Data disaggregated by gender. The results show the level of participation of both men and women when considering all the activities that influence the complete commodity chains. The black color indicates the activities that directly influence the fisheries; the gray color corresponds to the sum of direct and indirect activities that influence the commodity chain.

Participation by gender at the different stages of the commodity chain

This methodology indicates that both men and women have a broad participation in value chains, which has been found invisible because it does not correspond to an activity that directly influences fisheries. When considering the direct and indirect works that influence the productive chains, we find different types of participation and a greater participation of women and men in the three fisheries.

According to our results, women contribute mainly in activities before and after extraction; being the lobster network, the fishery where the largest number of women participate in pre-capture activities, pen shell where there is more participation of women in post-harvest activities (and the only place where they operate) and Spiny lobster is the only fishery where women participate in the harvest (Table 3).

Table 3 Participation of women in the different stages of the value chain of three fisheries studied. "*" means that the same people participate in different activities.

Activities	Activities	Red lobster	Pen shell	Spiny lobster	Total by stage
Pre-capture	Pre shipment	40	0	3	43
Harvest	Shipment	0	0	3	3
	Production	0	0	3	
	Storage	0	0	0	
Post-harvest	Monitoring team	5	5	12	53
	Surveillance	0	14*	0	
	Processing	4	14*	0	
	Transport	0	0	0	
	Marketing	1	0	0	
	Administration	6	3	3	
Total by fishery		56	22	24	99

On average for the three fisheries, from 99 women accounted for, 43% participate in pre-capture activities, 54% in post-harvest activities and only 3% in extraction (Fig. 4).

The study invites to take into account not only those who are engaged in harvesting, but to observe the fishing sector with a comprehensive vision, including all those who contribute significantly to the sector, increasing their chances of accessing resources, benefits and participation in fisheries management and decision-making.

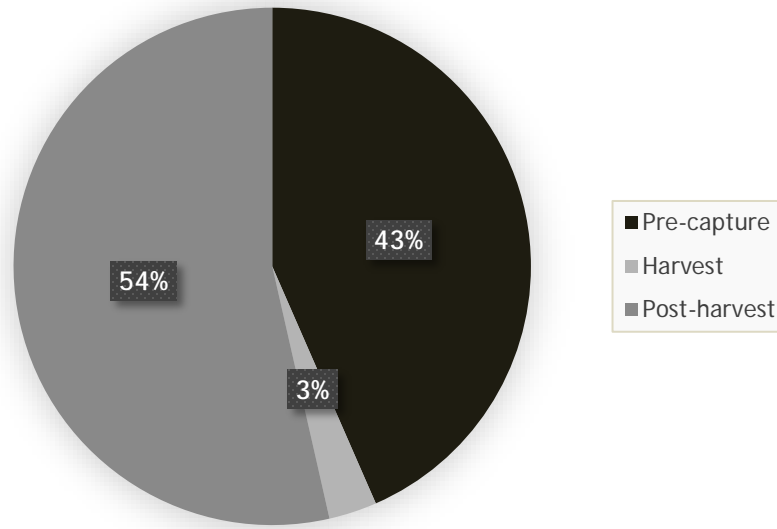


Figure 4 Participation of women in pre-harvest activities, harvesting and after the capture of the product. Average participation of three fisheries (n = 99).

Historical monographs

In parallel, the monographs show a close relationship between men and women in fisheries, considering the particularities of the environment where they live; since the scenarios for fishing, the geographical isolation, the type of art used and the proximity of the work area to the domestic sphere, clusters conditions that may be related to the opening or not of the fishery to women's participation.

In the case of the fishery that takes place in a less isolated urban area (Gulf of California), the participants describe it as an activity historically shared between men and women; since it is possible to fish on the shore (less risky activity and more "appropriate" for women, according to their perception), which makes it possible to combine this activity with household care. For this reason, the pen shell fishery, has greater representation of women in the organization, and even participate in its board of directors; fact that does not happen in the other fishing organizations. It should also be considered that this fishery has suffered the most in terms of the penshell population health (*Atrina maura*) and is therefore the fishery that has been forced to look for integral and inclusive solutions.

In the two cases where fishing takes place in remote areas, the geographic distance and the conditions of habitability of the camps made it difficult to reconcile the domestic sphere with professional activity. The historical view that fishing is an activity that both genders can perform is not shared. This relationship has reinforced for years the gender roles of the Latin American fishing sector: men participating in the extraction and women contributing to the processing and marketing of the product; occasionally participating some women out of the usual tasks.

Discussion

The study indicates that in the three fisheries both men and women participate in direct and indirect activities. However, participation is unequal and there is labor segregation strongly marked by gender. Within direct activities, women perform mostly in post-harvest work (Hapke & Ayyankaril, 2018), such as processing (with the exception of the Spiny lobster fishery³) and administration. As indirect activities, women contribute to pre-harvest, taking care of the domestic work and participating in conservation activities (community monitoring and surveillance).

Fishery dynamics influence the level of participation of women varies for each fishery. The Spiny lobster is sold alive, so its processing stage does not require a large number of personnel (men dominated); while in the other hand women and men both participate in the processing of red lobster of the Pacific, that even counts with a processing plant.

Data obtained agree with the information of Salazar, Castañeda and Vidal (2000), who point out that the majority of women in the fishing sector in Mexico are more involved in the processing, storage and packing of fish products, than in harvesting.

Some researches related to the use of coastal space, indicate that women often work in aquaculture or activities adjacent to the coast, since they are done close to home, takes relatively little time, does not require expensive fishing equipment and can be carried out in company of children (Tekanene 2004; Arce-Ibarra & Charles 2008). This information explains the preference of the women studied, for working in tasks prior to and after the capture of resources. E.g. In this study, most of the people who are dedicated to the processing of pen shell are women; activity that takes place on the beach, during a few hours of work. This allows combining professional activity with the domestic sphere and therefore facilitates their participation in the work.

In addition to indirectly contributing to support families and communities of fishermen, several studies have pointed to a good relationship and commitment of women to conservation and sustainable use of natural resources (Revollo-Fernández *et al.*, 2015; Velázquez, 1996) due to its responsibilities towards family and concern for the welfare of future generations (Jackson, 1993). Results of this research also reflect women engaging in conservation through community actions: surveillance (La Paz, BCS) and monitoring teams (Divers of Natividad island, BCS and Cozumel island, Q. Roo).

The invisibilization and lack of recognition of women's contribution to the fishing sector, together with political and social barriers, hinder their participation in decision-making processes (Kleiber, 2014).

If women's role is not recognized as contributing to the overall fishery system, they cannot become members of the cooperative and therefore, won't participate in decision-making bodies, access resources or enjoy the benefits and obligations of that this type of organization implies. The number of women within each cooperative in this study was 5% (red lobster), 4% (spiny lobster) and 20.5% (pen shell). Only penshell has women within its board of directors, even though they are considerably immersed in the direct and indirect works of the sector.

³ Women participating in harvesting were found only in the spiny lobster fishery (n = 3), but no women were identified as participating in the processing within this cooperative.

Conclusions

Reproductive and community activities, carried out mostly by women, contribute to building social capital, which is important for the construction and maintenance of collective action; which is a fundamental driver of substantial and long-term changes in the administration of natural resources (Westermann, et al., 2005). Also, women participate actively in activities prior to and after the extraction of fish and shellfish, because these activities allow them to balance better their family and professional life.

Besides, the experience and knowledge that women have about the management of natural resources, due to their close relationship with the environment, can be essential to define the direction of the fisheries and aquaculture sector. This premise suggests that considering the perspective of women in fisheries management, can contribute to diversifying service-related alternatives, problem solving and organizations growth.

The analysis of the commodity chain shows there is a significant difference in the results when fishing is observed as an extractive activity, and when it is analyzed in terms of fishery. This provides a more realistic picture of the contribution of women to the fishing sector than the analysis centered on the harvest *per se*; since all the people that influence in some way in each stage of the commodity chain are contemplated, which allows to understand the elements that make possible a whole fishing system.

In addition, research helps to understand what conditions prevail or have weight when it comes to achieving greater gender equality. E.g. the history of the penshell fishery, as well as its geographical location and the way in which the product is processed, has provided the conditions for women to be formally members of the organization and to be part of the board, in contrast with the other fisheries studied.

In Mexico as in other countries, there is a lack of information disaggregated by sex in the fishing sector. This work emphasizes the importance and degree of participation of women in fishing. Visibilizing and recognizing the work of women increases their chances of participating in the management of fisheries.

To develop similar studies that demonstrate who participates, where they participate and what are the conditions in which people participate in the fishing sector, will contribute to provide the necessary information to find strategies that reduce gender disparity and promote the inclusion of women in decision-making processes.

Both men and women contribute substantially, from the public and private sphere to the maintenance of their fishing communities. If the different knowledge, perspectives and experiences of women and men are taken advantage of, gender equality can be a key element to achieve marine conservation and fisheries sustainability.

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