Supplementary Material

# Supplementary Data

Survey

Survey to identify the teachings, knowledge, and communication channels of current and future generations

Date (dd/mm/yyyy): \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Good morning, my name is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and I am part of the organization Comunidad y Biodiversidad, A.C. (COBI). We are surveying community members to conduct a study to identify knowledge and the best routes to communicate scientific information to the entire community. Your participation is voluntary and the information you provide us will be treated confidentially. Your name, opinions, and any information you provide us will only be available to COBI and will be used solely for this purpose. You can decide not to answer any question at any time.

Respondent information. Next, I will ask you for personal information. If you object to providing certain information, please indicate your preference.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Age: \_\_\_\_\_\_\_\_\_ Gender/Sex: \_\_\_\_\_\_\_

Occupation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Number of years in the occupation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Organization/Cooperative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Post/Function: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Traditional Ecological Knowledge. Perception and prior knowledge. Next, I will ask you a series of knowledge and perception questions about fishing in your area. \*When we refer to knowledge, we mean the traditional or empirical knowledge transmitted or acquired.

1. What traditional knowledge do you think your community has of fishing?
2. How did you learn this knowledge?
3. Do you believe that knowledge of fishing has been lost? Why?
4. What knowledge has been lost?
5. If you are 29 years old or older, what knowledge would you like to transmit to younger generations?

5b. What tools or capabilities do you think you can learn from younger generations?

1. If you are less than 29 years old, what knowledge would you like to share with the current generation of fishers?

6b. What tools or capabilities can you learn from the current generation of fishers?

1. How do you imagine the fishers of the future?

Prior knowledge. Next, I will list different topics related to conservation and fishing.

1. Which of the following topics do you already know? Interviewer: Put an E if you have heard and understood it and an L if you have read and understood it. You can mention both options.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Global warming  |  | Vulnerable species |  | Ecosystem services |  |
| Adaptation to change and collective action |  | Functional species |  | Payments for ecosystem services |  |
| Adaptation and resilience of the fishing sector |  | Trophic networks  |  | Impacts of changes in temperature and oxygen on fisheries |  |
| Resource variability |  | Social, ecological, and economic vulnerability |  | Gender roles |  |
| Protected natural areas |  | Oceanographic processes |  | Gender equality |  |
| Marine reserves  |  | Ocean acidification |  | Participation of men and women in resource management and care  |  |
| Fishing refuge zones |  | El Niño effects |  | Decision-making (individual, cooperative, community) |  |
| Larval distributions and recruitment |  | Fishery certifications and ecolabels |  | Science communication |  |
| Maximum sustainable yield |  | Fishery improvement projects |  | Citizen science |  |
| Species connectivity  |  | Criteria for certification standards |  | Ecological fishery knowledge  |  |
| Ecosystem-based management |  | Fishery management tools |  |  |  |

1. How did you learn about the topics you mentioned? You can select more than one. In the case of WhatsApp and Facebook, indicate by UNDERLINING if you acquired the information by video, image, or text.

|  |  |  |
| --- | --- | --- |
| Social networks | Traditional means of communication | In-person or written |
| WhatsApp(Video, image, or text) |  | Printed newspaper |  | Workshop |  |
| Facebook(Video, image, or text) |  | Brochures |  | Presentation |  |
| Web page |  | Posters |  | Course |  |
| YouTube |  | Radio |  | Printed report |  |
| Email |  | Television |  | Scientific article |  |
| Instagram |  | Documentary |  | Book |  |
| Twitter |  | Movie |  | Magazine |  |
| Other: | Other: | Other: |

1. If any institute or organization was involved in sharing the topics above, could you indicate which ones?

|  |  |  |
| --- | --- | --- |
| Actor | Mark with X | Institution/Organization, etc. |
| NGO/CSO |  |  |
| Academia |  |  |
| Government |  |  |
| Cooperative |  |  |
| Company |  |  |
| Family |  |  |
| Other: |  |  |

1. Of the topics you mentioned, which ones have influenced your cooperative or community? Why?
2. Tell me what knowledge or lesson you have shared.

How have you shared it?

Who did you teach?

1. Do you consider that the lesson or knowledge you shared impacted the person who taught it to you? If yes, could you explain why? If no, go to question 14.
2. What do you think is the best way to communicate knowledge or information??

If you are 25 years old or older, how would you communicate knowledge to younger generations?

1. If you are under 25 years old, how would you communicate knowledge to the current generation of fishers?
2. Do you know if any research and/or conservation projects are being conducted in your community? By whom?

|  |  |
| --- | --- |
| Project Name/Topic | Person responsible |
|  |  |
|  |  |

Media. Next, I will ask you some questions regarding the main media outlets you use in your community to learn about fishing and scientific information. Tell me which ones you use to learn about general topics and which you use to learn about specific fishing, research, and conservation topics and the like.

1. How do you report the news? Interviewer: Indicate with an x ​​if you consult the media for general topics or for fishing topics.

|  |  |  |  |
| --- | --- | --- | --- |
| Media | General topics  | Fishing topics | Frequency of use/participation(number of times per week) |
| Television |  |  |  |
| Printed newspaper |  |  |  |
| Radio |  |  |  |
| Facebook |  |  |  |
| WhatsApp |  |  |  |
| Fishing cooperative assemblies |  |  |  |
| Meetings with government representatives |  |  |  |
| Meetings with researchers |  |  |  |
| Meetings with NGOs/CSOs /private companies |  |  |  |
| Other: |  |  |  |

1. Do you use social networks? If yes, continue with question 18. If not, go to question 19.

a) Yes b) No

1. What social networks do you use? Tell me which 3 you use most frequently (indicate from highest to lowest, with 1 being most important and 3 being least important) and which device you use to access it:

|  |  |  |
| --- | --- | --- |
| Social network | Rank | Through the phone, computer, or other device |
| Facebook |  |  |
| WhatsApp |  |  |
| Twitter |  |  |
| Youtube |  |  |
| Instagram |  |  |
| Tiktok |  |  |
| Otros  |  |  |

1. Finally, what would be the best way to inform the community about topics of interest, conservation projects, and scientific activities that take place in the community?

For my part, that is all. I appreciate your time and availability to answer the interview questions. The results will strengthen the exchange of knowledge between the fishing sector and other institutions so that all interested and involved parties in the fishing sector are aware of what is happening within the fishing communities. Thank you.

# Supplementary Figures and Tables

Interviewees Regions: Pacific coast of Baja California (PB), Gulf of California (GC), Mexican Caribbean (MC). Gender: Man (M), Woman (F). Number: Consecutive interview number.

|  |  |  |
| --- | --- | --- |
| Region | Gender | Number |
| GC | M | 1 |
| GC | M | 2 |
| GC | M | 3 |
| GC | M | 4 |
| GC | M | 5 |
| GC | M | 6 |
| GC | M | 7 |
| GC | M | 8 |
| GC | M | 9 |
| GC | M | 10 |
| GC | M | 11 |
| GC | M | 12 |
| GC | M | 13 |
| GC | M | 14 |
| GC | M | 15 |
| GC | M | 16 |
| GC | M | 17 |
| GC | M | 18 |
| GC | M | 19 |
| GC | M | 20 |
| GC | M | 21 |
| GC | M | 22 |
| GC | W | 1 |
| GC | W | 2 |
| GC | W | 3 |
| GC | W | 4 |
| GC | W | 5 |
| GC | W | 6 |
| GC | W | 7 |
| GC | W | 8 |
| GC | W | 9 |
| GC | W | 10 |
| GC | W | 11 |
| GC | W | 12 |
| GC | W | 13 |
| GC | W | 14 |
| GC | W | 15 |
| GC | W | 16 |
| GC | W | 17 |
| GC | W | 18 |
| GC | W | 19 |
| GC | W | 20 |
| GC | W | 21 |
| GC | W | 22 |
| PB | M | 1 |
| PB | M | 2 |
| PB | M | 3 |
| PB | M | 4 |
| PB | M | 5 |
| PB | M | 6 |
| PB | M | 7 |
| PB | M | 8 |
| PB | M | 9 |
| PB | M | 10 |
| PB | M | 11 |
| PB | M | 12 |
| PB | M | 13 |
| PB | M | 14 |
| PB | M | 15 |
| PB | M | 16 |
| PB | M | 17 |
| PB | M | 18 |
| PB | M | 19 |
| PB | M | 20 |
| PB | M | 21 |
| PB | M | 22 |
| PB | M | 23 |
| PB | M | 24 |
| PB | M | 25 |
| PB | M | 26 |
| PB | M | 27 |
| PB | M | 28 |
| PB | M | 29 |
| PB | M | 30 |
| PB | M | 31 |
| PB | M | 32 |
| PB | M | 33 |
| PB | M | 34 |
| PB | M | 35 |
| PB | M | 36 |
| PB | M | 37 |
| PB | M | 38 |
| PB | M | 39 |
| PB | M | 40 |
| PB | W | 1 |
| PB | W | 2 |
| PB | W | 3 |
| PB | W | 4 |
| PB | W | 5 |
| PB | W | 6 |
| PB | W | 7 |
| PB | W | 8 |
| PB | W | 9 |
| PB | W | 10 |
| PB | W | 11 |
| PB | W | 12 |
| PB | W | 13 |
| PB | W | 14 |
| PB | W | 15 |
| MC | M | 1 |
| MC | M | 2 |
| MC | M | 3 |
| MC | M | 4 |
| MC | M | 5 |
| MC | M | 6 |
| MC | M | 7 |
| MC | M | 8 |
| MC | M | 9 |
| MC | M | 10 |
| MC | M | 11 |
| MC | M | 12 |
| MC | M | 13 |
| MC | M | 14 |
| MC | M | 15 |
| MC | M | 16 |
| MC | M | 17 |
| MC | W | 1 |
| MC | W | 2 |
| MC | W | 3 |
| MC | W | 4 |

# Important topics identified in the leadership program (COBI 2020, Fernández et al. 2022).

|  |
| --- |
| Topic |
| Global warming  |
| Protected natural areas |
| Gender equality |
| El Niño effects |
| Marine reserves |
| Governance |
| Vulnerable species |
| Sustainable fisheries |
| Fishery resource management |
| Fishing refuge zones |
| Fishery improvement projects |
| Ecological fishery knowledge |
| Fishery management tools |
| Larval distributions and recruitment |
| Resource variability |
| Impacts of climate change on fisheries |
| Fishery certifications and ecolabels |
| Gender roles |
| Vulnerable communities |
| Adaptation to climate change |
| Adaptation and resilience of the fishing sector |
| Science communication |
| Ecological connectivity |
| Oceanographic processes |
| Citizen science |
| Ecosystem-based management |
| Maximum sustainable yield |
| Functional species |
| Ocean acidification |
| Trophic networks |
| Ecosystem services |
| Payments for ecosystem services |

# External actors that transfer knowledge to fishing communities.

|  |  |
| --- | --- |
| **Academia** | **Mentions** |
| Universidad Autonoma de Baja California (UABC) | 18 |
| Stanford University | 15 |
| Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (CICESE) | 9 |
| Universidad Autonoma de Baja California Sur (UABCS) | 7 |
| Universidad of California, San Diego (UCSD) | 2 |
| Centro de Investigaciones Biológicas del Noroeste (CIBNOR) | 1 |
| Universidad of California, Santa Cruz (UCSC) | 1 |
| Univerisdad Nacional Autonoma de México (UNAM) | 1 |
| University of Georgia | 1 |
| Centro de Investigación en Alimentación y Desarrollo (CIAD) | 1 |
| Instituto Mauren | 1 |
| Universidad de Quintana Roo | 1 |
| **Civil society organizations** |  |
| Comunidad y Biodiversidad (COBI) | 76 |
| Ocean Revolution | 29 |
| Grupo de Ecología y Conservación de Islas (GECI) | 25 |
| Prescott College | 19 |
| Smartfish | 15 |
| Grupo Tortuguero | 13 |
| Sociedad de Historia Natural Niparaja | 7 |
| Alianza Kanan Kay (AKK) | 7 |
| Christensen Fund | 3 |
| Environmental Defense Fund (EDF) | 2 |
| Reef Check | 2 |
| Four North American Wild Sheep | 3 |
| Amigos de Sian Ka'an | 2 |
| Centro Intercultural de Estudios de Desiertos y Océanos (CEDO) | 1 |
| Conservación y Manejo Cmiique | 1 |
| Fondo Mexicano para la Conservacion de la Naturaleza (FMCN) | 1 |
| Laura Monti | 1 |
| NextGen | 1 |
| Pronatura Noroeste | 1 |
| Oceanus | 1 |
| Pelagicos | 1 |
| The Nature Conservancy (TNC) | 1 |
| WILD COAST | 1 |
| **Government institutions** |  |
| Comisión Nacional de Áreas Naturales Protegidas (CONANP) | 59 |
| Instituto Nacional de los Pueblos Indígenas (INPI) | 28 |
| Comisión Nacional de Acuacultura y Pesca (CONAPESCA) | 18 |
| Instituto Nacional de Pesca y Acuacultura (INAPESCA) | 17 |
| Secretaría de Agricultura y Desarrollo Rural (SADER) | 12 |
| Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora (CEDES) | 6 |
| Procuraduría Federal de Protección al Ambiente (PROFEPA) | 3 |
| Secretaria Pesca y Acucultura Estatla (SEPESCA) Baja California | 3 |
| Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) | 1 |
| Fondo para la Protección de Recursos Marinos (FONMAR) | 1 |
| Instituto de Acuacultura del Estado de Sonora (IAES) Sonora | 1 |
| Secretaría de Desarrollo Agropecuario, Rural y Pesca (SEDARPE) Quintana Roo | 1 |
| Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) | 1 |
| Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria (SENASICA) | 1 |
| SEPESCA | 1 |
| Vida Silvestre (SEMARNAT) | 1 |
| **Fishing cooperatives** |  |
| Cooperativa Buzos y Pescadores de la Baja California | 16 |
| Federación Regional de Sociedades Cooperativas Pesqueras (FEDECOOP) | 10 |
| Cooeprativa Ensenada | 8 |
| Purísima | 5 |
| Cooperativa Banco Chinchorro | 3 |
| Cooperativa Jovenes Ecopescadores | 2 |
| Cooperativa California San Ignacio | 2 |
| Cooperativa Pescadores de Vigía Chico | 2 |
| Cooperativa Emancipación | 2 |
| Cooperativa Bahía Tortugas | 2 |
| Cooperativa Pescadores Nacionales de Abulón | 1 |
| Cooperativa José María Azcorra | 1 |
| Cooperativa Langosteros del Caribe | 1 |
| Cooperativa Punta Abreojos | 1 |
| Comité de Pesca y Acucultura de Puerto Libertad | 1 |
| Cooperativa Progreso | 1 |