

El impacto de los subsidios en las comunidades pesqueras artesanales en el sur del Golfo de California *

The impact of subsidies on artisanal fishing communities in the southern Gulf of California

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Summary: Introduction. 1. Materials and methods. 2. Results. 3. Discussion. Conclusions. Bibliography.

Resumen: Este estudio evalúa el impacto de los subsidios a la pesca en las comunidades pesqueras artesanales del sur del Golfo de California, México. Se realizaron talleres participativos con pescadores de tres localidades (n=36) para evaluar los efectos de los subsidios sobre los recursos pesqueros. Los resultados indican que los subsidios a los motores de dos tiempos y a la gasolina se percibieron como perjudiciales, mientras que los programas de creación de capacidad se consideraron positivos. A partir de indicadores reflejados en variables ordinales, mediante la prueba de Kendall se observaron correlaciones entre los tipos de subsidios y sus impactos. Estos hallazgos subrayan la necesidad de políticas adaptadas para mejorar la sostenibilidad y la equidad en la pesca en pequeña escala, alineándose con los esfuerzos globales para mitigar los subsidios dañinos.

Palabras clave: pesca en pequeña escala; subsidios para la pesca; sostenibilidad de los recursos; México; autoevaluación.

Abstract: This study evaluates the impact of fisheries subsidies on artisanal fishing communities in southern Gulf of California, Mexico. Participatory workshops were conducted with fishers from three localities (n=36) to assess the effects of subsidies on fisheries resources. Results indicate that subsidies for two-stroke engines and gasoline were perceived as harmful while capacity-building programs were considered positive. Using indicators reflected in ordinal variables, Kendall's test revealed correlations between the types of subsidies and their impacts. These findings underscore the need for tailored policies to enhance sustainability and equity in small-scale fisheries, aligning with global efforts to mitigate harmful subsidies.

Keywords: small-scale fishing; fisheries subsidies; resource sustainability; Mexico; self-assessment.

INTRODUCTION

Fisheries subsidies have been scrutinized because they may promote overfishing (Cisneros-Montemayor et al., 2020; Milazzo, 1998). Many subsidies have been allocated to expand or modernize fishing fleets, often favoring large-scale fisheries (LSF) over small-scale fisheries (SSF)

(Schrank, 2003; Schuhbauer et al., 2020). This imbalance can increase fishing effort and fossil fuel consumption (Ovetz, 2007).

Von Moltke (2011) points out that when fishery resources are healthy and managed under an efficient system, most subsidies do not cause harm. Conversely, in fisheries with overcapacity, any increase in fishing effort due to subsidies will have a negative impact on fish populations. Subsidy prohibitions established in the World Trade Organization (WTO) Agreement (WTO, 2022) are expected to reduce negative impacts and overfishing. Marine resources are overexploited by both LSF and SSF (Sumaila et al., 2016). As noted by Kolding et al. (2014), a large number of small-scale impacts can also collectively generate significant negative environmental effects.

In Mexico, fishing provides income, nutritional-value food, and contributes to foreign exchange (Lluch-Cota et al., 2006, Román-Alarcón, 2013); generates between 250,000 and 300,000 direct jobs (Nenadovic et al., 2018). Due to its social importance, small-scale fishing began to be studied from ethnographic and territorial perspectives in the late twentieth century (Alcalá, 1992; Bretón, 2018). In the early 2000s, this recognition led to an increase in subsidies to this sector, although these remained lower than those allocated to large-scale fisheries (WWF, 2013; ASF, 2014). Despite the social, economic, and cultural importance of artisanal fishing in Mexico¹, there is little literature on the impact of these subsidies.

To address this problem, the present study aimed to conduct a self-assessment of the impact of subsidies on small-scale fisheries resources in a region of southern Sinaloa, Mexico, within the international context of subsidies. For this purpose, we have included three types of subsidies. First, those received by fishermen to carry out fishing activities and related complementary activities, which are generally considered harmful subsidies because they promote unsustainable fishing. Second, non-fishing subsidies (SNP), which are support intended for family spending, which are considered ambiguous. And finally, the capacity development courses (CDC) that promote ecosystem sustainability, and which are consistent with the analytical frameworks of the FAO and the IPCC+.

Therefore, we used as a reference an analysis of their impact at a global level (von Moltke, 2011), compared the subsidies granted to SSF in

¹ Inteligencia Pública, EDF México, 2019. Impacto Social de la Pesca Ribereña en México: Propuestas para impulsar el bienestar social en el sector pesquero.

Mexico with the classification of Sumaila et al. (2019), and finally, discussed the results of the self-assessment. Thus, the objective of this study was to analyze the impact of subsidies on fisheries resources based on the assessments carried out by small-scale fishers from three fishing communities (Celestino Gazca, Mazatlán, and Chametla).

1. MATERIALS AND METHODS

Our approach aligns with the principles suggested by Shulha et al. (2016) for evaluations developed collaboratively between evaluators and stakeholders. These principles include motivation for collaboration, fostering relationships, developing a shared understanding of the program, encouraging evaluative thinking, and advancing the use of results. The information provided by fishers in this study can be considered as “drawing on expert knowledge” (Begossi, 2015), referred to as local ecological knowledge.

Initially, information was collected through a survey, followed by workshops with artisanal fishers from three communities (Table 1). The procedure for conducting the survey is described in detail by Villanueva-Fortanelli et al. (2025). To estimate the sample size in each locality, the study population (N) and sample size (n) were as follows: Celestino Gazca 25 and 18, Mazatlán 22 and 17, and Chametla 110 and 42 (Figure 1). All names and other personal data of interviewed people remain anonymous to protect their privacy.

Table 1. Study communities along the southern coast of the state of Sinaloa, Mexico

Locality name	Municipality	Type of population	Main economic activities in the locality
Celestino Gazca	Elota	Rural	Livestock production, as well as agriculture, tourism, and small-scale fishing.
Mazatlán	Mazatlán	Urban	Large-scale tourism, services, industrial and large-scale fishing (mainly tuna and shrimp), and small-scale fishing.
Chametla	El Rosario	Rural	Small-scale livestock production, agriculture (fruit farming), and small-scale fishing.

Table Source: Own elaboration

The main fisheries in which fishers from each community participate are oyster and marine fish in Celestino Gazca, lobster and fish in Mazatlan, and shrimp and fish in Chametla.

Figure 1. Map of the study area. a) Celestino Gazca, b) Mazatlan, and c) Chametla

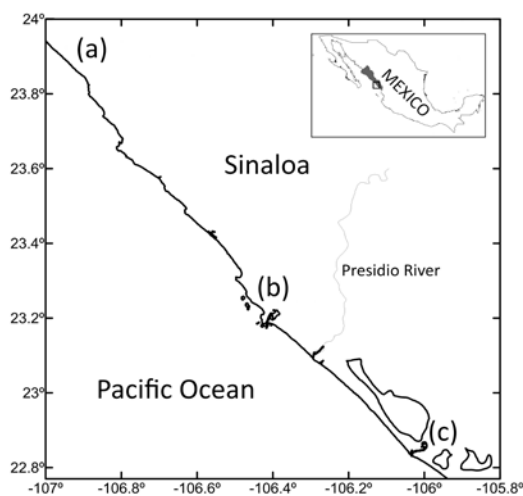


Figure Source: Own elaboration

The study was conducted with a group of fishers in each location. The survey was primarily answered by the boat's skipper. This role is typically held by the owner of the fishing equipment or by someone designated by them. For the workshops conducted with the fishers in each location, indicators obtained from information in an audit conducted by the Mexican government (ASF, 2014) on federal fishing subsidies were evaluated (Table 2). For a comprehensive analysis, two additional indicators related to monetary support between 2005 and 2020 were considered. One refers to support for fishers, primarily for the purchase of outboard motors and fishing vessels, called the "subsídio pesquero" (SPE). The other refers to annual monetary support for households or the "subsídio no pesquero" (SNP).

Table 2. Indicators used in the participatory workshops where fishers evaluated the impact of subsidies on fishery resources in the three studied communities.

Description of the concept to be evaluated	Acronym	Short name
Two-stroke outboard motor	MDT	two-stroke motors
Four-stroke outboard motor	MCT	four-stroke motors
Gasoline used in outboard motors	GAS	gasoline
Fishing gear	APE	fishing gear
Fishing vessels	EPE	pangas ¹
Satellite geopositioning device	GPS	geopositioner
Onboard product preservation in iceboxes	CPB	iceboxes ²
Onshore facilities (warehouse, sales space)	IET	warehouses
Onshore equipment (tables and other stainless steel)	EET	utensils ³
Ice factory	FDH	ice factory
Vehicle for transporting fishery products	VTP	fishing pick-up
Capacity-building courses	CDC	various training programs

¹ Panga refers to a type of small fishing boat commonly used in artisanal fisheries.

² Iceboxes used to preserve the catch onboard.

³ Utensils made of stainless steel, used in handling and processing.

Table Source: Own elaboration

To evaluate indicators, an impact scale was established in agreement with the participants, which included four levels: 1 (very low), 2 (low), 3 (medium), and 4 (high). Each level received equal weight in the analysis. Interpretation of the scores followed the criteria proposed by Villanueva-Fortanelli et al. (2025), where the impact ranges are defined as: very low (0.0 to 1.0), low (1.1 to 2.0), medium (2.1 to 3.0), and high (3.1 to 4.0).

To identify potential participants, the steps used by Villanueva-Fortanelli et al. (2025) were used: 1) Ensure that participants understood key concepts, indicators, measurement scale, and how to evaluate. 2) Examples were provided regarding the impact of the small-scale fisheries on fishery resources. 3) Materials were provided for the evaluation. 4) The support team refrained from influencing responses. During each workshop, key concepts were explained, such as subsidy, fishery resources, fossil fuel, impact, environment, fishing effort, overexploitation, responsible fishing. A summary of the global discussions on subsidies was presented. It was emphasized that, after nearly two decades of negotiations, in June 2022 an agreement was reached to eliminate harmful subsidies (WTO, 2022). Finally, a general overview was

presented on the types of subsidies granted to SSF in Mexico during the period from 2005 to 2020.

The ratings provided by each fisher were coded according to the four-level ordinal scale. The calculations performed were based exclusively on the whole numbers of the original scale (1 to 4), so the ranges presented are interpretive intervals of the averages, not of the original responses and were expressed as a weighted average per locality. Two monetary indicators were recorded. For fishing subsidy (SPE), the categories were: very low (0 to 1856 US dollars), low (1857 to 3711), medium (3712 to 5567), and high (≥ 5567). In the case of non-fishing subsidy (SNP), it was recorded only whether the support had been received (1) or not (0). Concordant pair comparisons were conducted using Kendall's rank correlation test (τ) (Zar, 2010). Correlation coefficients followed the scale from -1.0 to 1.0 (Hinkle et al., 2003): [0.0 to 0.3) indicates negligible correlation; [0.3 to 0.5) low; [0.5 to 0.7) moderate; [0.7 to 0.9), high; and [0.9 to 1.0), very high. The analysis emphasized comparisons related to the three types of subsidies described in Table 4: harmful (SPE), beneficial (CDC), and ambiguous (SNP).

Subsidies were classified as follows (Sumaila et al., 2019): a) harmful, which increase fishing effort and overcapacity; b) beneficial, which promote responsible use of fishery resources; and c) ambiguous, whose impact may vary depending on the context. The first group (a) included 12 indicators (SPE, MDT, MCT, GAS, APE, EPE, GPS, CPB, IET, EET, FDH, and VTP), the second (b) included one indicator (CDC), as did the third (c) (SNP).

Correlation was calculated based on the ratings given by each fisher for the impact indicators (MDT, MCT, APE, EPE, GPS, CPB, IET, EET, FDH, and VTP), using the four-level scale (very low, low, medium, and high). For the results of the Kendall test, only significant correlations ($p < 0.05$) were considered, except for those whose coefficient fell within the "negligible" range [among -0.3 to 0.3] (Hinkle et al., 2003).

2. RESULTS

A total of 36 fishers participated in the study, from a population of 157 individuals across three localities. Celestino Gazca had the highest number of indicators not assessed: gasoline, fishing gear, pangas, GPS, ice chests, warehouses, and ice factory. In Mazatlán, two indicators (IET and EET) were not unevaluated by 25% of participants. In Chametla, no one

assessed indicators related to warehouses (IET) and ice factory (FDH). One-third of participants omitted the evaluation of utensils (EET) and the fishing pick-up (VTP), while approximately two-thirds did not assess the geopositioner (GPS). Most fishers in the study were unaware of the global debate on fisheries subsidies. They were also unfamiliar with the classification of these subsidies (harmful, beneficial, and ambiguous) as well as the progress of WTO negotiations aimed at eliminating those considered harmful.

The highest ratings were observed in the group from Mazatlán, while the lowest were recorded in Celestino Gazca. The three communities agreed that two- and four-stroke engines, gasoline, and fishing gear have a negative impact on fishery resources. Among these, MDT engines and gasoline received the most negative scores. The remaining indicators were considered beneficial, particularly diverse training (CDC), including courses and workshops on best practices, and the use of onboard ice chests for product preservation (CPB). Both received the highest scores (Table 3).

Table 3. Type of impact of fisheries subsidies on fishery resources: average values

Indicator	C. Gazca		Mazatlan		Chametla	
	Impact	Rating	Impact	Rating	Impact	Rating
MDT	Negative	2.6	Negative	2.8	Negative	2.0
MCT	Positive	1.9	Negative	2.4	Negative	2.4
GAS	Negative	2.4	Negative	2.3	Negative	2.6
APE	Negative	2.3	Negative	2.6	Positive	2.2
EPE	Positive	1.4	Positive	2.1	Positive	2.2
GPS	Positive	1.9	Positive	1.9	Negative	1.0
CPB	Positive	2.6	Positive	3.3	Positive	2.4
IET	Positive	1.6	Positive	3.0	-	-
EET	Positive	2.7	Positive	2.8	Positive	2.0
FDH	Positive	2.1	Positive	2.4	-	-
VTP	Positive	2.7	Positive	2.1	Positive	3.0
CDC	Positive	2.9	Positive	2.7	Positive	2.8

Table Source: Own elaboration

The arithmetic mean for the three communities reflects the same pattern previously described. The two-stroke engine and gasoline had the highest negative impact. Conversely, the four-stroke engine and fishing

gear were classified as very low. The indicators with the greatest positive impact (EET, VTP, CPB, and CDC) were situated at the medium level. However, three indicators (FDH, IET, and EPE) were considered to have a low impact. Finally, only one indicator -the GPS- was placed at the lowest level (Figure 2).

Figure 2. Behavior of impact indicators on fishery resources considering the average of the three SSF communities. The scale of the values on the y-axis corresponds to the four established categories

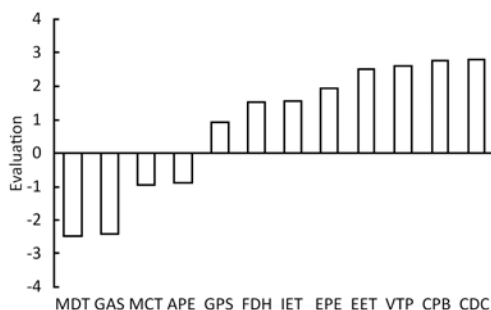


Figure Source: Own elaboration

The SSF in Mexico's coastal areas largely relies on the use of fishing equipment which includes the engine, vessel, and fishing gear. Like gasoline and other inputs, these have been subsidized to varying degrees. Von Moltke (2011) identifies eight categories of subsidies, four of which are similar to the indicators considered here: i) Management services ("fishery administration"), including monitoring, enforcement, and management research. ii) Capital cost subsidies, such as acquisition of vessels, fishing gear, soft loans, tax incentives, and others that encourage fleet renewal or modernization. iii) Variable cost subsidies, mainly fuels. iv) Income support for fishers. These categories are presented here, compared with the indicators used in this study, as well as with an internationally recognized classification of subsidies (Table 4).

Table 4. Comparison of the indicators used in this research with some conventional subsidy classifications

Subsidy categories¹	Indicators in the present study	Subsidy types²
Capital costs	SPE, MDT, MCT, APE, EPE, GPS, CPB, IET, EET, FDH, and VTP	Harmful (promote increased fishing effort and capacity)
Variable costs	GAS	Harmful (promote increased fishing effort)
Management services	CDC (Capacity Development Courses or diverse training)	Beneficial (promote responsible fishing and resource conservation)
Income support	SNP (to support household expenses or non-fishing subsidy)	Ambiguous (positive or negative impact depending on design and/or implementation)

Table Source: Own elaboration based on ¹von Moltke (2011) and ²Sumaila et al. (2019)

The CDC indicator corresponds to courses provided by the National Aquaculture and Fisheries Commission (CONAPESCA) from the late 2000s through 2018 (CONAPESCA, 2013, 2018). CONAPESCA developed these courses to improve fishing practices and onboard product handling, add value to fishery products, and fishery regulations. The SNP indicator refers to the economic support program “BIENPESCA” which grants 376 US dollars annually per fisher since 2020 (DOF, 2020). The state of Sinaloa grants an additional 50% for a total of 549 US dollars per year (CONAPESCA, 2024). Some fishers mentioned having received other federal government support through a program called “temporary employment,” implemented by institutions outside CONAPESCA. They also highlighted incentives granted by the government of Sinaloa to promote fishing activity.

Results of the correlation analysis indicate that, among the three subsidies of greatest interest, capacity development (considered beneficial) showed the highest number of associations, all positive. No correlations were observed with monetary subsidies (SPE and SNP). In particular, the strongest correlations were recorded in Chametla (Table 5).

Table 5. Kendall's rank correlation analysis between subsidy indicators (SPE, CDC, and SNP) and impact indicators on fishery resources

Indicators		Celestino Gazca	Mazatlan	Chametla
SPE vs	MDT		moderate (-)	
	APE	low (+)		
	EET		moderate (-)	
	SNP		moderate (+)	
CDC vs	MDT	moderate (+)		moderate (+)
	GAS			high (+)
	APE			high (+)
	EPE			moderate (+)
	GPS		moderate (+)	
	CPB			high (+)
	EET	high (+)		
	FDH		moderate (+)	
VTP	moderate (+)	high (+)		
SNP vs	MCT	low (-)		
	APE		moderate (-)	
	GPS			low (-)
	EET			moderate (-)
	VTP			low (-)

Table Source: Own elaboration.

Regarding the two monetary subsidies, fishing support (SPE) showed fewer moderate correlations compared to the non-fishing subsidy (SNP). However, the latter presented the weakest correlations ($-0.05 \leq \tau \leq 0.5$), all negative ($-0.49 \leq \tau \leq -0.06$), especially in Mazatlán ($-0.49 \leq \tau \leq -0.17$) and Celestino Gazca ($-0.43 \leq \tau \leq -0.06$). The fishing subsidy exhibited four significant correlation values ($p < 0.05$), evenly distributed between negative ($\tau = -0.60$) and positive ($0.41 \leq \tau \leq 0.65$). One of them was a moderate positive correlation with the non-fishing subsidy ($\tau = 0.65$). Chametla was the only site where no associations were identified for this subsidy ($0.08 \leq p \leq 0.70$), while in Celestino Gazca only one was observed (SPE vs. APE, $p < 0.05$, $\tau = 0.41$). However, with respect to the total number of significant correlations, Chametla was the locality with the most associations (38, $-0.55 \leq \tau \leq 0.98$), followed by Celestino Gazca (27, $-0.43 \leq \tau \leq 0.81$) and Mazatlán with 18 ($-0.61 \leq \tau \leq 0.90$).

By type of indicator, the most associated elements were fishing gear, warehouses (EET), the two-stroke engine (MDT), and the fishing pick-up. The indicator with the greatest number of negative correlations was EET.

Regarding the number of associations considering all indicators (Figure 3), Chametla showed the highest number of correlations (38), followed by Celestino Gazca (27). Mazatlán, although recording just under half the correlations observed in Chametla, presented only one less in the correlations of greatest interest.

Figure 3. Kendall's rank correlation between subsidy indicators (SPE, CDC, and SNP) and impact indicators on fishery resources for three localities. Blue and red circles represent positive and negative correlations respectively. The color intensity and size of the circles reflect the degree of correlation and the gray boxes significant correlations

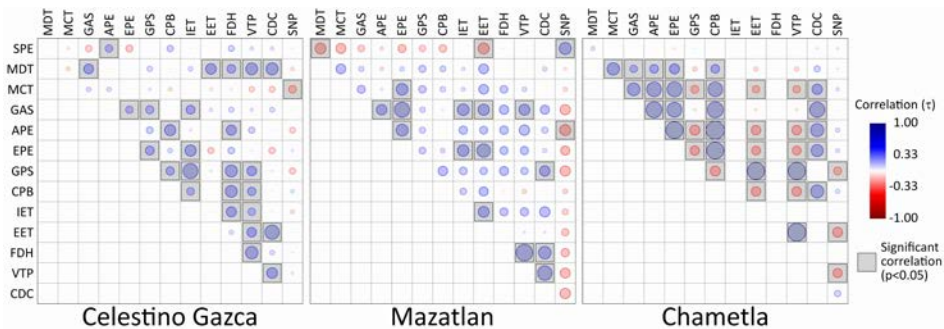


Figure Source: Own elaboration

The impact of pangas (EPE, $-0.51 \leq \tau \leq 0.93$) and fishing pick-up (VTP, $-0.52 \leq \tau \leq 0.98$) showed the highest number of significant correlations (17; $p < 0.05$), followed by fishing gear (APE, $-0.61 \leq \tau \leq 0.93$) and gasoline (GAS, $0.41 \leq \tau \leq 0.87$) also stand out with the same number of correlations (15). Other impact indicators with a significant number of correlations (14) include GPS, value-adding utensils (EET), and ice chests (cf., Figure 3). This general pattern matches the associations observed in the indicators of greatest interest (cf., Table 5), except for EPE, which was observed only once. Instead, the two-stroke engine appeared, which was not among the indicators with the most correlations.

3. DISCUSSION

For the small-scale fishers in the three study communities who conducted the self-assessment, the topic of subsidies captured their interest and allowed them to identify three common points: subsidies are economic support that affects family well-being, they can impact fishery resources, and fishing activity itself has environmental effects. Among the fisheries

subsidies (SPE) they have received, they believe that some (CPB, EET, and VTP) prevent deterioration and reduce losses, thus increasing their income. Regarding the fuel subsidy, although they admit its negative impact on both the environment and fishing, they believe it does not incentivize longer or more distant fishing trips, but rather reduces their main operating cost and improves their profits. The fishers do not consider the family income subsidy (SNP) harmful, but it could benefit them more if it were granted during the season when they need it most, as this depends primarily on the fisheries they engage in. Capacity building courses (CBC) were also highly valued by fishermen because they believe that training can lead to improvements in various aspects: fishing activity, personal or family life, community, and the environment.

The SPE subsidies (which include the vast majority of indicators), SNP, and CDC were considered the three key indicators in the correlational analysis. The similarity in the behavior of these indicators among the communities analyzed is low; however, at the local level, the correlations of interest showed agreement with the characteristics of the subsidies received and the socioeconomic conditions of the fishers.

The participatory approach allows for discussion with local fishermen about what is happening globally with subsidies.

To strengthen its validity, the study's objectives and rationale were transparently established before the participatory workshops, where the indicators and ratings were agreed upon. The teaching-learning process developed between researchers and participants allowed for immediate and continuous interaction (Guba and Lincoln, 1989). This fostered the construction of new knowledge based on their perceptions and discussions, particularly regarding the status of subsidies and influencing factors. The synthesis of these reflections was partially reflected in the self-assessment. Armstrong and Falk-Petersen (2008) highlight that, while fishers rarely formally assess the environmental impact of their activity, they are aware of its effects.

To facilitate comparison between communities, although there was a majority agreement prior to the workshops to use the same indicators, some indicators were not evaluated by certain participants in the self-assessment, a phenomenon also observed in studies of natural resource and wildlife valuation (e.g., Vaske et al., 2022). This was mainly due to the fact that the subsidies received differed among communities (IET, FDH, EET, VTP), or were perceived as irrelevant (e.g., GPS) given the type of fisheries they engaged in.

Specifically, regarding the granting of subsidies by the Mexican State to artisanal fishing, attention should be paid to the support for the acquisition of outboard motors, especially the “ecological” four-stroke motors (MCT), which have a lower environmental impact than two-stroke motors (MDT) (Martínez-Cordero and Sánchez-Zazueta, 2017).

In Mexico, artisanal fishing received an average of 20% of total fuel subsidies (Lara-González, 2024). Sinaloa accounted for 40% of coastal gasoline subsidies between 2011 and 2019, the period with the highest subsidies for fishing (Pedroza-Gutiérrez et al., 2023). Fishers in the three communities recognize that accessible and viable alternative energy sources for outboard motors are not yet available. Therefore, they consider the use of gasoline detrimental.

The fuel subsidy in the case of the PPE refers primarily to support for the purchase of gasoline for outboard motors. These are classified as variable costs and can be detrimental to fishery resources in a catch control system (von Moltke, 2011); while the magnitude depends on the level of subsidy, the degree to which technological changes in vessels increase catch capacity, and the combination of fisheries management measures. This is the case in Mexico, with a catch control regime; however, in the PPE the change in technologies on vessels is very limited, so the greatest impact would be due to the magnitude of the subsidy. An additional aspect is the changes that may occur in some fisheries in the type of fishing gear or capture method or both, which can impact fishery resources and the environment.

According to von Moltke (2011), the "Apoyo al Ingreso" subsidy includes: i) unemployment support and insurance for fishermen, and ii) support for shipowners in case of temporary cessation of activity. In Mexican artisanal fishing, the BIENPESCA subsidy is considered as income support for fishermen's households and has been granted to both salaried fishermen and the owner of the vessel, who usually actively participates in fishing.

Although correlation does not imply causation (Gershman and Ullman, 2023), the tau (τ) test allowed the identification of relationships between the type of positive or negative impact based on the ratings of the indicators that, at the local level, are related to the type of subsidies received.

Regarding the possible implications of the policy for fishing, the differences in the impact of subsidies could reflect the diverse conditions

among fishing groups. Therefore, further research of this type is recommended to guide the redesign of public policies, because, although certain patterns may be observed at the regional level, local circumstances in each area warrant analysis to find the best alternatives from a social, economic, and environmental perspective for granting subsidies.

A limitation of this study is that it began with an agreement with community representatives to decide among themselves who would participate in the workshop held in each of the three locations, thus determining the number of attendees. This number varied in each case but was generally lower than expected. This had implications for the type and scope of the statistical analysis. Therefore, it is desirable to explore strategies to ensure an attendance of between 20 and 30 people. This depends heavily on the context of each community, always keeping in mind the principles of transparency, respect, and equity.

In the correlation analysis we included all the indicators (14), however, given the emphasis of the study on subsidies, we considered the SPE, SNP and CDC indicators to be key, because they were the ones that best represented the emphasis given to them by the fishermen, however, this meant leaving out of the analysis possible correlations that, although they may be of interest, their inclusion requires a deeper and broader study.

CONCLUSIONS

Essential inputs such as gasoline and two-stroke outboard engines received negative evaluations; the same occurred, to a lesser extent, with the ecological four-stroke engine and fishing gear. This perception may be due to dialogue and shared reflection adopted during meetings with participants. The evaluated indicators showed a predominantly positive impact. Two subsidies stand out: one practical, ice chests to preserve the product and another more complex to evaluate: capacity building workshops (CDC), key to the sustainability of small-scale fisheries (SSF). The correlation among variables confirms the workshop and survey results, with greater interaction around the CDC subsidy, followed by the non-fishing subsidy (SNP), and lastly, the fishing subsidy (SPE), which relates to the number of beneficiaries during the analyzed period. The participatory approach allows for discussions with fishers, although on a general level, about what is happening with subsidies internationally. Their

opinions should be taken into account in the design of differentiated policies for the small-scale fishing sector.

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