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*Research*

# Opportunities and challenges for livelihood resilience in urban and rural Mexican small-scale fisheries

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ABSTRACT. Most small-scale fisheries (SSFs) in the developing world are exploited by rural communities, but global trends in coastal urbanization and development are rapidly transforming many SSF landscapes. The implications for livelihood resilience, or the capacity of a livelihood to overcome shocks and stresses, remain unknown. The environmental and economic shocks and stresses experienced by SSF communities are becoming more frequent and severe, highlighting the urgent need to understand how urban and rural SSF contexts influence how fishers build livelihood resilience. To shed light on this issue, we performed a systematic review of the Mexican SSF literature to compare constructions of livelihood resilience across urban and rural communities. Our findings suggest that attributes innate to urbanness and ruralness may influence how these communities and individuals build livelihood resilience. Specifically, our results suggest that population density, isolation, and the diversity of jobs available are associated with several indicator variables for livelihood resilience. Moreover, we find that the greatest threats to livelihood resilience in urban communities are weak incentives to cooperate and threats to ecosystems, while the greatest opportunities to achieve livelihood resilience are easier access to education and ample prospects for additional employment outside the fishing sector. In contrast, livelihood resilience in rural communities is most threatened by the relatively fewer opportunities for education and additional employment, but benefits from strong incentives to cooperate. Efforts to bolster livelihood resilience within SSF communities would benefit from considering these different opportunities and challenges presented by urban and rural contexts.

Key Words: *coastal development; livelihood resilience; Mexico; systematic literature review; urbanization*

## INTRODUCTION

Small-scale fisheries (SSFs) support approximately 90% of the world's fishers and are increasingly vulnerable to a variety of shocks and stresses (FAO 2020). Moreover, approximately 97% of these fishers live in the developing world (World Bank 2012), mostly in rural settings (FAO 2020). However, global trends in coastal development are forcing a growing number of SSF communities to adapt their traditional ways of life to urban environments (Aswani and Sabetian 2010, Leite et al. 2019, Kadfak 2020). To understand better how this transition may be affecting the ability of fishing livelihoods to withstand shocks and stresses, we conducted a systematic literature review that compares indicators for livelihood resilience in Mexico's urban and rural SSF communities. We find that conditions that are inherent to urbanness and ruralness profoundly affect how livelihood resilience is constructed within the studied communities and should be considered when implementing policies that seek to bolster livelihood resilience in SSF settings.

Global trends in environmental degradation and globalization present fishers with new shocks and stresses and exacerbate existing ones. For example, tropical cyclones, harmful algal blooms, and marine heatwaves have devastated many fishing communities in the past and are projected to become more extreme due to rising global temperatures (Knutson et al. 2010, Cavole et al. 2016, Gianelli et al. 2021). SSFs that are connected to globalized markets are also confronted by economic shocks such as sudden demand or supply shifts that can either induce overexploitation or reduce the profitability of the fishery (Berkes et al. 2006, Schmitt and Kramer 2009).

Because of the urgency of these problems, it is important to understand if and how SSF livelihoods and social-ecological systems can withstand such shocks and stresses. Perspectives in livelihood resilience, or the ability of a livelihood to maintain or improve its essential functions in the face of shocks and stresses (Ifejika Speranza et al. 2014), offer one way of achieving this understanding. Broadly, approaches aiming to characterize livelihood resilience rely on multidimensional analysis of the factors or circumstances that bolster or threaten livelihood resilience (Marschke and Berkes 2006, Liu et al. 2020). Thus, to account for the multiple factors that contribute to resilience within SSF communities and the multiple levels at which resilience can occur, we implement such an approach in our analysis. Importantly, these perspectives are also sufficiently insightful and flexible to assess the implications of global increases in coastal urbanization and development (Honey and Krantz 2007, Neumann et al. 2015).

Trends in coastal urbanization and development subject fishing communities to shifting social and ecological conditions and simultaneously promote and hinder the construction of different forms of livelihood resilience. Some studies, for example, have connected the urbanization of SSFs to weakened land tenure (thus threatening to evict communities from their historical

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fishing grounds) but increased opportunities for alternative sources of income that can be used to supplement fishery earnings (Fabinyi 2020, Kadfak 2020, Kadfak and Oskarsson 2020). However, although livelihood resilience has been studied across various rural agricultural and fishery settings (Marschke and Berkes 2006, Pelletier et al. 2016, Fang et al. 2018, Tebboth et al. 2019, Liu et al. 2020), it remains understudied in urban settings, including urban SSFs (Kadfak and Oskarsson 2020). Additionally, and to our knowledge, there are no studies that directly compare the livelihood resilience of urban and rural SSF communities. Such comparisons are necessary to highlight how the differences between these two settings can influence paths toward livelihood resilience.

Building on the contrast between these two types of coastal environments, our study's aim is to describe and explore patterns in how urban and rural settings play a role in the construction of livelihood resilience. We explore this question through a systematic review of the literature on Mexican SSFs, which account for roughly 40% of Mexican seafood production and directly support > 200,000 livelihoods along the Mexican coast (Fulton et al. 2019).

Mexico is an ideal boundary for this review for two reasons. First, many studies have examined and documented Mexican SSF communities in detail. Second, and consistent with the global trend, many coastal fishery livelihoods in Mexico are being exposed to new, more severe, and more frequent shocks and stresses due to trends in climate change and globalization. Many environmental disturbances that threaten fishers, such as tropical cyclones, droughts, rising oceanic temperatures, and algal blooms, are becoming more frequent and more intense in Mexico (Karl et al. 2008, Knutson et al. 2010, Ojeda et al. 2017, Ulloa et al. 2017, Arafeh-Dalmau et al. 2019, Cabanillas-Terán et al. 2019, Smale et al. 2019, Wang et al. 2019). In addition to being vulnerable to environmental processes, Mexican SSF communities are also being presented with new economic shocks and stresses due to trends in globalization (Bennett and Basurto 2018). The COVID-19 pandemic, for example, has highlighted how economic vulnerabilities in Mexican SSFs are exacerbated by connections to globalized markets. Among the affected were lobster fishers in the Pacific and Caribbean, who rely heavily on Chinese markets and experienced severe price reductions in January 2020 when the Chinese government imposed travel restrictions and lockdowns that reduced national demand for lobster (Bennett et al. 2020, Lopez-Ercilla et al. 2021).

Our review connects the documented patterns across urban and rural locations in the Mexican SSF literature to indicators for livelihood resilience. To do so, we draw from the framework for characterizing livelihood resilience developed by Ifejika Speranza et al. (2014). This framework defines four dimensions that contribute to livelihood resilience: buffer capacity, self-organization, learning capacity, and diversity. Because of its flexibility, the framework is appropriate for characterizing multilevel constructions of livelihood resilience through a literature review. Specifically, we use the framework as a structured means of reframing previous research through the lens of livelihood resilience and its several components.

Our analysis suggests that urban and rural fishers in Mexico generally build livelihood resilience in different ways. Specifically, and as reflected by the literature, the greatest threats to livelihood resilience in urban SSF communities are weak economic incentives to cooperate and threats to ecosystems; the greatest opportunities to achieve livelihood resilience are through easier access to education and ample prospects for additional employment outside the fishing sector. Conversely, the livelihood resilience of rural fishers is most threatened by the relatively few opportunities for education and additional employment, but benefits from strong incentives to cooperate.

Our study expands on the literature by shedding light on how urban and rural settings can shape livelihood resilience in SSFs and the relevance of these findings for policy-making. Through the comparison of livelihood resilience indicators, we identify key ways in which ruralness and urbanness can influence the construction of livelihood resilience. Although some of the patterns observed may be fully or partially driven by factors that are unique to Mexico, we highlight the similarities between the patterns observed in our review and patterns from livelihood resilience studies in non-Mexican SSFs. This cross-context overlap allows us to show that some of these patterns may be driven, at least in part, by features inherent to urbanness and ruralness. The results highlight that any policy or initiative aiming to bolster livelihood resilience in SSFs should consider the inherent challenges and opportunities presented by these contrasting coastal contexts.

## BACKGROUND: LIVELIHOOD RESILIENCE AND SMALL-SCALE FISHERIES

Livelihood resilience is the ability of a livelihood to maintain or improve its essential functions in the face of shocks and stresses. Shocks and stresses are pressures on social-ecological systems that are distinguished from one another by intensity and duration. Shocks represent a sudden and extreme pressure that is beyond the bounds of normal variability, such as a hurricane, whereas stresses are slowly building pressures that exist mostly within the bounds of normal variability, such as a drought (Turner et al. 2003).

Previous research within a variety of food-producing settings has sought to identify how social-ecological factors present different sources of livelihood resilience and affect livelihood resilience outcomes in the face of environmental disturbances such as volcanic eruptions, earthquakes, floods, droughts, tsunamis, and tropical cyclones (Crittenden et al. 2003, Joakim and Wismer 2015, Thulstrup 2015, Quandt et al. 2017, Fang et al. 2018, Sina et al. 2019, Liu et al. 2020, Campbell 2021). For example, within agricultural communities in northwest Ethiopia, Weldegebriel and Amphune (2017) find that households that are most resilient to flooding typically have stronger social networks, greater access to natural resources, and higher levels of education. That is, in that setting, households with those characteristics appear more likely to maintain their incomes and fulfill their nutritional needs after a flood.

Ifejika Speranza et al. (2014) account for such empirical findings to propose four primary dimensions of livelihood resilience that guide our analysis: buffer capacity, self-organization, learning capacity, and diversity (Table 1). Buffer capacity refers to the dimension of a livelihood that allows it to buffer shocks and stresses and fundamentally resist change through ownership or access to five types of capital: human, natural, financial, social,

**Table 1.** Indicators for livelihood resilience relevant to the patterns observed in this review.

| Dimension | Indicator | Indicator definition | Source |
|---|---|---|---|
| Diversity | Occupational multiplicity | The state of working across multiple sectors | Comitas (1964) |
| | Intra-sector diversity | Diversity of livelihood strategies within a sector | |
| Buffer capacity | Human capital | An individual's knowledge and capabilities | Grossman (2000) |
| | Natural capital | The stock of natural resources or ecosystem services that provides a sustainable flow of income | Costanza and Daly (1992) |
| Self-organization | Network structure | The orientation of the nodes and links that comprise a social network | Janssen et al. (2006) |
| | Cooperation and networks | The interactions between actors in a system that promote cooperation and lead to the creation of institutions | Ifejika Speranza et al. (2014) |
| | Institutions | Rules, norms, and formal organizations of people | Ifejika Speranza et al. (2014) |
| Learning capacity | Knowledge identification capability | The ability to identify useful knowledge and the willingness to experiment with new ideas | Ifejika Speranza et al. (2014) |

and physical. The status of these assets, along with the actions used to improve, maintain, or deplete them, define buffer capacity because they account for the resources from which individuals or communities may be able to draw in the event of a disturbance (Adger and Kelly 1999, Ifejika Speranza 2013). The self-organization dimension of livelihood resilience encompasses the spontaneous or deliberate formation of self-organization through rules, norms, and values. Different realizations of self-organization can bolster or hinder livelihood resilience through the formation of institutions and social-ecological linkages within the livelihood system. The learning capacity dimension of livelihood resilience is concerned with a social-ecological system's ability to adjust based on past experiences (Ifejika Speranza et al. 2014), endowing communities with the ability to learn from past shocks and stresses and prepare for future disturbances of the same nature. Diversity refers to the multiple ways in which livelihoods achieve their function. High levels of diversity confer livelihood resilience by providing alternate pathways toward achieving a livelihood in cases where shocks or stresses present challenges (Ifejika Speranza et al. 2014).

Ifejika Speranza et al. (2014) also propose several proxy indicators that allow researchers to operationalize the four dimensions of livelihood resilience, which are otherwise abstract and difficult to observe directly. We use several of these proxy indicators to frame the results of the review (Table 1). Additionally, we differentiate between two primary types of diversity: occupational multiplicity (livelihood diversity across sectors) and intra-sector diversity. Because livelihood resilience is largely dependent on local contexts and circumstances, certain dimensions and indicators of the framework will be more crucial in some contexts than in others. Accordingly, there is no defined combination or a minimum number of indicators that communities or individuals must demonstrate to achieve livelihood resilience. As such, our results are presented in terms of indicators for livelihood resilience rather than in terms of the presence or absence of livelihood resilience itself.

## METHODS

We performed a systematic review of the literature on Mexican SSF communities, which we divided into two stages: (1) a systematic and reproducible collection of relevant literature, and (2) four rounds of hierarchical coding. The first stage consisted of a search in Scopus and Web of Science, followed by inclusion or exclusion based on relevance criteria. To complete the search, we first created a comprehensive list of English and Spanish Boolean search terms (Table 2) to ensure that the searches captured all research that could be traced back to specific Mexican SSF communities. This is a purposefully broad swath of literature because livelihood resilience itself is a broad concept that presents itself in many ways. The searches were conducted on 07 December 2020. We recorded the title, author(s), and date of publication for each paper. The last search result yielded no additional relevant papers, suggesting that the searches were comprehensive. To determine which of these initial search results would ultimately be included in the review, we read at least through the abstract of each paper and applied a simple set of inclusion criteria. That is, to be included in the review, the publication must (1) have contained information about modern (i.e., not based on the archeological record), coastal Mexican SSFs; (2) have contained social or ecological information relevant to the livelihood resilience of one or more specific fishing communities; and (3) have been written in English or Spanish (the languages understood by the authors and in which information was likely to be published). The second criterion was necessary because, to make comparisons between livelihood resilience in urban vs. rural settings, each piece of information used in the analysis must have been able to be connected to a specific locality with corresponding census data.

The second stage consisted of a qualitative analysis with four rounds of hierarchical coding. The first round was to record in a spreadsheet the names of the communities being studied, the population of each community, and the state(s) in which the communities were located, for each publication. If the publication provided such details, we also recorded the problems, successes, shocks, and stresses experienced by the communities; the importance of tourism to the local economy; the target species; whether the communities were urban or rural; and local population characteristics. The importance of tourism, an industry often promoted as a potential source of livelihood diversity for communities relying on resource extraction (Bernard et al. 2007, Mbaiwa and Stronza 2010, Leu 2019), to the local economy was considered to be "high" if it was clear in the literature that tourism-related activities provided full or partial employment to a significant number of residents or accounted for a significant amount of money flowing into the community. The importance of tourism to the local economy was considered

**Table 2.** List of Boolean search terms used to obtain literature for this review.

| English terms | Spanish terms |
|---|---|
| "Mexico" AND ("small-scale fishery" OR "artisanal fishery") | "México" AND ("pesca de pequeña escala" OR "pesca artesanal") |
| "Mexico" AND "fishing community" | "México" AND "comunidad pesquera" |
| "Mexico" AND "fishery" AND ("social-ecological system" OR "socio-ecological system") | "México" AND "pesquería" AND "sistema socio-ecológico" |
| "Mexico" AND ("fishers" OR "fishermen") AND "community" | "México" AND "pescadores" |

to be "low" if the opposite was clear. If the literature was unclear regarding the role of tourism in the community, this category was left blank.

We recorded the population of each community using census data from the census year nearest to the date of the reviewed literature's publication (INEGI 2021). We used the National Institute of Statistics and Geography's definition to determine whether a community was "urban" (> 2500 inhabitants) or "rural" (≤ 2500 inhabitants; INEGI 2016). We chose this definition over others because it was the most practical to apply given the large number of communities included in our data set.

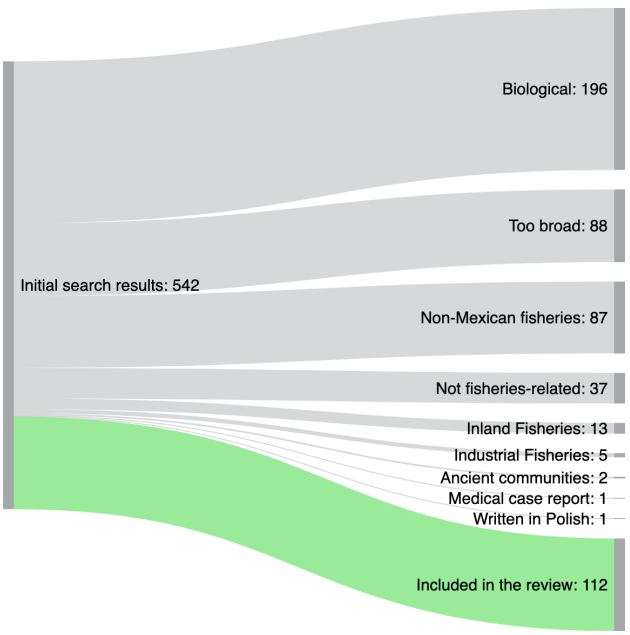
We implemented three additional rounds of hierarchical coding to reveal patterns of livelihood resilience within urban and rural communities. The second round of coding placed each "success", "problem", and "local population characteristic" into a more specific category. For example, each piece of information related to education was coded under the education category. We created new spreadsheets for each category. Each piece of data in these spreadsheets remained connected to the specific community from which it came. This second round facilitated the third round of coding, which looked for patterns related to livelihood resilience within each category and to determine whether each category's patterns differed between urban and rural communities. For example, were educational patterns within urban settings similar to or noticeably different from educational patterns within rural settings? Multiple patterns may have been observed within a single category, some consistent across urban and rural communities and some not. The final round of coding placed each of these patterns under a specific indicator of livelihood resilience. We discuss the major patterns and indicators in the following section.

## RESULTS

The initial search results comprised 542 unique publications, with 112 publications ultimately included in the review. Of the 542 initial results, 196 focus solely on biological aspects of the fishery that bear no direct connection to livelihood resilience (e.g., the dietary composition of a given species), 88 contain only broad data that could not be connected to any particular community, 87 study non-Mexican fisheries, 37 are not fisheries related, 13 study inland fisheries, 5 study industrial fisheries, 2 study the archeological record of ancient communities, 1 was a medical case report, and 1 was written in Polish (Fig. 1).

The 112 relevant publications that were included study anywhere between 1 and 12 communities and represent 102 unique communities in total (see Appendix 1 for full list). The represented communities come from Baja California Sur (39), Sonora (14), Quintana Roo (9), Tabasco (8), Jalisco (7), Yucatán (7), Baja California (5), Sinaloa (5), Campeche (2), Oaxaca (2), Veracruz (2), Colima (1), and Nayarit (1). Seventy-four of these communities are rural (≤ 2500 residents) and 28 are urban (> 2500 residents; Fig. 2). The median population of the rural communities is 393 people, and the median population of the urban communities is 12,104 people. The reported shocks faced by these communities include hurricanes, algal blooms, the 2008 global financial crisis, floods, sudden shifts in demand for seafood products, and forest fires. Stresses include droughts, illegal fishing, decreased freshwater flow into estuaries, seasonal variability, interannual variability (El Niño/La Niña), climate change, increasing numbers of resource users, health impacts from frequent and untreated decompression sickness, pollution, and coastal development.

**Fig. 1.** Visualization of initial search results and excluded (gray) vs. included (green) publications




### Diversity

Both rural and urban SSFs demonstrate a similar propensity for intra-sector diversity, but important differences arise in terms of occupational multiplicity. Intra-sector diversity and occupational multiplicity confer livelihood resilience to fishers via risk spreading and income gains.

Differences in occupational multiplicity extend to both the type of additional occupations that fishers assume and the likelihood

of having multiple occupations. Urban fishers supplement their income as tour guides, construction workers, restaurateurs, taxi drivers, painters, guards, restaurant workers, waiters, gardeners, maintenance workers, and divers (Robles-Zavala 2014, Finkbeiner 2015, Nenadović et al. 2016, Manjarrez-Bringas et al. 2018, Ojeda-Ruiz et al. 2018). Rural fishers earn nonfishing income as tour guides, agricultural workers, miners, construction workers, taxi drivers, restaurateurs, ranchers, and by renting out rooms or cabins and participating in biological monitoring programs funded by nongovernmental organizations (NGOs; Chuenpagdee et al. 2002, Sievanen 2014, Audefroy and Sánchez 2017, Metcalfe et al. 2020, Quintana et al. 2020). Also, urban fishers are generally more likely to have achieved occupational multiplicity than their rural counterparts (Arceo and Granados-Barba 2010, Avila-Forcada et al. 2020, Bravo-Olivas and Chávez-Dagostino 2020).

Although urban fishers have the highest quantity of opportunities for occupational multiplicity, the highest quality opportunities (as measured by pay and job satisfaction) are in rural communities. These high-quality opportunities are found in communities with thriving ecotourism industries (Young 1999, Marín-Monroy and Ojeda-Ruiz de la Peña 2016, Kaplan-Hallam et al. 2017, De la Cruz-González et al. 2018, Uc-Espadas et al. 2018). For example, in Punta Allen and Río Lagartos, despite local abundance of valuable fisheries resources, some fishers reduce fishing effort or abandon fishing completely in favor of higher paying ecotourism jobs (Sosa-Cordero et al. 2008, Méndez-Medina et al. 2015, Kaplan-Hallam et al. 2017). These opportunities, however, are rare because most rural communities do not have ecotourism industries.

**Fig. 2.** Map showing the Mexican states (orange), rural communities (red points), and urban communities (black points) represented in the review.

Although the literature presents tourism as the most common source of occupational multiplicity for both urban and rural fishers (Arceo and Granados-Barba 2010, Morzaria-Luna et al. 2014, Robles-Zavala 2014, Velez et al. 2014, Villanueva-Poot et al. 2017), there are important differences in the relationships between tourism and these two types of communities. First, urban communities are more likely to have tourism industries that are important to the local economy. Of the 74 rural communities represented in the study, 12 have strong local tourism economies compared to 19 of the 28 urban communities. Also, the nature of tourism jobs offered to fishers differs between rural and urban communities. Fishers from rural areas and smaller urban communities more often work as tour guides or tour boat crew members, whereas fishers from larger urban communities more often work as hotel maintenance staff, restaurant workers, and construction workers (Azcárate 2006, Barr and Mourato 2009, Ojeda-Ruiz et al. 2018, Uc-Espadas et al. 2018, Rubio-Cisneros et al. 2019).

In contrast, intra-sector diversity is mostly achieved by targeting multiple species, and this practice is common for both rural and urban SSFs. In fact, every community observed in our review targets multiple species for their commercial value.

In addition, some urban and rural communities with strong tourism industries show an interplay between opportunities for occupational multiplicity and intra-sector diversity. Specifically, in addition to providing opportunities for occupational multiplicity, local tourism activity can create markets for species that otherwise would have had little to no commercial value, providing fishers with additional viable target species. Such patterns occur in Loreto with chocolate clams, various finfish in Isla Holbox, and grouper in La Paz (Sievanen 2014, Rubio-Cisneros et al. 2019, Pellowe and Leslie 2021).

Occupational multiplicity and intra-sector diversity can bolster livelihood resilience by providing fishers with more paths toward earning a living, allowing fishers to manage risk and potentially accumulate more wealth. Specifically, occupational multiplicity allows fishers to manage risk by providing alternative sources of income that remain steady, even when fishing becomes temporarily less profitable. For example, in response to the increasing frequency of storms in the region that negatively affect fishing, many fishers in San Felipe, Yucatán have bolstered their resilience to such events by allocating more time and resources toward ranching, a livelihood activity that benefits from the storms (Metcalfe et al. 2020). Through supplemental income, occupational multiplicity also allows many fishers to accumulate more wealth than through fishing alone (Sosa-Cordero et al. 2008, Méndez-Medina et al. 2015, Kaplan-Hallam et al. 2017). Intra-sector diversity can also provide both risk management and increased income benefits. Some communities reap both benefits by regularly alternating between two or more species based on value and availability, thus maximizing income while decreasing the risk of overexploitation (Duer-Balkind et al. 2013, Schneller et al. 2014, Saldaña et al. 2017).

Because there are no distinguishable differences in the literature between urban and rural fishers in terms of intra-sector diversity, the most important differences in diversity between them are related to occupational multiplicity. In this respect, our results suggest that urban fishers have access to the greatest number of opportunities, whereas rural fishers have access to the highest quality opportunities.

**Buffer capacity**

Although our review indicates that Mexican SSF communities display all five indicators for buffer capacity, the strongest patterns and differences between urban and rural communities relate to

human and natural capital. Disparities in educational opportunities account for the differences in human capital, whereas varying levels of overexploitation and coastal development account for the differences in natural capital. Low levels of natural capital can limit livelihood resilience by reducing income flow and preventing the accumulation of other forms of capital that can be tapped into during times of scarcity. Low education levels limit fishers' opportunities for occupational multiplicity.

Education represents the strongest pattern related to human capital and is more prevalent in urban communities. Although other forms of human capital are also important for fishers, such as health, age, and years of experience, there is insufficient information concerning those variables to produce readily visible patterns. All three studies that directly compare the education levels of nearby rural and urban populations find that urban fishers generally have more years of formal education (Jiménez-Badillo 2008, Bravo-Olivas et al. 2015, Marín-Monroy and Ojeda-Ruiz de la Peña 2016). Perhaps relatedly, rural communities are sometimes located hours away from the nearest high school (Quintana et al. 2020). Proximity to educational opportunities in urban communities is followed by a pattern in which younger members are encouraged to finish high school or attend college. This pattern is evidenced by the fact that the younger members of some urban communities have received more years of formal education than previous generations did (Peterson 2014, Sievanen 2014). This pattern is consistent with sentiments expressed by urban fishers across the country who wish for their children to receive an education and seek employment outside of the fishing industry (Jiménez-Badillo 2008, Peterson 2014, Peláez 2020). These sentiments may be connected to Mexican fishers' general sense of pessimism about the future of their trade (Jiménez-Badillo 2008, Peterson 2014, Bravo-Olivas et al. 2015, Rodríguez-Quiroz et al. 2018, Ramos-Muñoz et al. 2019).

Still, like rural fishers, urban small-scale fishers have generally low levels of education compared to the wider population and might be more constrained by their education than their rural counterparts. For both groups of fishers, it is common for approximately one-half of the fishing community not to have completed primary education (i.e., < 6 years of formal education; Hernández-Ramírez et al. 2008, Barr and Mourato 2009, Schneller et al. 2014, Manjarrez-Bringas et al. 2018, Rodríguez-Quiroz et al. 2018). For reference, the mean duration of schooling in Mexico was 8.8 yr in 2019 (UNDP 2019). Urban fishers appear to be more affected by their low level of education in that it prevents them from obtaining desirable jobs outside the fishing sector that are otherwise within proximity (Jiménez-Badillo 2008, Peterson 2014, Manjarrez-Bringas et al. 2018). In comparison, the alternative livelihood opportunities available to rural fishers generally do not require secondary or tertiary education. As a result, formal education may have less influence over livelihood resilience in rural settings, where there are few opportunities to leverage it for alternative forms of employment.

There are also important patterns in the literature related to natural capital, which is mostly threatened by (1) overexploitation and (2) habitat destruction and degradation. While both urban and rural communities across Mexico face both threats, they appear to be felt more intensely in urban communities.

Overexploitation in Mexican SSFs is fueled by a growing number of resource users and difficulties in maintaining resource exclusivity; the problem is most acute in urban SSFs. Both urban and rural communities have difficulties in coping with fishing pressure from outsiders (Cinti et al. 2010*a,* 2014, Espinosa-Romero et al. 2014, Vázquez 2017, Bennett and Basurto 2018, De la Cruz-González et al. 2018). In some cases, the communities have no legal recourse to prevent outsiders from exploiting their local resources (Cudney-Bueno and Basurto 2009, Schneller et al. 2014, Kaplan-Hallam et al. 2017, Quintana and Basurto 2021). Outside pressure also commonly comes from illegal fishers (Cinti et al. 2010*a,* 2014, Vázquez 2017, Bennett and Basurto 2018, Raya and Berdugo 2019, Rubio-Cisneros et al. 2019). Instances of illegal fishing are often accompanied by shortcomings in monitoring and enforcement on behalf of the government (Reyes et al. 2009, Aguilar-González et al. 2014, Palacios-Abrantes et al. 2018, Aranda-Fragoso et al. 2020, Méndez-Medina et al. 2020). These limitations in enforcement result from lack of capacity and corruption (e.g., taking bribes in exchange for turning a blind eye), and are commonly observed in both rural and urban areas. However, trends in how far fishers travel to fish suggest that problems with overexploitation may be most severe among urban communities, where there are higher densities of resource users. Four studies compare the average distances traveled by fishers in urban and rural communities, and each finds that fishers from the urban community[ies] generally travel furthest (Moreno-Báez et al. 2012, Cinti et al. 2014, Sievanen 2014, Raya and Berdugo 2019). One study compares 17 communities (12 rural and 5 urban) in Sonora, Baja California, and Baja California Sur; four of the five communities that travel the furthest to fish are urban (Moreno-Báez et al. 2012). One possible explanation for this pattern is that the fishing grounds nearest these urban communities have been overexploited, forcing fishers to venture further away. Alternatively, this pattern could be explained by infrastructure that facilitates longer travel distances near urban areas, such as major roads.

The literature indicates that few communities have managed to avoid overexploitation. Those that have are rural, have concessions (territorial use rights for fishing, or TURFs) for high-value benthic species, and are either very isolated or are close to geographical features that allow the community to effectively regulate outsiders' access to the fishing grounds (Basurto 2005, Des Lauriers 2009, Méndez-Medina et al. 2015, Cota-Nieto et al. 2018, Rubio-Cisneros et al. 2019).

Urban SSFs also suffer the most from habitat destruction and degradation resulting from coastal development and urban waste (Lagunas et al. 2002, Azcárate 2006, Jiménez-Badillo 2008, Robles-Zavala 2014, Baker et al. 2020). Some of these impacts are linked to large-scale tourism industries (Flores-Skydancer 2002, Azcárate 2006, Jiménez-Badillo 2008, Baker et al. 2020). In certain cases, these problems are exacerbated by inadequate municipal infrastructure that allows untreated pollutants to enter the ocean (Lagunas et al. 2002, Robles-Zavala 2014, Baker et al. 2020).

In sum, our review suggests that the buffer capacity of urban SSF communities benefits from greater education opportunities and suffers from more intense threats to natural capital compared to the buffer capacity of rural communities. Despite the comparative

advantages of each setting, neither strongly demonstrates the discussed indicators, as rural SSF communities also experience great difficulties with overexploitation and urban SSF communities are nonetheless less educated than the general populace.

**Self-organization**

Our review indicates that differences in the self-organization of urban and rural SSFs arise through an interplay of three indicators: network structure, cooperation and networks, and institutions. Specifically, unequal economic incentives to cooperate in rural vs. urban areas may shape local network structures that either impede or facilitate cooperation and the development of rules and norms. These differing network structures matter for livelihood resilience because collective action is necessary for community-level responses to shocks and stresses.

In terms of network structure, incentives to cooperate can play an influential role in shaping the dominant local access mechanisms in urban vs. rural locations. The documented cases suggest that the two most common avenues for fishers to achieve access to regulated fishery resources in Mexico are through cooperative membership or patron-client arrangements. In patron-client arrangements, permit holders, or "patrons", serve as middlemen, sponsoring "free fishers" with whom they have entered a working relationship. Findings from Basurto et al. (2013*a*) suggest that some incentives to work in cooperatives may be more powerful in rural communities. Specifically, among 12 communities in Baja California Sur, they find that distance to the first point of commercialization is correlated with the dominant access mechanism in a community. Isolated fishers in communities with high distances to market were more likely to join cooperatives, whereas fishers in communities with shorter distances to market were more likely to enter patron-client arrangements. This finding suggests that isolated, rural fishers are incentivized to form cooperatives to reduce the high transaction costs of commercialization that result from long distances to markets. For individual fishers in isolated communities, it can be prohibitively expensive to sell products without assistance because of the temporal and financial costs associated with transporting their product. Fishers that belong to cooperatives can pool their resources to benefit from economies of scale, for example, by transporting their collective catch in a large, refrigerated truck. Urban fishers, however, are more likely to live within proximity of middlemen (patrons; Basurto et al. 2013*a*) and other potential buyers such as fish markets, hotels, restaurants, and end-consumers. Therefore, with lower transaction costs of commercialization, urban fishers lack one of the most important incentives to join or create a fishing cooperative, possibly disincentivizing the initial establishment of cooperatives in urban areas or leading to higher rates of cooperative failure.

Consistent with this idea, our results indicate that, in the considered cases, cooperative membership is more common among rural communities, whereas patron-client arrangements are more common among urban communities. In addition to the pattern described by Basurto et al. (2013*a*), we can describe the dominant local access mechanisms of 21 unique localities using the information gathered from our review. There are five communities in which the majority of fishers are in patron-client arrangements, three urban and two rural (Cinti et al. 2010*b,* 2014, Bennett and Basurto 2018, Manjarrez-Bringas et al. 2018, Siegelman et al. 2019). There are twelve communities in which the majority of fishers belong to cooperatives, ten rural and two urban (Jiménez-Badillo 2008, Hoffman 2014, Velez et al. 2014, Méndez-Medina et al. 2015, Cota-Nieto et al. 2018, López Torres et al. 2018, Torre et al. 2019, Mendoza-Portillo et al. 2020, Quintana et al. 2020). In three communities, two urban and one rural, approximately one-half of all fishers belong to a cooperative, whereas the other half work for patrons (Jiménez-Badillo 2008, Barr and Mourato 2009, Bennett and Basurto 2018). While these numbers are consistent with the unequal incentives to cooperate between urban and rural communities, the small sample size implies that further research is needed to draw strong conclusions concerning the rural-urban distribution of cooperative and patron-client networks.

With potential implications concerning the success of collective action, cooperatives and patron-client arrangements dictate how different social nodes of the network are or are not linked. Although practices vary from cooperative to cooperative, members, in theory, regularly meet with each other, develop informal norms and rules to coordinate sustainable fishing effort, pool resources, and use their collective voice to communicate and negotiate with buyers, suppliers, the government, NGOs, and academia. Decisions are often made democratically through majority vote (Sosa-Cordero et al. 2008, Basurto et al. 2013*a,* Méndez-Medina et al. 2015, De la Cruz-González et al. 2018). Thus, while being born out of a need for collective action to reduce transaction costs of commercialization, cooperatives also serve as a structure to facilitate further collective action that can be harnessed to address a variety of other problems. The primary social links within a patron-client network are between the patron and fishers. Here, without a formal institution to connect fishers with one another, achieving cooperation and collective action is much more difficult.

This pattern of differing propensities for collective action is important because collective action can be conducive to livelihood resilience. Specifically, collective action can facilitate sustainable resource use and community-level responses to shocks and stresses. An example comparing the responses to an economic shock in two communities in the state of Yucatán, Río Lagartos and Celestún, illustrates the implications that these two network structures have for collective action, the establishment of rules and norms, and, potentially, livelihood resilience. In 2013 and 2014, both communities established connections with Asian markets for sea cucumber, a highly valuable resource, leading to influxes of prospective fishers and the threat of overexploitation. The fishers of Río Lagartos, a rural community where approximately one-half of all fishers belong to cooperatives, came together through their cooperatives to form local access rules to control aggregate fishing effort. In Celestún, an urban community dominated by patron-client arrangements, the few cooperative members were overpowered by the patrons, who profited from the sudden surge in fishing effort and continued to sponsor an influx of resource users (Bennett and Basurto 2018). In this way, by facilitating cooperation and the establishment of rules, the network structure of the Río Lagartos fishers may have promoted resilience to a sudden surge in demand that threatened to lead to

**Table 3.** Summary of the most important patterns observed in this review, according to the corresponding indicator variables for livelihood resilience.

| Dimension | Indicator | Rural pattern | Urban pattern |
|---|---|---|---|
| Diversity | Occupational multiplicity | Fishers have few, higher quality employment opportunities outside the fishing sector | Fishers have many lower quality employment opportunities outside the fishing sector |
| | Intra-sector diversity | Frequently practiced | Frequently practiced |
| Buffer capacity | Human capital | More difficult to access opportunities for formal education | Easier to access opportunities for formal education |
| | Natural capital | Relatively less damaged | Relatively more damaged |
| Self-organization | Network structure | Fishers are more commonly organized into cooperatives | Fishers are more commonly organized according to patron-client relationships |
| | Cooperation and networks | Dominant local network structure and economic incentives facilitate cooperation | Dominant local network structure and economic incentives impede cooperation |
| | Institutions | Incentives to cooperate lead to the development of informal rules and norms | Less evidence of informal rules and norms playing an important role in governing behavior |
| Learning capacity | Knowledge identification capability | Open to collaboration with academia, nongovernmental organizations, and government scientists | Open to collaboration with academia, nongovernmental organizations, and government scientists |

overexploitation, whereas the network structure of the fishers in Celestún may have impeded successful collective action and created vulnerability to such a shock.

These patterns suggest that the self-organization of rural fishing communities is conducive to livelihood resilience by facilitating the protection of the resource base and collective action in the face of disturbances. In sum, economic incentives in rural and urban communities that stem from transaction costs may play an important role in shaping local network structures that, respectively, facilitate and impede cooperation and the development of local institutions. We see the potential implications of this relationship between indicators for livelihood resilience (network structure, cooperation and networks, and institutions) in the example of Río Lagartos and Celestún. That is, without network structures that facilitate cooperation, urban communities may face greater challenges in developing institutions and relationships that would enable resource management and community-level responses to shocks and stresses. Thus, stronger incentives to cooperate and existing social structures (i.e., cooperatives) in rural areas may facilitate the collective action that is necessary to recover from stresses and shocks, whereas the scarcity of these incentives and structures in urban areas presents urban communities with obstacles in achieving similar outcomes.

### Learning capacity

Communities with high learning capacity can gather new knowledge and apply it to resilience-building activities. Knowledge identification capability, or the ability to identify useful knowledge and the willingness to experiment with new ideas, is an indicator of learning capacity demonstrated by both urban and rural communities.

The most prominent manifestation of knowledge identification capability in Mexican SSFs is through community engagement with NGOs, academia, and government scientists. Through this engagement, fishers receive knowledge about no-take zones and learn the skills necessary to conduct biological monitoring programs (Basurto et al. 2013*b,* Gardner et al. 2017, Cota-Nieto et al. 2018, De la Cruz-González et al. 2018, Torre et al. 2019).

Regardless of whether these collaborative relationships produce direct livelihood resilience benefits, willingness to engage in these relationships indicates a capacity to accumulate new knowledge that can catalyze institutional and behavioral changes that support livelihood resilience (Ifejika Speranza et al. 2014). In some instances, the knowledge gained through scientific collaboration directly serves as this catalyst. For example, the successful implementation of no-take zones, a common aim of such collaboration, can aid communities in maximizing the economic potential of the resource base over time, allowing fishers to build buffer capacity through the accumulation of natural and financial capital. We observe this type of collaboration and knowledge sharing in both rural and urban communities. Therefore, learning capacity, through knowledge identification capability, may be a source of livelihood resilience for both rural and urban Mexican SSFs. However, of the four dimensions of livelihood resilience, learning capacity is the least studied. More data are needed to tease out patterns (Table 3).

## DISCUSSION

With this review, we aim to uncover patterns of how livelihood resilience is constructed in urban vs. rural communities. We find patterns that differ across urban and rural communities related to diversity, buffer capacity, and self-organization, and observe no great differences in learning capacity. Differences in diversity extend to occupational multiplicity whereby urban communities have the greatest quantity of opportunities while rural communities possess the highest quality opportunities. Of the five types of capital that confer buffer capacity, urban and rural communities differ most in natural and human capital: natural capital is generally less degraded in rural environments, whereas opportunities for formal education are more available in urban communities. The self-organization of rural communities appears more conducive to collective action because of the networks and institutions that arise from greater incentives to cooperate. The scarcity of information in the literature directly relating to learning capacity in Mexican SSF communities indicates a research gap that scientists must explore further.

While these results shed light on the potential mechanisms behind livelihood resilience in SSF communities, there are a few

limitations of this review. First, we acknowledge that the literature is likely not exhaustive of all SSF communities in Mexico, and there might be important patterns that have been systematically missed by researchers. These limitations arise from the fact that our review and conclusions rely solely on what other researchers have observed and chosen to write about. For example, researchers may be more likely to study cases of exceptionally successful fisheries governance rather than failures or cases that are more widely representative. Another bias relates to the unequal representation of rural and urban communities in the literature. Specifically, the breadth of relevant information available for rural communities is far greater than for urban communities, an observation that is consistent with the underrepresentation of urban fisheries in the broader SSF literature. Similarly, there are likely other important urban-rural patterns linked to indicators for livelihood resilience that are not captured by the existing body of literature. For this reason, we only discuss the presence of indicators for livelihood resilience, rather than their absence. In addition, because of the context-specific nature of livelihood resilience outcomes, the indicators captured by our review should not be conflated with true resilience. These caveats imply that our results must be corroborated by future research that directly connects indicators for livelihood resilience to outcomes, with an emphasis on urban SSF communities. Furthermore, because this study is purely observational, we cannot make causal inferences or broad inferences about the population of SSF fishers in Mexico.

Another challenge to this analysis is the inherently arbitrary task of deciding what is "urban" and what is "rural." Although several scholars have attempted to define these words, often describing "urban" and "rural" as a continuum rather than a binary classification, neither term has an agreed-upon definition (Hoggart 1990, Deavers 1992, Woods 2010). For ease of comparison, our analysis follows the 2500-inhabitants threshold definition used by the Mexican federal government. We choose this definition because it is the most practical to apply given our reliance upon census data and the large number of communities included in our analysis. The downside of this definition, however, is that it is, in some respects, arbitrary and oversimplistic. Any definition of ruralness or urbanness is arbitrary to a certain extent, but picking a hard cutoff based on population may be particularly so. Also, focusing entirely on the total population of a locality glosses over other attributes that have been used by scholars to characterize rural and urban areas, such as population density, distance from large population centers, and degree of specialization (Deavers 1992). Nonetheless, we compensate for these shortcomings by considering how factors related to isolation (e.g., distance to the nearest point of commercialization), density (e.g., number of resource users, urban waste), infrastructure (e.g., proximity to schools), and specialization (e.g., occupational multiplicity) influence livelihood resilience. In fact, these factors related to urbanness and ruralness potentially explain most of the patterns we observe in this review. Thus, while the definition in use may be simplistic, it serves as a sufficient jumping-off point for further analysis in which other factors related to urbanness and ruralness are considered.

Bearing in mind these limitations, our review contributes to the broader livelihood resilience literature by identifying urbanness and ruralness as potentially influential factors in the construction of livelihood resilience. Through a comparison of livelihood resilience indicators, we show how factors related to attributes inherent to urbanness and ruralness facilitate or hinder the realization of livelihood resilience in SSF communities. Such factors include transaction costs of commercialization, coastal degradation, educational opportunities, and alternative livelihood opportunities. These findings fit into the broader efforts of scholars to identify how local contexts can influence livelihood resilience sources and outcomes. Specifically, scholars have studied how livelihood resilience is shaped by differing policies, infrastructure, social networks, resettlement scenarios, and access to social services and capital (Crittenden et al. 2003, Marschke and Berkes 2006, Joakim and Wismer 2015, Thulstrup 2015, Weldegebriel and Amphune 2017, Fang et al. 2018, Sina et al. 2019, Liu et al. 2020). The goal of such studies is often to use these context-specific observations to produce policy recommendations that aim to bolster livelihood resilience under a specific set of circumstances (Thulstrup 2015, Weldegebriel and Amphune 2017, Liu et al. 2020). Within this context, our literature review is the first study to consider directly how factors related to urbanness and ruralness might shape livelihood resilience while also highlighting the relevance of these findings for policy.

Our findings are consistent with previous studies of the impacts of urbanization on SSF communities outside of Mexico, underscoring the idea that these patterns might be driven by general factors inherent to urban vs. rural environments. For example, in a case study of the fishing community in Tota-Bengre, India, Kadfak (2020) highlights several of the livelihood diversity benefits that urban fishers enjoy. These benefits mainly derive from proximity to markets, processing facilities, financial institutions, schools, and opportunities for alternative career paths. Similar to our review, Kadfak (2020) demonstrates that diversification opportunities allow fishers to accumulate more wealth and manage risk. Another case from Ubatuba, Brazil offers a recent example of an SSF community that has experienced urbanization due to the expansion of tourism. A multilevel resilience study conducted by Leite et al. (2019) finds that opportunities for part- or full-time employment in tourism-related activities in Ubatuba cushion the economic blow of declining fish stocks. However, the authors also observed an association between tourism development and the deterioration of social capital due to increasing individual independence and decreasing community interdependence. Parallels in that case can be drawn to the high levels of livelihood diversity, low levels of natural capital, and weak incentives to cooperate in urban Mexican SSF communities. We hypothesize that these weaker incentives to cooperate are related to lower transaction costs and reduced distance to markets. Corroborating this idea, Cinner (2005) finds that higher distance to markets is correlated with stronger customary sea tenure systems among 21 coastal communities in Indonesia and Papua New Guinea, demonstrating how incentives to cooperate may strengthen community rules and other local institutions. Lastly, the adverse effects of coastal development and population growth on coastal ecosystems and fisheries, such as pollution, habitat loss or alteration, eutrophication, and changed salinity, are well documented globally (Islam and Tanaka 2004, Crain et al. 2009, Barbier et al. 2011). Thus, in line with our results, past studies have connected factors related to specialization (Leite et al. 2019, Kadfak 2020), isolation (Cinner 2005), and density (Islam and Tanaka 2004, Crain et al. 2009, Barbier et al. 2011) to indicators

for livelihood resilience, suggesting that some features inextricable from urban and rural environments may lead to important differences in how fishers construct livelihood resilience.

By comparing current constructions of livelihood resilience across urban and rural communities, we can hypothesize how opportunities and challenges in achieving livelihood resilience may or may not change due to urbanization. Following this line of thinking, we see that intra-sector diversity and learning capacity will likely continue to remain sources of livelihood resilience for SSF communities, despite advancements in urbanization. Conversely, urbanization may potentially disrupt cooperation, natural capital, and certain types of institutions in SSF social-ecological systems while promoting widespread occupational multiplicity and providing easier educational access.

Similarly, any future efforts to bolster livelihood resilience within Mexican SSF communities should account for the role that urbanness and ruralness have in shaping constructions of livelihood resilience. When aiming to foster livelihood resilience in any setting, policies need to consider how immutable features of the setting offer both limitations and opportunities. Rather than resisting trends in coastal urbanization, categorizing these trends as inherently harmful to fishers, and attempting to maintain previous ways of life and organizational structures, it is important to consider how coastal urbanization may unlock new livelihood pathways for fishers and the potential for these new pathways to bolster livelihood resilience. For example, our analysis suggests that policy-makers who are aiming to bolster livelihood resilience in urban SSFs may consider leveraging the accessible opportunities for occupational multiplicity and education. Similarly, in rural areas, policy-makers might consider leveraging the economic incentives and community network structures that are conducive to collective action.

Some of the pathways to bolster the resilience of urban SSF livelihoods (education and occupational multiplicity) could lead urban fishers to abandon the fishing sector entirely as alternative livelihood opportunities arise. As observed in our review, urban and rural Mexican fishers alike have expressed a general sense of pessimism about the future of their fisheries, citing changing weather patterns, pollution, lack of assistance from authorities, low earnings, increasing numbers of fishers, poor fisheries organization, low quality of life, illegal fishing, declining catches, exclusion from fishery resources, and coastal development (Jiménez-Badillo 2008, Peterson 2014, Bravo-Olivas et al. 2015, Kaplan-Hallam et al. 2017, Rodríguez-Quiroz et al. 2018, Ramos-Muñoz et al. 2019, Metcalfe et al. 2020). However, through opportunities for education and occupational multiplicity, urban fishers may be more empowered to act on this pessimism and abandon fishing in favor of other more lucrative or more stable work, which would explain the growing emphasis on fishers' children completing secondary school and college within urban communities. This trend has been observed not only in Mexico but in other parts of the world as well (Kadfak 2020, Kadfak and Oskarsson 2020). In this way, urban fishers abandoning the trade is not necessarily a threat to livelihoods, but possibly one route that fishers are taking to adapt to their changing environments and the decline of fisheries. Therefore, policy-makers aiming to bolster livelihood resilience within urban fishing communities must account for this possibility by ensuring that their policies do not resist such a transition.

Nonetheless, our review indicates that small-scale fishing is still persistent in urban Mexican communities, with the number of urban small-scale fishers potentially growing as trends in coastal development and urbanization progress. Future research should continue to investigate how this growing demographic can respond to problematic global trends in environmental and economic shocks and stresses.

## CONCLUSION

Our study implements a systematic review of the literature on Mexican SSF communities to identify patterns in indicators for livelihood resilience across urban and rural settings. Comparatively, the results indicate that livelihood resilience in rural areas benefits from strong self-organization, whereas livelihood resilience in urban areas benefits from opportunities for formal education and occupational multiplicity. Through this comparison, we provide insights into the possible implications of coastal urbanization and development for livelihood resilience in SSFs. We recommend that policy aiming to bolster livelihood resilience in SSFs considers the opportunities and challenges for achieving livelihood resilience presented by urban and rural settings. Because this is an observational study, further research is needed to confirm our results, especially in urban communities, which may be currently underrepresented in the literature. Such research is critical in the effort to understand how urban and rural small-scale fishers are coping with the variety of shocks and stresses that are strengthening and becoming more frequent due to climate change, coastal development, and globalization.

*Responses to this article can be read online at:*
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**Data Availability:**

*The data gathered throughout this review and the results of the hierarchical coding process are available openly in the Harvard Dataverse repository at https://doi.org/10.7910/DVN/6GQWDY*

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**Appendix 1**

Table A1.1. List of communities represented in the review

| Locality | State | Urban/Rural | # of publications locality appears in |
|---|---|---|---|
| Isla Guadalupe | Baja California | Rural | 1 |
| Bahía de los Angeles | Baja California | Rural | 3 |
| El Barril | Baja California | Rural | 1 |
| Pueblo Cedros | Baja California | Rural | 1 |
| San Felipe | Baja California | Urban | 5 |
| San Juanico | Baja California Sur | Rural | 1 |
| Isla Magdalena | Baja California Sur | Rural | 1 |
| Laguna San Ignacio | Baja California Sur | Rural | 2 |
| Puerto Aldofo Lopez Mateos | Baja California Sur | Rural | 8 |
| El Pardito | Baja California Sur | Rural | 2 |
| El Sargento | Baja California Sur | Rural | 3 |
| Cabo Pulmo | Baja California Sur | Rural | 1 |
| San Nicolás | Baja California Sur | Rural | 1 |
| Juncalito | Baja California Sur | Rural | 1 |
| Ligüí | Baja California Sur | Rural | 2 |
| Ensenada Blanca | Baja California Sur | Rural | 2 |
| Puerto Agua Verde | Baja California Sur | Rural | 4 |
| La Ventana | Baja California Sur | Rural | 3 |
| San Juan de la Costa | Baja California Sur | Rural | 1 |
| Agua Amarga | Baja California Sur | Rural | 1 |
| Bonfil | Baja California Sur | Rural | 1 |
| Boca de Sauzoso | Baja California Sur | Rural | 1 |
| Punta de los Muertos | Baja California Sur | Rural | 1 |
| Punta Abreojos | Baja California Sur | Rural | 3 |
| San Evaristo | Baja California Sur | Rural | 3 |
| Ensenada de Cortés | Baja California Sur | Rural | 2 |
| La Ribera | Baja California Sur | Rural | 2 |
| Puerto Chale | Baja California Sur | Rural | 2 |
| Isla Natividad | Baja California Sur | Rural | 3 |
| Campo René | Baja California Sur | Rural | 1 |
| Ejido Luis Echeverría | Baja California Sur | Rural | 1 |
| El Cardón | Baja California Sur | Rural | 1 |

| | | | |
|---|---|---|---|
| Santa Martha | Baja California Sur | Rural | 1 |
| La Palma Sola | Baja California Sur | Rural | 1 |
| Punta Alta | Baja California Sur | Rural | 1 |
| La Cueva | Baja California Sur | Rural | 1 |
| Nopoló | Baja California Sur | Rural | 1 |
| El Portugués | Baja California Sur | Rural | 1 |
| Punta Coyote | Baja California Sur | Rural | 1 |
| Puerto San Carlos | Baja California Sur | Urban | 8 |
| Loreto | Baja California Sur | Urban | 3 |
| La Paz | Baja California Sur | Urban | 5 |
| Santa Rosalía | Baja California Sur | Urban | 1 |
| El Centenario | Baja California Sur | Urban | 1 |
| Isla Arena | Campeche | Rural | 2 |
| Villa Madero | Campeche | Urban | 1 |
| Manzanillo | Colima | Urban | 1 |
| Chimo | Jalisco | Rural | 1 |
| La Cruz de Loreto | Jalisco | Rural | 2 |
| Pérula | Jalisco | Rural | 1 |
| Tenacatita | Jalisco | Rural | 1 |
| La Manzanilla | Jalisco | Rural | 1 |
| Puerto Vallarta | Jalisco | Urban | 1 |
| Barra de Navidad | Jalisco | Urban | 1 |
| Santa Cruz de Miramar | Nayarit | Rural | 1 |
| Álvaro Obregón | Oaxaca | Urban | 1 |
| San Dionisio del Mar | Oaxaca | Urban | 1 |
| Punta Allen | Quintana Roo | Rural | 8 |
| Isla Holbox | Quintana Roo | Rural | 1 |
| Punta Herrero | Quintana Roo | Rural | 4 |
| María Elena | Quintana Roo | Rural | 4 |
| Xcalak | Quintana Roo | Rural | 2 |
| Chetumal | Quintana Roo | Urban | 1 |
| Cancún | Quintana Roo | Urban | 1 |
| Playa del Carmen | Quintana Roo | Urban | 1 |
| Tulum | Quintana Roo | Urban | 1 |
| El Huitussi | Sinaloa | Rural | 2 |
| El Tortugo | Sinaloa | Rural | 1 |
| Boca del Río | Sinaloa | Rural | 2 |

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|---|---|---|---|
| Mazatlán | Sinaloa | Urban | 2 |
| El Cerro Cabezón | Sinaloa | Urban | 1 |
| Rodolfo Campondonico | Sonora | Rural | 1 |
| Desemboque de los Seris | Sonora | Rural | 2 |
| Puerto Lobos | Sonora | Rural | 2 |
| Agiabampo | Sonora | Rural | 1 |
| Bahía San Jorge | Sonora | Rural | 1 |
| Punta Jagüey | Sonora | Rural | 1 |
| Santo Tomás | Sonora | Rural | 1 |
| Punta Chueca | Sonora | Rural | 11 |
| Desemboque | Sonora | Rural | 2 |
| Puerto Peñasco | Sonora | Urban | 7 |
| Bahía de Kino | Sonora | Urban | 11 |
| Golfo de Santa Clara | Sonora | Urban | 5 |
| Guaymas | Sonora | Urban | 1 |
| Puerto Libertad | Sonora | Urban | 2 |
| Ejido Chiltepec | Tabasco | Rural | 1 |
| Ranchería José Maria Morelos | Tabasco | Rural | 1 |
| Puerto de Chiltepec | Tabasco | Rural | 1 |
| Ejido Libertad | Tabasco | Rural | 1 |
| Ejido Carrizal | Tabasco | Rural | 1 |
| Colonia Nuevo Torno Largo | Tabasco | Rural | 1 |
| Miguel de la Madrid | Tabasco | Rural | 1 |
| Puerto Ceiba | Tabasco | Urban | 1 |
| Veracruz | Veracruz | Urban | 3 |
| Antón Lizardo | Veracruz | Urban | 3 |
| Río Lagartos | Yucatán | Rural | 6 |
| San Felipe | Yucatán | Rural | 7 |
| Las Coloradas | Yucatán | Rural | 1 |
| Sisal | Yucatán | Rural | 2 |
| Dzilam Bravo | Yucatán | Rural | 2 |
| Celestún | Yucatán | Urban | 3 |
| Progreso | Yucatán | Urban | 1 |