

COMMUNITY CONSULTATION
ON THE OPERATION AND FUTURE OF THE

Gulf Province Fish Maw Fishery



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SUMMARY

The Piku Biodiversity Network (PBN) met with communities in the Kikori region of the Gulf Province Fish Maw Fishery ahead of the Kikori Bycatch Workshop in Port Moresby, Papua New Guinea on 14–16 October 2025. Fish maw is dried swim bladder, highly prized in Asian cuisine. In August 2025, the PBN held interviews with community leaders, fishers, buyers of fish maw, and key informants, either individually or in small groups.

Immense concern for the sustainability and wastage of fish maw byproducts were expressed by interviewees. They reported that fish are becoming harder to catch and that sizes of fish caught are declining. Fishing effort is also conducted further from shore than previously observed. The feedback from fishers, buyers, and community leaders indicates a fishery that is being overexploited. Driving this is an under-regulated market for fish maw that is controlled by expatriate owned companies. Many of these companies only purchase fish maw, and often only *Nibea squamosa* (jewel fish, locally called ‘stone fish’) fish maw, and interviewees express immense frustration and concern over the volume of wasted byproduct (meat from fish that have maws harvested) and bycatch (species without maws). The main sentiment is that the fish maw fishery is undermining the economic resource potential of the region’s fishery, and rapidly overexploiting it, with sincere concern expressed for intergenerational sustainability.

Interviewees want greater management input from the National Fisheries Authority. The three most common management themes put forward by interviewees were 1) increased access to markets for meat so that they can realise the full economic potential of their catch and negate issues with disposal of fish maw byproduct and bycatch, 2) restrictions in effort and gear; specifically reduced numbers of nets and banning of large mesh sizes, and 3) increased tools and training for reducing bycatch, and release of bycatch. Ultimately, controls on fisher effort and improved infrastructure for better market access for meat products presents a complex situation. Fishing effort needs to be reduced, but doing so needs to be done carefully so as to not further undermine the economic security of communities. Efforts to increase the number of fish processing plants, or better access to meat markets also need to be carefully considered, and must be paired with clear guidelines on which species can be sold and which must be protected from commercial sale.

Collectively, the Gulf Province Fish Maw Fishery requires significant reform. Protection of the fisheries long-term sustainability, protection of fishers economic security, and mitigation of threatened species bycatch remain the core issues a management plan needs to address. All interviewees wanted change and the introduction of management measures.

1. Background information on the operation of the fishery

1.1 Spatial characteristics

The Gulf Province Fish Maw fishery operates in all provincial customary waters. This fishery lacks formally defined spatial boundaries, but is dictated by customary tenures which extend to 3 km out to sea from the coast, and the ecological distribution of target species within this area (Figure 1). Most fishing effort occurs along the coastal fringe of the Kikori-Puari Delta, where there is more marine water influence and greater abundance of larger estuarine fish targeted for maw. Fishing activity is most intense from October to March (dry season), when southeast trade winds dissipate. In the wet season (April to September), the southeast trade wind leads to rough water conditions and fishing activity is more limited, and is conducted mostly behind delta islands.

Within the Gulf of Papua, the fish maw fishery also extends into Western Province customary waters, from the Bamu River, southwest until at least the Mia Kussa River, though likely further west toward the Papua Indonesia boarder (Grant et al. 2021a, 2021b). The Gulf of Papua Prawn Trawl Fishery also operates in the Gulf of Papua (White et al. 2019). This fishery is defined by nine spatial management units. Management units 3–8 extend from the customary tenure boundary (3 km from shore), offshore, while management units 0–2 are mostly offshore.

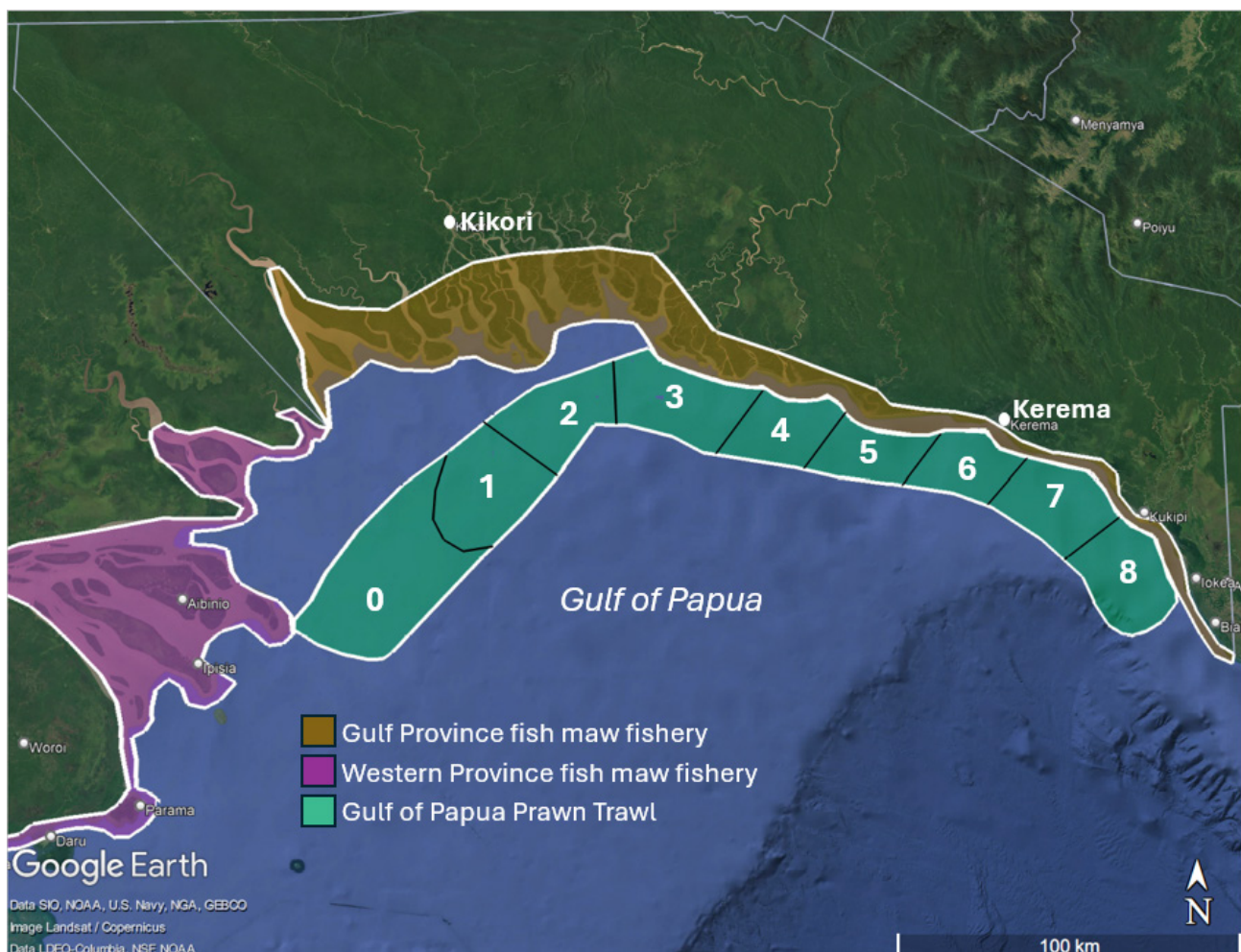


FIGURE 1. Approximate spatial areas of the fish maw fishery in Gulf Province and Western Province, and the management zones of the Gulf of Papua Prawn Trawl. Customary waters extend 3 km from shore and form the inshore boundary of the Gulf of Papua Prawn Trawl Fishery.

Within the Gulf Province fish maw fishery area, individual fishers are restricted to fishing within the customary waters of their associated family, clan, or tribe. Observation of fishing effort in 2021/2022 found that fishers have fishing camps scattered throughout their customary waters which act as a temporary residence for fishing activity. Communities situated on the coast conduct most of their fishing effort in close proximity to their village, or fishing camps. Individuals in communities further up the delta may leverage kinships to fish within customary waters of coastal villages.



FIGURE 2. Observation of fishing effort made during the 2021/2022 fishing season (October to March). Stars represent village locations and circles of corresponding color represent location of fishing camps. Image sourced from Grant et al. (2022).

1.2 Fishery trade and market structure

The structure of the fish maw market in Gulf province has three general parts (Figure 3):

1. Companies that purchase fish maw and export it to Port Moresby.
2. Buyers, who act on behalf of companies to buy fish maw from fishers.
3. Fishers who catch and sell fish maw.

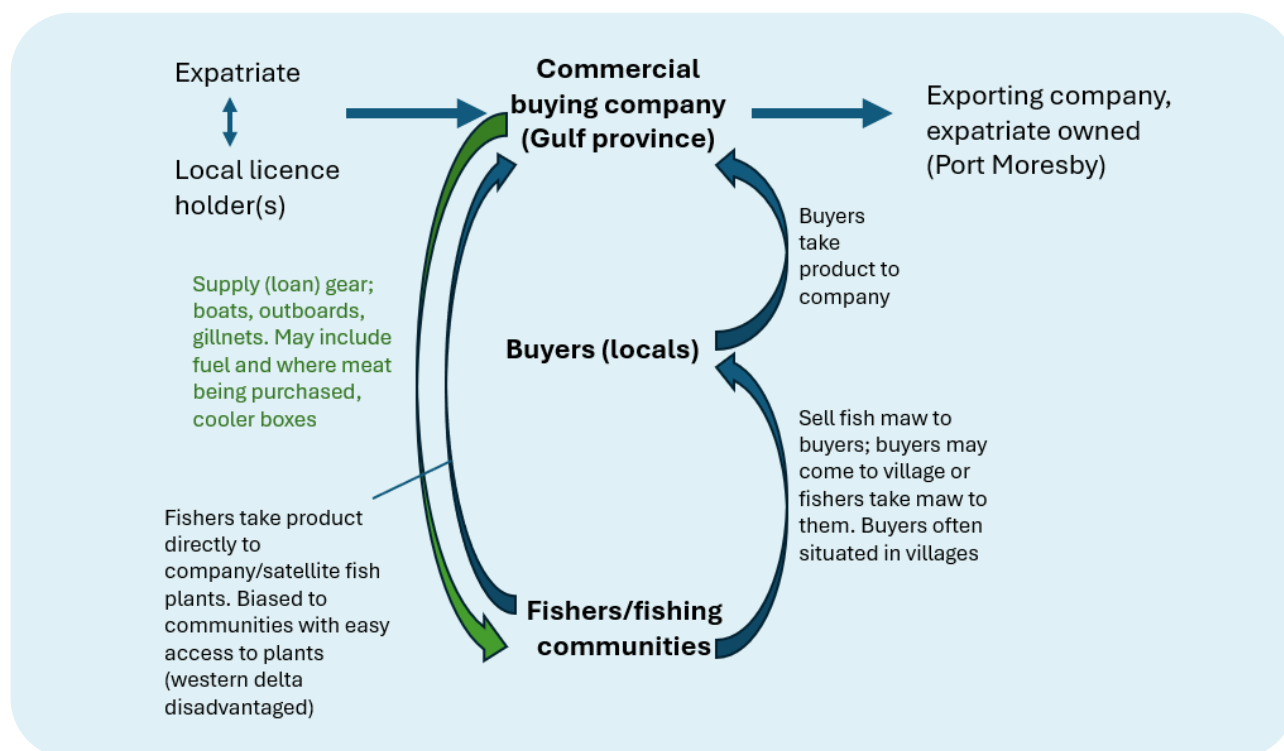


FIGURE 3. Market supply chain of fish maw within Kikori communities

Companies that are licensed to buy and export fish maw from Gulf Province include an expatriate and at least one PNG national, usually a community leader with upstanding social capital. The presumption of this arrangement is that the expatriate finances the company and facilitates international export with partner companies, also expatriate owned, in Port Moresby. Meanwhile, the PNG national(s) hold the fish maw buying licenses, and facilitate the buyer network among fishers. They act as the conduit between the fish maw purchasing companies and the fishers. Expatriates cannot directly hold a fish maw buying license. According to the National Fisheries Authority (NFA 2021), only licensed companies and/or buyers can buy fish maw and export it from the province of origin. However, fishers in Gulf and Western Provinces are allowed to take fish maw to Central Province or National Capital District directly for sale. Having a facility (fish plant) used to be a condition of the fish maw buying license, though in subsequent years licenses have been issued without the requirement of a facility. There are three fish plants in Kikori for fish maw, two in Kikori Town and one in Veraibari, though at least six other companies hold licenses.

Fish maw purchasing companies provide fishing gear to fishers. This includes fibreglass boats (banana boats), outboard engines, and gillnets. For the limited number of companies that additionally purchase fish meat, cooler boxes may also be provided. Other materials such as anchors and floats appear to

mostly be acquired from makeshift materials by fishers themselves. Some fuel is provided to fishers upon negotiation and others purchase their own fuel. These gears are provided to fishing communities on loan-like arrangements, and carry the expectation that fishers will sell their fish maw back to the loaning company.

Once fishers have accrued maw for sale, there are three main ways it reaches purchasing companies:

1. Fishers take the product directly to the company.
2. Buyers visit communities following neap tide fishing activity to collect maws.
3. Some buyers live onsite in communities and facilitate the purchase and movement of fish maw to companies.

Companies export fish maw to Port Moresby via airplane, or less commonly by ship. Once fish maw is in Port Moresby, the market supply chain is less clear. Fish maw is presumably sent to exporting companies and shipped to China (Hong Kong), though some export to Singapore is evident in the United Nations Comtrade database (Amepou et al. 2024).



FIGURE 4. Top, a group of ten fishers from Ewamu Village checking a net for catch.
Bottom left, three fishers hauling a heavy engine part that is being used to anchor the net.
Bottom right, a boat at Ekeirao Village heading out to set nets.

1.3 Target species and value

Fishery effort is centered around targeting of *Nibea Squamosa*. Prices for maw rapidly scale with increased weight. Amepou et al. (2024) report that the maximum value that fishers can receive for *N. squamosa* maw is PGK 7,000 for individual maws greater than 130 grams dried weight (USD 15,615 kg⁻¹). Prices offered for fish maw appear to be dynamic, and differ between companies. In August 2022 for example, prices of maw advertised on public notice boards at two companies show quite a large variation: at KW Veraibari Seafood, individual dried *N. squamosa* maw weighing between 90–99 grams were being purchased for PGK 4,000 (USD 11,717 kg⁻¹), while at Kikori Seafood LTD individual dried *N. squamosa* maw weighing between 91–100 grams were purchased for PGK 2,800 (USD 8,120 kg⁻¹) (Table 1, Table 2).

TABLE 1. Prices for scaly croaker *Nibea squamosa* fish maw at KW Veraibari Seafood, Aug 2022.

1 Papua New Guinea Kina = USD 0.29. Prices of other species were unavailable at the time. Sourced from Amepou et al. (2024).

Nibea squamosa maw wet weight (grams)	Nibea squamosa maw dry weight (grams)	Local price (PGK)	USD kg ⁻¹
1–14	1–7	2	83
15–29	8–9	5	161
30–49	10–19	20	305
50–69	20–29	100	1,000
70–89	30–39	300	2,231
90–109	40–49	500	2,959
110–129	50–59	900	4,424
130–159	60–69	1,000	4,203
160–180	70–79	1,500	5,506
181–200	80–89	3,000	9,775
201–220	90–99	4,000	11,717
≥ 221	100–129	6,000	13,488
	≥ 130	7,000	15,615

TABLE 2. Prices for scaly croaker ‘stone fish’ *Nibea squamosa* and black jewfish *Prontonibea diacanthus* fish maw at Kikori Seafood LTD, Aug 2022.

1 Papua New Guinea Kina (PGK) = USD 0.29. Prices of other species were unavailable at the time.
Sourced from Amepou et al. (2024).

Nibea squamosa maw dry weight (grams)	Local price (PGK)	USD kg-1	Prontonibea dicanthus maw dry weight (grams)	Local price (PGK)	USD kg-1
11–20	20	290	20	15	218
21–30	120	1,160	40	30	218
31–40	300	2,175	60	90	435
41–50	450	2,610	80	120	435
51–60	700	3,383	100	200	580
61–70	950	3,936	120	250	604
71–80	1,400	5,075	140	300	621
81–90	2,000	6,444	160	510	924
91–100	2,800	8,120	180	580	934
			200	800	1,160
			220	940	1,239
			240	1,030	1,245
			260	1,370	1,528
			280	1,490	1,543
			>300	1,600	1,547

The primary species targeted for maw, owing to their high value include:

- Scaly Croaker *Nibea Squamosa*
- Black Spotted Croaker *Protonibea diacanthus*
- Secondary maw species include:
 - Barramundi *Lates calcarifer*
 - King Threadfin Salmon *Polydactylus macrochir*
 - Blue Threadfin Salmon *Eleutheronema tetradactylum*
 - Catfish Siluriformes

For all of the above species, meat is a secondary product. Other species that are secondarily landed for meat, though are less commonly caught and for which any value for maw is unknown, include:

- Atlantic Tripletail *Lobotes surinamensis*
- Mangrove Red Snapper (Mangrove Jack) *Lutjanus argentimaculatus*
- Papuan Black Snapper (Papuan Black Bass) *Lutjanus goldei*

In August 2022 prices offered from meat were collected from Kikori Seafood LTD. The highest value meat product was for *L. calcarifer*, PGK 7.50 kg⁻¹ (USD 2.20 kg⁻¹), while *N. squamosa* meat was PGK 2.00 kg⁻¹ (USD 0.60 kg⁻¹). Of the two species with meat and maw prices provided, the maximum ratio of meat:maw price was 1:26,025 for *N. squamosa*, and 1:1718 for *P. diacanthus*. The meat:maw ratio for *N. squamosa* is presently the largest known globally within a fish maw fishery, excluding species such as Chinese Bahaba *Bahaba tapaiensis* that do not sustain fisheries and are only sporadically caught (Amepou et al. 2024). Comparatively, Totoaba *Totoaba macdonaldi* one of the world's most sought after maw species have a meat:maw ratio of 1:8389 (CITES 2024).

TABLE 3. Prices of meat products for various species at Kikori Seafood LTD, Aug 2022.
1 Papua New Guinea Kina (PGK) = USD 0.29.
Sourced from Amepou et al. (2024).

Meat Product	Species	Local price (PGK) kg-1	USD kg-1
Barramundi (with head)	<i>Lates calcarifer</i>	5.00	1.5
Barramundi (without head)		7.50	2.2
King threadfin salmon (with head)	<i>Polydactylus macrochir</i>	3.00	0.9
King threadfin salmon (without head)		4.00	1.2
Black Bass	<i>Lutjanus goldei</i>	3.00	0.9
Triple tail	<i>Lobotes surinamensis</i>	3.00	0.9
Red Emperor	<i>Lutjanus sp.</i>	3.00	0.9
Catfish	Siluriformes	2.00	0.6
Black jewfish	<i>Prontonibea diacanthus</i>	3.00	0.9
Shark	Elasmobranch	1.00	0.3
Scaly croaker 'Stone fish'	<i>Nibea Squamosa</i>	2.00	0.6

2. Methods

2.1 Ethical Considerations

Before commencing this study, the Piku Biodiversity Network (PBN) sought guidance from the National Research Institute of Papua New Guinea, which confirmed that the research fell outside the scope requiring formal human ethics review. To ensure ethical integrity, PBN followed established procedures approved by the James Cook University Human Research Ethics Committee (Grant et al. 2021; Grant et al. 2022), which were used in comparable studies within the Kikori region.

These procedures included:

- Prior engagement with village councilors, chiefs, and elders to explain study objectives and obtain community-level consent;
- Provision of a written and verbal information sheet describing the study purpose, voluntary participation, anonymity, and public reporting of aggregated results;
- Securing both verbal and written consent, including optional consent for audio recording; and
- Upholding Free, Prior and Informed Continuous Consent (FPICC) throughout the study.

All participants were informed that the research aimed to understand the dynamics and sustainability of the Kikori fish maw fishery, and that their perspectives would contribute to a public report shared with the Secretariat of the Pacific Regional Environment Programme (SPREP), National Fisheries Authority (NFA), and Conservation and Environment Protection Authority. (CEPA). No personal identifiers were included in published outputs. Interviews and workshops were conducted in *Tok Pisin* or local languages to ensure comprehension and voluntary participation.



2.2 Interview Process and Questionnaire Design

Community sensitisation was carried out in July 2025 through meetings and WhatsApp communication, informing fishers, buyers, and leaders about the upcoming field activities and ensuring FPICC was maintained.

Structured interviews were conducted between 10 - 18 August 2025, engaging participants across the Kikori Delta and, where necessary, through remote interviews with respondents in Kerema and Port Moresby who were temporarily away on business.

Five questionnaires were developed to capture perspectives within the fish maw value chain:

- **Fishers** – individuals whose primary occupation is fishing;
- **Buyers (non-plant)** – fish maw traders without plant ownership;
- **Buyers (plant)** – traders with plant ownership or association;
- **Community Leaders and Elders** – with local decision-making authority;
- **General Community Members** – including women and youth.

Interviewers explained the themes of the study, confirmed voluntary participation, and ensured each participant understood their right to withdraw at any time. Questions were delivered verbally due to varying literacy levels, and all responses were audio-recorded with participant consent for later transcription. Group interviews were permitted where appropriate to reflect shared ownership of fishing rights and collective decision-making, consistent with Kikori cultural norms.



FIGURE 5. PBN staff reviewed consent forms with interviewees before beginning audio recordings, and all interviews were conducted prior to the participatory workshops.

2.3 Workshops and Participatory Tools

The Piku Biodiversity Network (PBN) conducted three participatory workshops in Kikori Town and neighboring communities between 19 August and 18 September 2025 to consolidate interview findings and prepare participants for the SPREP National Multistakeholder Workshop on Fish maw Bycatch (Port Moresby, 14–16 October 2025). These sessions were designed not only to validate and deepen information gathered through individual interviews but also to equip community representatives—many of whom would attend a national policy multistakeholder meeting for the first time—with practical tools and shared vocabulary for constructive engagement.

Language and Participation

All discussions were conducted in a mix of Tok Pisin, Kikori English and Hiri Motu, creating a multilingual environment that encouraged open, inclusive dialogue across age and gender. Participants were drawn from buyer, fisher and community leader groups, each having completed an individual interview prior to joining the workshop (except for those in the final session). This structure allowed the workshops to build directly on verified local perspectives and ensure that group outputs reflected a broad community consensus.

Participatory Tools Applied

Four participatory tools were introduced and used during the workshops:

- **Stakeholder Analysis** – used to map all actors within the fish maw fishery system. This activity introduced participants to new concepts such as ‘value chain’ and ‘traceability’, linking local experience to broader market processes.
- **Power and Influence Grid** – encouraged discussion of who holds decision-making power and how communities can strengthen their voice in governance.
- **SWOT Analysis** – identified strengths, weaknesses, opportunities and threats within the current fishery structure, highlighting gaps in policy and benefit sharing.
- **Theory of Change Framework** – helped participants articulate cause-and-effect relationships between local aspirations, governance reforms and sustainable outcomes.

These tools were deliberately visual and discussion-based rather than text-heavy, allowing participants with varying literacy levels to engage freely. Collectively, they revealed several recurring concerns that became key themes of the results and subsequent policy recommendations.

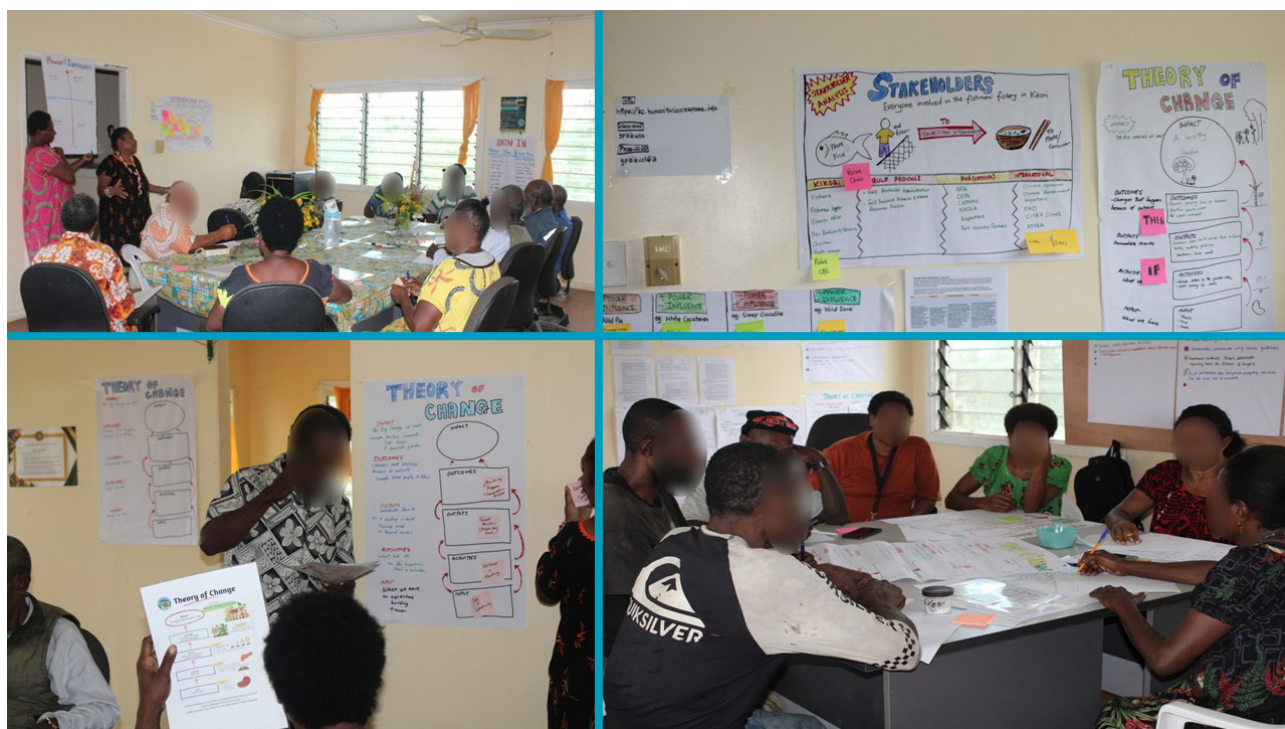


FIGURE 6. Workshop participants in Kikori discussing and applying participatory tools to explore governance, value chains, and community roles in the fish maw fishery.

2.4 Data Collection and Analysis

Data were gathered from 18 structured interviews and three workshops, engaging over 80 participants representing at least ten tribal groups of the Kikori River Delta.

Recordings were transcribed, translated, and anonymised (villages coded *Village 1*, *Village 2*, etc.; companies as *Company A*, *Company B*).

Responses were categorised into major thematic areas:

- Fishing practices and gear use.
- Market networks and trade routes.
- Observed ecological changes and species of concern (e.g., sawfish, dolphins, turtles).
- Bycatch and management concerns, and
- Social and economic impacts, such as livelihoods, alcohol use, and household tensions.

Thematic coding followed a local knowledge analysis framework adapted from Grant et al. (2021). Outputs from workshops—including SWOT matrices, stakeholder maps, and Theory-of-Change charts—were photographed, digitised, and compared with interview themes to assess individual (interview) and collective (workshop) insights.

2.5 Limitations

Adverse weather conditions and transport disruptions during the August field period limited access to several coastal delta villages, restricting full participation in the initial workshop rounds. To address this gap, a supplementary workshop was held on 18 September 2025 to capture feedback from affected communities.

While this ensured broader representation, not all intended participants could attend, and some data were therefore derived primarily from individual interviews rather than group discussions. Additionally, logistical constraints and limited time prior to the national SPREP workshop prevented deeper field validation of certain emerging themes, particularly regarding provincial governance and licensing processes.

Despite these limitations, the combination of interviews and participatory tools provided a strong, community-driven evidence base that reliably informed both the Kikori preparatory workshops and subsequent national-level discussions.

3. Results

3.1 Kikori Preparatory Workshops: Key Issues and Emerging Insights

Owing to the time constraints leading up to the SPREP Multistakeholder Fish Maw Bycatch Workshop and the extensive range of data generated during community sessions, this section focuses primarily on interview findings, supplemented by key themes drawn from the Kikori preparatory workshops.

These workshops, conducted between August and September 2025, provided a structured space for participants to review, validate, and deepen earlier interview insights, ensuring that community perspectives were articulated before the national dialogue in Port Moresby.

Across all three workshops, discussions revealed systemic concerns and aspirations shared among fishers, buyers, and community leaders.

- 1. Lack of transparency and clarity in governance** – Participants voiced significant uncertainty about how the fish maw fishery is licensed and managed. Many reported limited access to information about regulatory guidelines, fees, and enforcement responsibilities.
- 2. Absence of effective Provincial Government oversight** – The Gulf Provincial Fisheries and Marine Resources Division was described as largely absent from Kikori's active fishery operations. This perceived lack of monitoring and institutional presence has raised community concerns over accountability, fairness, and compliance.
- 3. Unclear benefit-sharing mechanisms** – While participants could estimate the substantial financial value of the fish maw trade, they expressed frustration at not knowing how much of that revenue reaches provincial or local-level governments—and, crucially, how much ultimately benefits the communities generating it.
- 4. Nominal ownership of local fish plants** – Fish plants operating in Kikori are formally required to have majority local ownership. However, community members observed that these arrangements exist “on paper” only, serving to satisfy regulatory requirements while decision-making power remains concentrated with Asian partners. This imbalance continues to frustrate local aspirations for meaningful participation and equitable management.
- 5. Demand for community-led fish processing and waste management** – Participants, particularly from the Morigi Tribe, whose lands border the Gulf and Western provinces, emphasised the urgent need for locally owned and operated fish plants. Such facilities could manage waste and discarded fish, provide cold storage for meat and by-products, and create jobs and monitoring opportunities for bycatch and threatened species.

Beyond these governance and infrastructure challenges, participants highlighted deeper connections between the fishery and climate resilience. Many coastal communities now depend on the fish maw trade to finance essential survival needs—access to clean water, food, and mobility—as they confront saltwater intrusion, resource decline, and changing weather patterns. This dependence has created an unsustainable tension: the same activity providing short-term adaptation finance also contributes to ecosystem degradation and long-term vulnerability.

Community participants identified an urgent need for integrated governance solutions that link fishery management to climate adaptation and local development. They proposed that government-supported fish plants, built in partnership with Kikori communities and overseen by local leadership, could improve fish quality, reduce wastage, and redistribute power back to custodians.

These workshop discussions show how participatory tools evolved beyond diagnostic exercises—they became spaces for collective analysis, negotiation, and empowerment. The resulting stakeholder maps, power–influence grids, SWOT matrices, and Theory of Change diagrams (see Appendix A) continue to guide dialogue between PBN, the Gulf Provincial Administration, and the National Fisheries Authority as Kikori communities prepare for long-term fishery reform.

3.2 Individual Interview Results

Results from interviews are presented under four dominant themes that emerged during the community discussions:

1. The status of the fishery.
2. Disposal and wastage of bycatch.
3. Emergent negative social issues.
4. Perspectives on management.

3.2.1 Status of the fishery

Through interviews with fishers, buyers, and community leaders, there is evidence that the status of the fish maw fishery, and particularly the target stock of *N. squamosa*, is declining. All fisher, buyer, and community leader interviewees report that fish are becoming harder to catch and that sizes of fish caught are declining. Fishers also report that fishing effort is having conducted further from shore than previously observed (Grant et al. 2021b, Grant et al. 2022).

Interview data with fishers from 2018–2025 indicate that between 2022 and 2025, the declining fish stocks have become apparent to fisher communities. In local knowledge surveys of sawfish conducted in Kikori in 2018–2019 (Grant et al. 2021b), fishing effort was close inshore, and no concerns were raised about the fishers ability to catch target species. At this time, the fishery was growing, with increased numbers of nets and interest in the fishery. In local knowledge surveys of dolphin conducted in 2021–2022 (Grant et al. 2022), fishers noted that close inshore catches of target species had declined, and that they were starting to set nets further offshore to maintain catch rates. In the present study, fishers continue to report that fishing is now conducted further offshore, often 1–4 km out to sea. Fishers unanimously report that the catches of *N. squamosa* are decreasing, and that the size of fish they are catching is decreasing. They report that they are having to spend more time fishing and that on occasion they fail to catch anything. Buyers also mention large decreases in the weight of maws they are purchasing:

“from the start of the fishing work, fish [maw] weight was bigger than 100g [dried weight], but today we see that the fish sizes are going down to 40g, 30g, 20g and 10g.. even 5g, so we normally buy these ones only. So now days, [the] fish population is going down.”

One former buyer interviewed mentioned that they had recently resigned from trading fish maws, due to the clear and obvious signs that the fishery was being overexploited and that they did not see a future in the business along with moral concern for the damage being caused:

“I started seeing that the larger sizes started decreasing, and then we were starting to get the smaller size so it was something sometimes we discuss with the fishermen, and telling them, maybe after some year, these bigger sized fish will all be gone and the smaller ones to grow will take a lot of time.... I had to resign from this work because I saw that we cannot replace what was already lost. It will take many more years to recover from what we have lost.”

These perceived declines in the fishery are further corroborated by data on catch volumes and fish maw exports (Figure 5). In 2024, the Fish Maw Fishery Management Guideline (NFA 2024) indicates that catch volumes remained steady and low, fluctuating around 100 tonnes annually up to 2015. Since 2016, the fishery grew exponentially from ~200 tonnes to a peak of ~1,800 tonnes in 2021. The steep increase between 2016 and 2021 corresponds to the time when a number of fish maw licenses were granted in Gulf and Western Provinces (Amepou et al. 2024). Following this peak, catch volumes have fallen to ~500 tonnes in 2023, representing a 73% decline in two years, despite no management intervention in this time. It appears that the fishery has surpassed ‘peak catch’, and there are now sincere risks of fishery collapse in the near future.

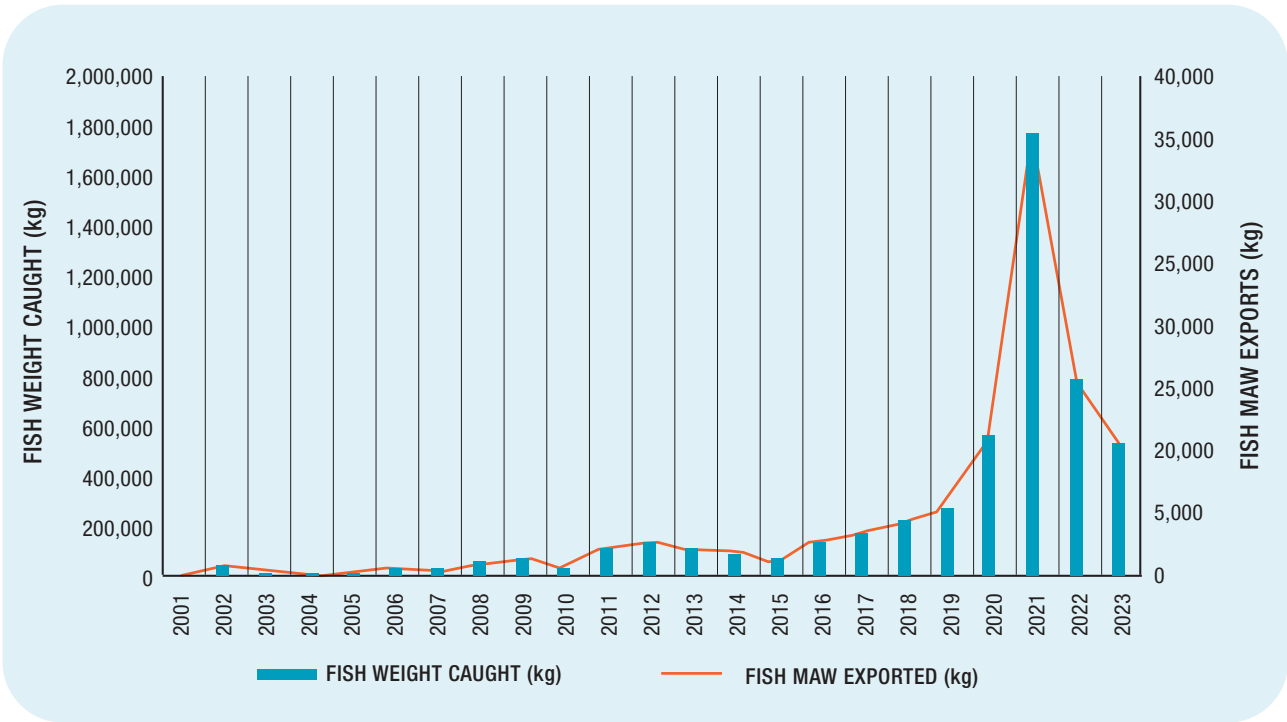


FIGURE 7. Estimates of total fish weight and fish maw export volumes from Papua New Guinea from 2001–2023. Species included in the data set are not provided. Sourced from NFA (2024).

3.2.2 Disposal and wastage of bycatch

In the context of bycatch there are three main issues raised in interviews:

1. Impacts to populations of threatened species.
2. The wastage of a potential economic resource.
3. The safe disposal of high volumes of bycatch.

Interviews with fishers and community leaders indicate that the wasted economic opportunity and safe disposal of byproducts of teleost and non-teleost bycatch are the primary concern within communities. Impacts to threatened species were not mentioned as a primary concern by fishers nor discussed in any detail despite questions being included in the interview to prompt such discussion. The only mention was that they (dolphin, sharks, and sawfish) are caught, and that they are released if still alive when checking gear, while if deceased they are discarded or disposed of onshore. Two fishers mentioned that sawfish can be very dangerous in the net and that they may be left to die for safe removal later. Despite not being raised in present interviews, previous research has indicated community concern for sawfish and dolphin populations due to high rates of capture, as these species hold cultural value to some communities (Grant et al. 2021b, Grant et al. 2022).

Previous research has highlighted the issue with the large amounts of bycatch within the fish maw fishery (Grant et al. 2021a, 2021b, Grant et al. 2022, Amepou et al. 2024). These previous studies have mainly focused on shark and ray bycatch, although the present study indicates that teleost bycatch, and moreover teleost meat as a byproduct of fish maw, present similar issues. Interviews with fishers, key informants, and community leaders strongly express that a major issue in the fishery is an inability to sell meat products, inclusive of shark and teleost. The volume of bycatch exceeds food requirements in village communities, and the abundance of regularly caught bycatch precludes economic value in preserving meat (smoking or drying), as fresh meat is in oversupply in most communities. As a result, excess meat is mostly discarded, although some interviewees mentioned that some fish are smoked, which may be for community consumption or sale at the Kikori Town market.

The lack of a market for fresh meat products is due to two primary reasons. Firstly, there are only three companies that have facilities to buy, store, and trade fresh meat products in the Kikori district. Two are located in Kikori Town, and one is located at Veraibari Village. Other licensed buyers of fish maw do not buy meat products, as it is no longer a condition of fish maw buyer licensees that the whole animal needs to be purchased. This has opened up a range of local expatriate owned business to opportunistically ‘cash in’ on the fish maw trade, with hotels and grocery store owners now purchasing dried maws (Amepou et al. 2024). For commercial buyers of fish maw, the additional purchase of meat presents expenses and logistical challenges that preclude any economic incentive, considering the disparity in local value of maw and meat (e.g., Table 1, 2, and 3). The situation reported in the present study is that most fish maw buyers only purchase fish maw. The consequence is that it is driving high fisheries effort, but for fishers who catch a wide variety of species, only a single product (i.e. fish maw) from a select number of species has a reliable market. Although interviews with buyers indicate that it is only fish maw from *N. squamosa* that is reliably purchased:

*“Mostly they bring stonefish [*N. squamosa*] fish balloon [fish maw] to me. I buy all mixed sizes. Small, medium and large. I usually buy only stonefish, and sometimes I buy salmon fish balloon [fish maw]”.*

Even within buyers associated with companies with fish plant facilities, discarding of meat appears to occur:

“After we have bought the fish balloons, the fresh fish is sold, sometimes discarded, and others are eaten. But sad to say that most of the fish are discarded.”

The exclusive market for maw has clearly led to the discarding behaviors of fishers:

“There are some that remove the swim bladder and throw the dead fish back into the water, so when we are travelling on the river, we see dead fish floating on the river, thinking that they have maw, but when we check the fish, we discover there is no maw, the person fishing removed the maw, and threw the dead fish back into the water.”

As a result, the bycatch wastage issue in this context not only extends to sharks and non-fish maw teleost species, but also meat products from target fish maw species. Among buyers, fishers, community leaders, and key informants interviewed, the lack of market for meat products was corroborated and highlighted as perhaps the most prudent issue to local communities. In a global fishery context, the high volumes of fishery capture for harvest of only a single high value part of a select number of species carries similar traits to shark finning practices in the late 1900s and early 2000s.

The absence or limited access to meat markets, combined with the disparity in price for meat, means that the disposal of bycatch and byproducts have become a large issue in communities. Interviewees report that the main methods of disposal include directly discarding back into the water, bringing carcasses ashore to be buried or ‘thrown in the bush’, or burning them. These alternatives to discarding carcasses back into the water stem from community concern that the water is being poisoned, posing a health risk to people and also perhaps contributing to declining catches of fish as it is degrading the quality of the environment:

“It’s not very good for us because we use the water to cook our food, and we use the water to wash.”

A few interviewees mentioned that women within communities encourage their husbands to bring bycatch back for safe disposal:

“our women in the coastal area...we try to tell our husbands, to bring the rotten fish and we can burn them in fire to dispose them. The women in my community, that’s what we always do.”

Another potential implication of the rotting bycatch around villages were safety concerns if it were to lead to a higher presence of crocodiles. Crocodile attack incidents have recently been problematic within coastal communities in Timor Leste, possibly due to villages providing food sources. However, while only explicitly asked in one interview, the increasing occurrence of crocodiles (or other potentially dangerous animals such as sharks) was not noted to be a concern.

3.2.3 Emergent negative social issues

Various benefits of fish maw were mentioned. The income generated from fish maw has helped some communities purchase boats, engines, fuel for transport, generators, and food items. One fisher expressed the importance of fish maw income for their family, which likely extends broadly to all fishers:

“The income I get from this helps me a lot with living expenses – things like school fees, uniforms, to me, it’s an opportunity.”

Community leaders however mentioned several social issues within communities stemming from the increased finances within communities from fish maw, along with the increased movement of people around the Kikori region. It was reported that fighting, domestic violence, and alcohol consumption have gotten worse. In one community, it is reported that buyers sometimes facilitate alcohol consumption when they visit, and it can lead to fighting. This community leader explicitly mentions that women and children are at risk, and that some fear travel to Kikori Town, presumably as the prevalence of drinking and fighting has increased in public areas. Fishers returning home drunk has also led to increased domestic violence, with women disproportionately affected. Young people were noted in another community to be wasteful in their spending of money made from fish maw, with money spent on drinking and other things that are not aligned with community and family needs. One fisher interviewed also indicated that women and families may be neglected in profit sharing following fish maw sales. This fisher remarked that:

“...sometimes I have problems with my wife. Especially after I sell the fish maw, they [wife] know the price and the amount I go and sell, when I give her K500 [presumably a low proportion of the sale] then there is conflict between me and my wife.”

Another fisher made a similar remark in the context of profit sharing leading to family disputes:

“When I have money from selling stone fish, my [extended] family is happy, but when I don't think of them and share the money with my wife for our family, we have lots of problems [with extended family]. Sometimes we have disputes in the community and fight.”

There was little further information provided on such matters, and this highlights a need for further interviews with key informants and women in the fishery communities to better understand such gender-based issues and vulnerabilities.

Another source of conflict and discontent within fishing communities was concerning the prices of fish maw being afforded to fishers from buyers. There were complaints among interviewees that fish maw prices are often low, and are not stable. There is clearly a feeling that along the market supply chain the fishers are struggling to make a significant amount of money while buyers and companies clearly are. While understood to widely occur, only one community leader spoke about how fishers ‘shop’ around for the best maw price among buyers. The issue pointed out by this community leader is that it can lead to conflicts within communities, especially where sale agreements are in place between particular buyers and fishers, or communities, which may extend to fishing gear loan arrangements whereby gear is repaid in fish maw. These loan arrangements can give leverage to buyers, allowing them to offer lower prices, on the understanding that fishers should not be engaging other buyers. This is constraining to fishers, who are frustrated by low prices and appear to risk sales to alternative buyers. Anecdotally, it has been reported that this can lead to confiscation of loaned fishing gear (boats, engines, nets) from fisheries by buyers when maw returns are low, leaving fishers without resources to continue fishing. This leads to conflicts between fishers and buyers. In this sense, the fisher's economic security is vulnerable under the present market chain structure of the fishery, and fishers express that they want better market security. One buyer expressed further discontent between his sale arrangements with the company he works for. They said that the expatriates do not pay them well, despite high volumes of maw being procured for the company, and this buyer acknowledged that these companies are receiving exceptional prices in overseas export markets. It appears that along the market supply chain, companies short-change buyers, who in turn short-change fishers. Fishers ultimately feel the consequences of the unregulated maw prices, and this is an immense source of frustration for them as it is their customary owned resource that is being exploited for expatriate gain.

Another issue is in relation to customary tenure violations, with fishers conducting fishing activities in waters they are not supposed to (i.e. outside their own customary boundaries). This issue appears to mainly concern communities situated further up the delta that do not have access to coastal waters where the greatest abundance of *N. squamosa* occur, and so they leverage distant family connections with coastal communities, or just outright fish in coastal waters. While this topic was discussed in informal conversations with communities in 2024, it was not raised in the present interviews. We however note that this is something that requires monitoring, as customary tenure violations have large potential to lead to serious conflicts between communities. A declining fishery resource may heighten this issue in the future.

3.2.4 Management perspectives

A common theme amongst fishers and community leaders was an absence of management from governing authorities (National Fisheries Authority or Gulf Provincial Administration) and that the operation of the fishery (gear, effort, prices, target products) is largely influenced by market dynamics exerted from companies.

At the establishment of the fish maw fishery (2015) and in subsequent years where fish maw purchase and trading licenses were being granted (2016–2021), community leaders do not feel that there was an appropriate level of correspondence with them. They feel that the companies and buyers just “rushed in”, and that there was not enough communication about associated management plans with the fishery. They note that two NFA officers are situated in the region, although there is limited communication with communities, no observation of the fishery through site visitation, no compliance officer presence to regulate buyer activities, and no monitoring of fishery status. Their perception is that NFA officials are mainly concerned with companies and economics, not the sustainability of the fishery and ensuring its benefits and equitable inclusiveness for local people. There was also mention that the main visibility of NFA officials is them wanting to get their ‘tax’ from buyers. These sentiments were quite strongly put forward and echoed in earlier informal conversations with two other communities in December 2024.

There was also a strong sentiment expressed by some interviewees that expatriate companies buying only maw are driving overfishing, and wastage of the fishery resources in their customary waters. This is an intergenerational sustainability risk as there are fears younger generations will not have large fish left to catch.

“What I think is, if we can stop these other [expatriates] coming in without a fish plant. Because now days, fish are just floating in the river, wasted. We are not making use of those fish.”

Within fisher and community leader interviews, there was a strong desire for managing authorities to increase the number of fish plants within the delta. Communities want the opportunity to be able to sell meat products as further income security. The current issue for them is that in the hot humid climate, fresh fish quickly spoils, and the fuel costs associated with travel to Kikori or Veraibari to sell meat precludes its economic viability. Furthermore, fishing is typically conducted in short intense periods around neap tide cycles and leaving fishing activities at this time to travel in search of markets for fresh meat, again precludes its economic viability, as it is more profitable for fishers to remain with nets in the water in pursuit of *N. squamosa*. What fishers and communities broadly want, are more satellite fish plants in the delta with freezer facilities that can be more easily accessed, and/or could supply ice and cooler boxes to communities during neap tide fishing periods. This was the most popular management recommendation toward reducing fishery byproduct wastage (Figure 8).

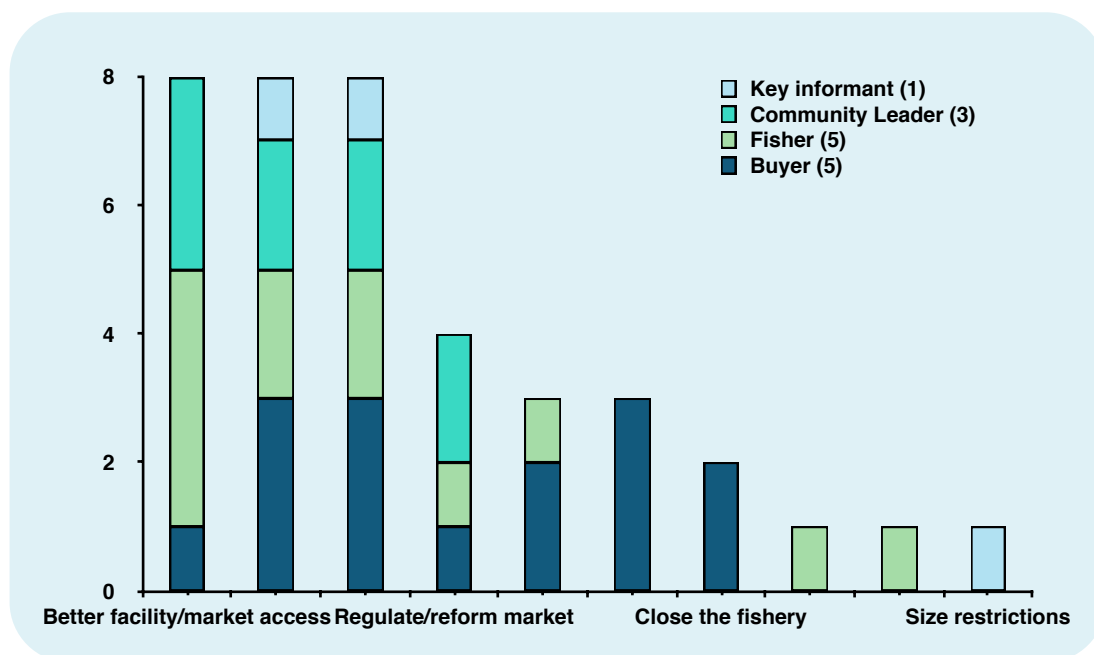


FIGURE 8. Fishery themes mentioned by interviewees that need management. Number of interviews with each demographic group are indicated in brackets.

While better access to facilities and markets for byproducts of meat was a strong management theme, in tandem with this were acknowledgements that the number of nets, and large mesh sizes being used are imparting too much fishing pressure on species. This was mentioned across all demographic interviewee groups. Comments about mesh sizes were linked to the perceived declines in fish abundance and size. Some interviewees were concerned about captures of small fish, which do not have a chance to grow and breed, and others were concerned about large mesh sizes catching “all the mothers”, along with carrying higher risks to dolphin, turtle, and sawfishes. Fisher interviewees report the use of gillnets exclusively within the fish maw fishery. Mesh sizes reported to be used included 3, 4, 5, and 6 inch most commonly, though one fisher interviewee remarked on seeing use of 7 and 8 inch nets. This information about gillnet use and mesh size corresponds to previous surveys where mesh sizes of 4–9 inches have previously been reported (Grant et al., 2021, Grant et al., 2022). Further details on the setting of nets and materials used are available in PBN (2022).

Overall, the perspective that limits on the number of nets and mesh sizes permitted to be used indicates potential for management in this space. However, reductions in gear capacity would likely need to be paired with better market access for meat, so that profits of catch can be maximised. Reducing gear capacity without improvement to facilitating meat markets would unlikely be accepted by communities as presently increasingly high effort is required to make a profit within the present market that is centered on *N. squamosa* maw.

Another key management aspect was around bycatch, which is mostly in the context of dolphins, turtles, and sharks and rays. All demographics said that they would welcome advice and training on methods to reduce bycatch. Most comments were about the safe release of bycatch, noting that sawfish or larger sharks can pose a safety risk to fishers. Many fishers noted that they need tools or gear to assist with disentanglement (such as ropes, gloves, or other protective gear). While a safe release guide for sawfish was recently developed and provided to communities (Grant et al. 2023), the reality of releasing lively large sawfish is a serious safety concern for fishers, and one that remains a challenge even in high-capacity fisheries in Australia and the United States (Grant et al. 2021). Realistically, fishers need to be encouraged to cut their nets to release sawfish, although this needs to be paired with provision of net repairing materials, and possibly incentives to release. Other concerns were catches of jellyfish, and a need for protective gear in their disentanglement from nets.

4. Key summary

The present interviews add to the evidence base that the Gulf of Papua Fish Maw Fishery is being overexploited and there are now clear indications of declining stocks. The triangulation of fishers, buyers, and community leaders indicating that fish are now harder to catch, and that average size of fish landed have decreased, is clear qualitative evidence. When paired with time series data on catch volume and fish maw exports, these qualitative indicators are corroborated. The fishery appears to have exponentially increased between 2015 and 2021, followed by a 73% decline in catch volume and fish maw exports from 2022-2023, despite no management intervention in this time. The Gulf of Papua Fish Maw Fishery requires urgent management controls. The consequences of the fishery collapsing is that local people will lose their primary economic resource, and for a province that has historically been linked to poverty, and low education and health standards (Wiltshire et al. 2020, Magury 2022), the looming risks to future economic insecurity of coastal communities should be seen as paramount for management intervention.

Controls on fisher effort present a complex situation. It is clear that fishing effort needs to be reduced, but doing so needs to be done carefully to not undermine economic security of communities. One avenue would be abolishment of present company-fisher fishing gear loan arrangements. In place, managing authorities could oversee and regulate all future procurement of gears (e.g., 4 inch mesh sizes) that must be done by fishing communities directly, and cap the number of nets purchased per community through an application system. Registered gears could be marked, and that way compliance officers could monitor the use of registered gears and confiscate unregistered gears. The present unabated private purchase of gears is untenable to the sustainability of target stocks and protection of threatened species bycatch.

Interviewees recommended that management authorities increase the number of fish plants, or provide better access to cooler boxes and ice, to reduce byproduct wastage and increase the economic potential and security for fishers. However, increases to market access and capacity must be paired with fishery controls so as to not lead to further overexploitation, and in particular, to not incentivise targeting and retention of threatened species. Previous research and fishery observation indicated that gillnet soak times average 5–6 hours during daytime fishing activity, while overnight soaking of gillnets (implicitly >11–12 hours) is common practice (Grant et al 2022). The issue with long soak times is that much of the catch is dead upon gear retrieval. Changes to fisher behavior to shorten soak times have the following benefits:

1. Economically, fish will be fresher, likely leading to a stronger market potential, with higher prices afforded.
2. Shorter soak times will increase survival on gear retrieval and carry the prospect of size harvest slot strategies for target species, and;
3. Shorter soak times will increase survival on gear retrieval of bycaught species and will facilitate their live release.

It is important that clear guidelines are given as to which species can be retained and sold for meat and which species cannot. Owing to the fact that southern Papua New Guinea holds strong populations for several species of threatened elasmobranchs that have undergone significant population reductions or extinctions in broader parts of their range in Asia, and that these species (sawfish, river sharks, winghead sharks) are caught in relatively high abundance in southern New Guinea (Grant et al. 2021a, 2021b, Grant et al 2022, Amepou et al. 2024), it is strongly advised that shark and ray retention is

prohibited in the fishery. This negates issues with look-a-like species, such as for complex species groups such as carcharhinids, while all hammerheads (Sphyrnidae) and Sawfish (Pristidae) are listed as Critically Endangered and should under no circumstances be considered for commercial sale.

For dolphins, widely held cultural connections precludes any risk of consumption or market development of these species. Communities in the Kikori region broadly share stories that dolphins have human ancestral links (Grant et al. 2022), and so any consumption is regarded as highly taboo. Notably, these are the only species in the fishery that carry no consumption value or economic incentive for fishers, while other highly threatened species such as sawfish are still consumed and occasionally have meat sold, despite some cultural significance. In order to mitigate dolphin drownings in nets, there either needs to be adoption of bycatch reduction technologies that have been trailed with proven effectiveness, or gillnets need to be monitored when soaking for quick release of accidentally caught individuals.

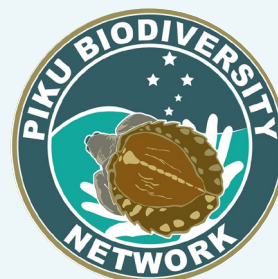
In regard to frustration expressed by fishers and community leaders around market dynamics, managing authorities need to give serious consideration to having a larger stake in market control. The present situation of purchasing companies loaning unrestricted amounts of fishing gear to fishers is facilitating overexploitation but also creating market traps for communities who are trapped into repaying loan arrangements with certain companies who can in turn negatively manipulate prices. Ultimately, the lack of market control is facilitating overexploitation, the use of destructive fishing practices (surplus effort and mesh sizes targeting the larger most important size classes to population dynamics), and creating economic instability for communities. These market traps are forcing the overexploitation of customary owned resources for negligible economic gain at the community level. Standardised on-the-ground pricing that is informed from export market price and regulated by the National Fisheries Authority could be a way to manage this. Companies with gear loaning arrangements with certain communities should be contributing to the much-needed human development within communities if loan arrangements are to continue. Such gestures would go a long way to reforming social relationships between communities and purchasing companies, which appear to be increasingly eroding in the face of a declining fishery.

Of other management suggestions put forward by interviewees, it is notable that seasonal closures, spatial closures, or a complete fishery closure were only really mentioned by buyers. The compatibility of such closures to the food and economic security circumstances of communities is likely untenable, and the suggestion of these management tools by buyers probably indicates a disconnect with the reality and pressures of living conditions in fishery communities. In particular, spatial closures within the customary tenure network, across an area significant enough to have a meaningful management benefit, are very unlikely to be achievable. It is unlikely that customary institutions will align and forfeit significant enough areas, and other management options are likely to receive greater buy-in from communities.

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APPENDIX Participatory Workshop Toolkit



Kikori Fishmaw Fishery Workshop

Workshop Summary – August 2025

Facilitated by the Piku Biodiversity Network

Why We Gathered

The Piku Biodiversity Network (PBN) is meeting with Kikori stakeholders to collect community views on the fishmaw fishery, which is currently unregulated and without a management plan. This is one of two local workshops being held to prepare for a multi-stakeholder meeting in October 2025, where representatives from Kikori, Gulf Province, National Government, and international partners will discuss the way forward.

Today we learned and practiced four simple planning tools that help us think clearly about the fishmaw fishery and how to manage it better.

1. Stakeholder Analysis – Who is involved?

A stakeholder is any person or group with an interest in the fishery.

- In Kikori: fishers, fishmaw buyers, company owners, women, and youth.
- Beyond Kikori: Gulf Province authorities, National Fisheries Authority, exporters in Port Moresby, and international markets like China.

Why it matters: It shows us who is connected, who benefits, and who makes decisions. This is the first step in building cooperation.

2. Power and Influence Grid – Who has the say?

Not all stakeholders have the same power. Some have money, markets, or laws on their side, while others have local knowledge and customary authority.

- The grid helps us place people according to their **power** (ability to make decisions) and **influence** (ability to shape opinions).

Why it matters: It helps us see who must be consulted, who needs more voice, and how to balance relationships fairly.

3. SWOT Analysis – What are our strengths and challenges?

SWOT stands for **Strengths, Weaknesses, Opportunities, and Threats**.

- Strengths: what we do well (e.g., local knowledge, strong community ties).
- Weaknesses: challenges within (e.g., lack of cold storage, limited training).
- Opportunities: chances to grow (e.g., markets, partnerships, government support).
- Threats: risks from outside (e.g., overfishing, illegal trade, pollution).

Why it matters: It gives a clear picture of the fishery and helps us plan realistically.

4. Theory of Change – How do we reach our goal?

A Theory of Change is like drawing a map from **today's problems** to **tomorrow's solutions**. It asks:

- What do we want? (Big Goal – e.g., a sustainable fishmaw fishery that supports livelihoods and protects biodiversity).
- What needs to change first? (Outcomes).
- What actions will bring those changes? (Activities).
- What do we need to do those actions? (Inputs).

Why it matters: It shows the pathway step by step. It is useful not only for fisheries but also for community projects, leadership, and government planning.

Key Takeaway

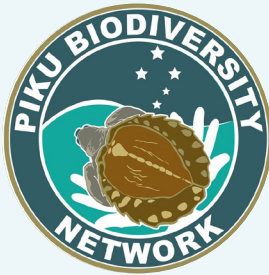
Together, these four tools help us:

- **Understand who is involved** (Stakeholder Analysis).
- **Recognize who holds power** (Power & Influence Grid).
- **See where we are strong or vulnerable** (SWOT).
- **Plan a path forward** (Theory of Change).

By using these tools, we can make better decisions not just for fishmaw management, but for any community initiative that requires teamwork, fairness, and long-term vision.

Next Steps:

The Piku team will prepare a preliminary report based on today's discussions and interviews. This report will be shared at the **October 2025 multi-stakeholder meeting**, where Kikori's voices will be heard alongside national and international partners.

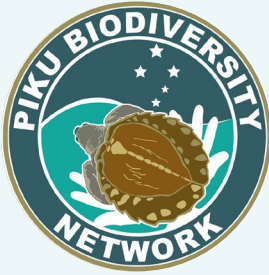


POWER AND INFLUENCE GRID

A Power and Influence Quadrant (or grid) helps users map and assess stakeholders based on their level of power and influence over a project.

This tool supports strategic engagement by clarifying who needs to be informed, consulted, or actively managed throughout the project.

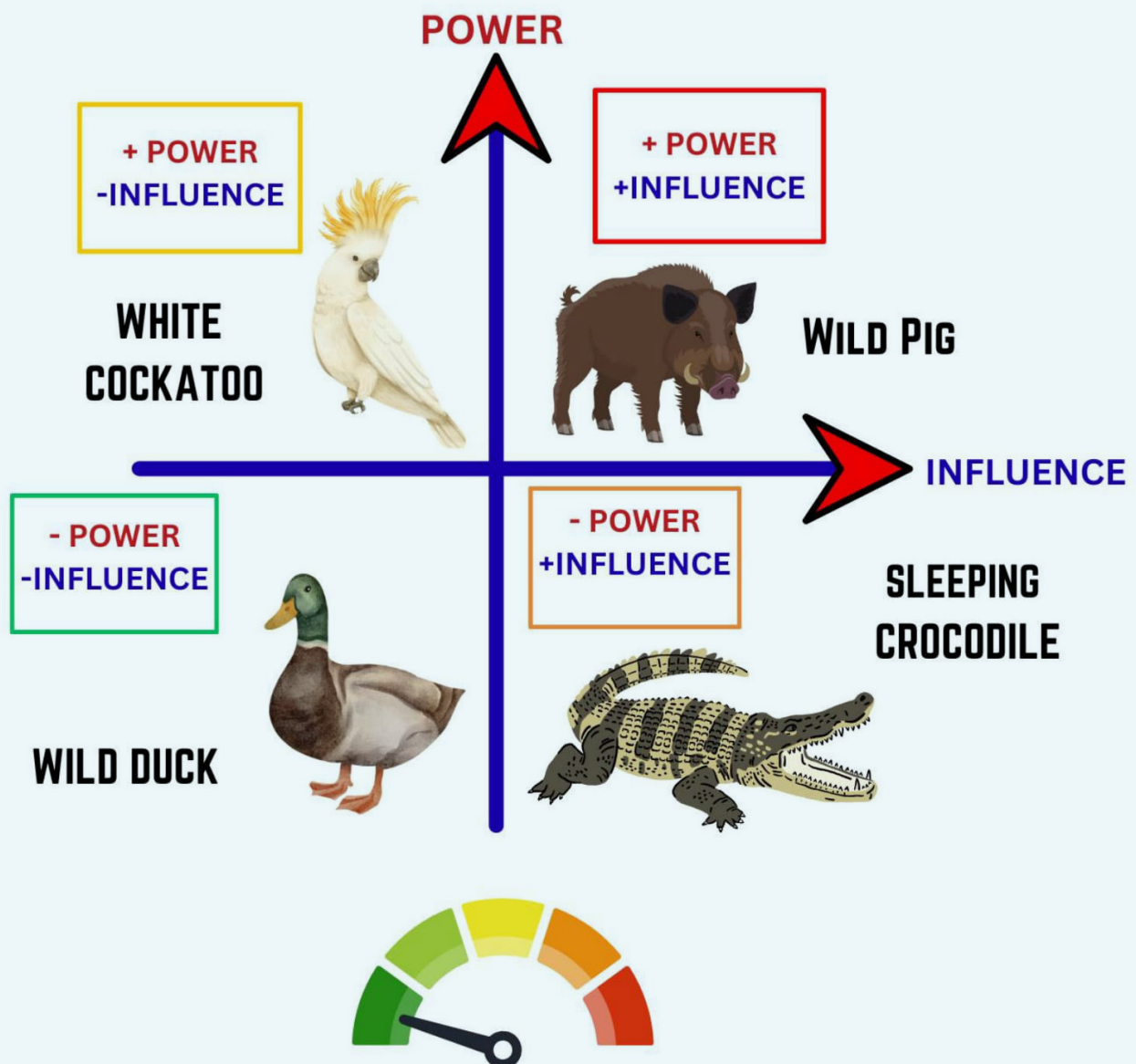
THE WHITE COCKATOO +High Power, -Low Influence <i>Who they are</i> These Individuals or groups hold Formal Authority or Resources but don't actively shape opinions or decisions. <i>What you do</i> Keep them informed and satisfied – they can quickly gain influence if overlooked	THE WILD PIG +High Power, +High Influence <i>Who they are</i> These stakeholders are the most critical. They have both the authority to make decisions and the capacity to shape others' perspective or behaviours <i>What you do</i> Engage closely, involve in planning and actively manage their interests
THE WILD DUCK -Low Power, -Low Influence <i>Who they are</i> These stakeholders have very little effect on decisions or outcomes. They are easy to forget about <i>What you do</i> Check on them, monitor them with little effort but make sure they are not excluded – roles can always shift.	THE SLEEPING CROCODILE -Low Power, +High Influence <i>Who they are</i> These stakeholders lack formal power but can significantly sway public or community opinion and thus indirectly affect Project success. <i>What you do</i> Consult and involve them regularly, these are key influencers and potential allies.



Power & Influence Grid

A Power and Influence Quadrant (or grid) helps users map and assess stakeholders based on their level of power and influence over a project.

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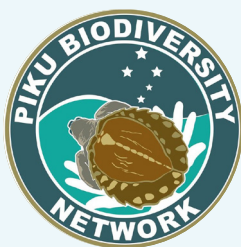




SWOT ANALYSIS

A SWOT analysis helps you figure out where you're strong, where you can improve, what chances you can take, and what challenges you might face. By being honest with yourself about these things, you can make smarter choices and be more successful in reaching your goals, whether it's in your personal life, at work, or on a specific project.

INTERNAL (Things I can Control)		EXTERNAL (Things I can not control)	
STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
• Things you can do well • Qualities that separate you from others • Internal resources like skills and knowledge • Things you can touch that you have like tools, technology, capital or items that are useful that can be used to support your initiative	• Things you can not do well • Things others can do better than you • Resources you do not have • Skills that you do not have • Knowledge that you do not have • Unclear idea of what you can do to help your initiative progress • Things people dislike and complain most about	• Available and unserved markets for specific products or services • Few ideas of the same type in the area • Emerging need for your products or services • Any media attention you can use to advertise your project or initiative (social media or mainstream media)	• Risks that threaten the success of your initiative, project or organization • Emerging competitors • Changing regulatory environment • Negative press/ media coverage • Lack of law and order • Non compliance and disrespect towards your initiative • People's changing attitudes towards your initiative



SWOT Analysis

A SWOT analysis helps you figure out where you're strong, where you can improve, what chances you can take, and what challenges you might face.

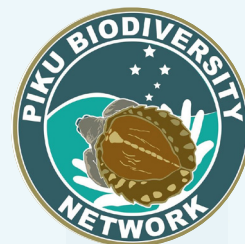


Example.

You want to own a seafood company in Kikori and contribute to a happy Community

STRENGTHS	WEAKNESS	OPPORTUNITIES	THREATS
You are hard working You have carpentry skills You know how to get crabs and prawns in Kikori.	You don't know business management	TVET in Kikori is offering Business Management studies that you can enrol in.	Moving products between Kikori and Port Moresby can be expensive & dangerous

By being honest with yourself about these things, you can make smarter choices and be more successful in reaching your goals, whether it's in your personal life, at work, or on a specific project.



Theory of Change – A Simple Planning Tool

What is a Theory of Change?

A **Theory of Change (ToC)** is a way of planning that shows how we move from today's challenges to the future we want. It helps us see the steps, resources, and results needed to reach a **big goal**.

Think of it like building a canoe – you need to know what materials you have, what work must be done, what the finished canoe looks like, and how it will change life for the people who use it.

The Five Elements of a Theory of Change

1. Inputs – What we have or need

- People, skills, knowledge, and time
- Materials, money, and tools
- Support from community, leaders, or partners

2. Activities – What we do

- Training, meetings, or workshops
- Building, planting, or creating something
- Awareness campaigns, events, or services delivered

3. Outputs – What is produced right away

- A new skill learned
- A training session held
- A building completed
- Awareness materials shared

4. Outcomes – The changes that happen because of the outputs

- People start using new skills
- Services improve or become more available
- Behaviours shift in the community
- Partnerships and cooperation strengthen

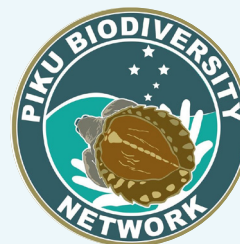
5. Impact – The big change we want to see

- Healthier people and communities
- Stronger local economy
- A safe, clean environment
- More opportunities for future generations

Why use Theory of Change?

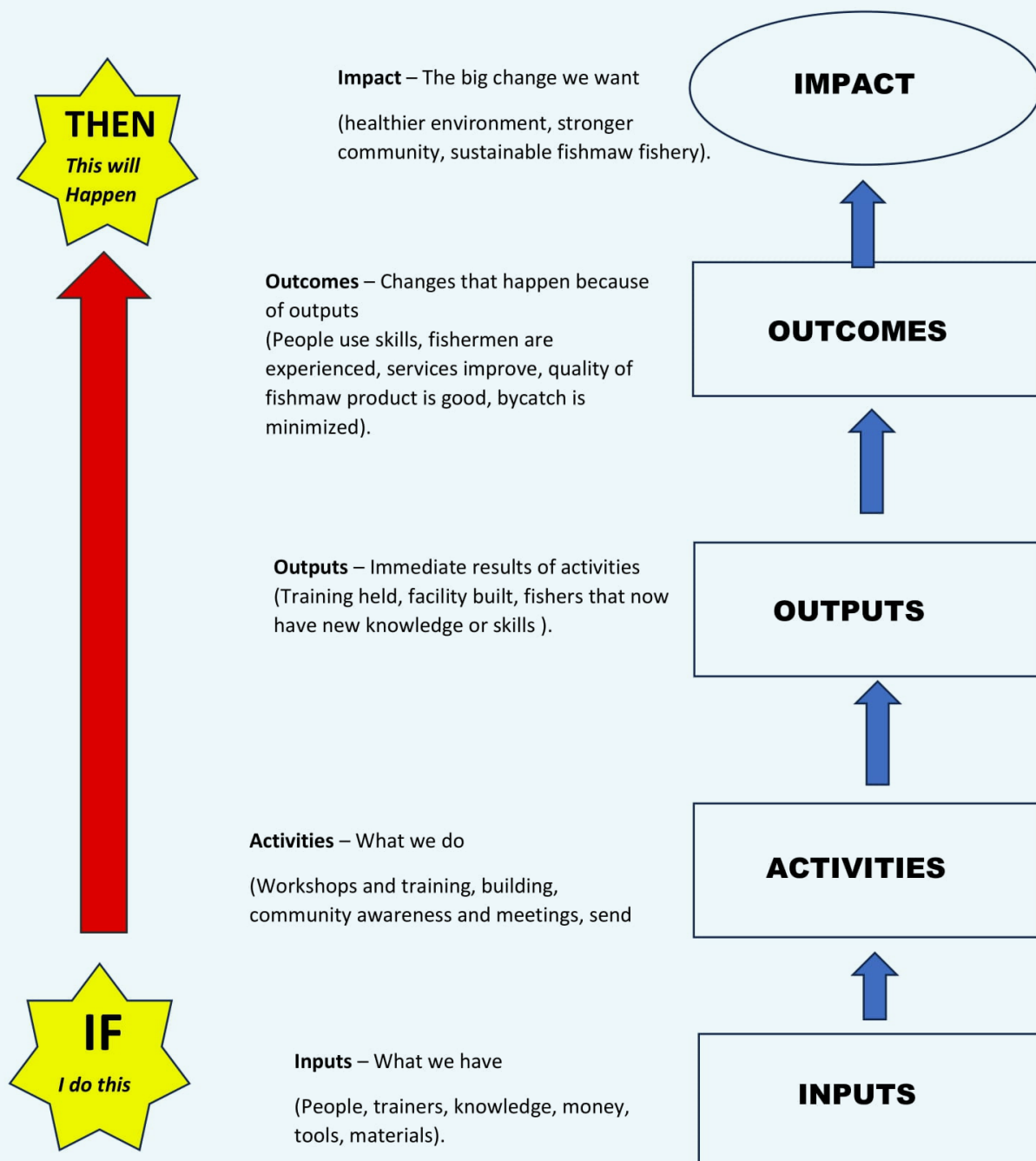
- It creates a clear path from **today's actions** to **tomorrow's change**.
- It shows what resources and partners are needed.
- It helps us track progress and stay accountable.
- It makes sure everyone understands the shared goal.

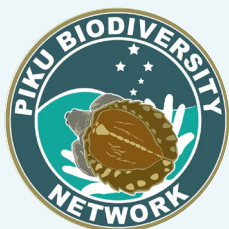
👉 **Remember:** Start with your **big goal (Impact)**, then work backwards to identify the Outcomes, Outputs, Activities, and Inputs that will get you there.



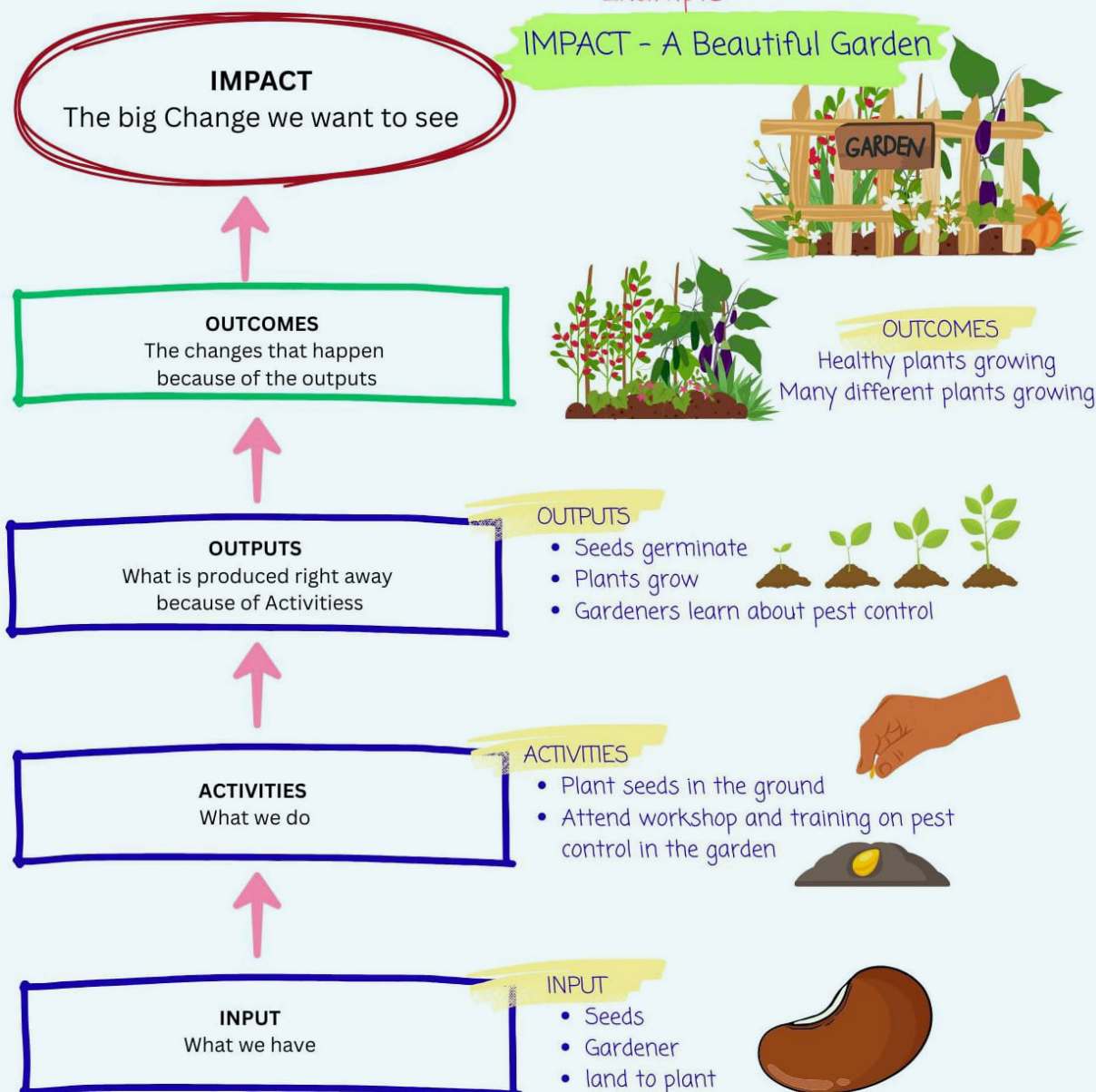
THEORY OF CHANGE DIAGRAM

Use this diagram to plan your Theory of Change. Start with your big goal (Impact) on the right, then work backwards to list Outcomes, Outputs, Activities. Draw arrows to show how each step leads to the next.





Theory of Change



A Theory of Change (ToC) is a way of planning that shows how we move from today's challenges to the future we want.

It helps us see the steps, resources, and results needed to reach a big goal.

