SALWEEN YOUTH ENGAGEMENT PROGRAM

TECHNICAL REPORT

Assessment of Fish Species in Nam Pang River, Kunhing, Southern Shan Sate



Submitted Date

30 December 2025

Research Team

Aung Htet, Khun Po Kyaw Kham, Nang Wutt Homne Thin, Sai Yawat Nguin

INTRODUCTION

Rivers that offer fresh water are important ecosystems in enhancing diversity and the lives of people. They offer food, incomes, and ecosystem services and yet they are the most threatened ecosystems on earth. The issue of habitat loss, overfishing, pollution, and water system alteration have continued to threaten the existence of many freshwater fish species, particularly the economic value that some of the fish have to the local economy.

Importance of Nam Pang River

The Nam Pang River (also known as the Pang River) is one of the most important rivers in Shan State, eastern Myanmar, and the largest tributary of the Salween (Thanlwin) River. Originating in the Shan Highlands, the river flows southward through Kunhing Township and surrounding lowlands before joining the Salween River. Due to its size and discharge, the Nam Pang plays a crucial role in maintaining the hydrological balance of the Salween River basin, one of the last major free-flowing river systems in Southeast Asia (World Bank, 2018).

Hydrologically, the Nam Pang River contributes significant seasonal flow, sediment, and nutrients to the Salween system. Its channel is characterized by braided reaches, rapids, floodplains, and river islands, which are important physical features for aquatic ecosystems (World Bank Sub-Basin Evaluation, 2018). These features support natural flooding cycles that replenish soil fertility and sustain downstream river processes.

Ecologically, the Nam Pang River is highly important for freshwater biodiversity, particularly fish and aquatic species. Research and field-based studies indicate that the river provides spawning grounds, feeding habitats, and migration routes for fish species that are vital for both local ecosystems and human livelihoods (Living Rivers Siam, 2003). Seasonal flooding allows fish to move into wetlands and rice fields, increasing fish productivity and biodiversity.

From a socio-economic perspective, the Nam Pang River is central to the livelihoods of river-dependent communities in Shan State. Local populations rely on the river for small-scale fisheries, irrigation, domestic water use, and transportation. Fisheries from the Nam Pang contribute significantly to food security and household income, especially in rural villages where alternative protein sources are limited (Living Rivers Siam, 2003). The river also holds cultural and spiritual value for ethnic communities living along its banks, reinforcing strong human–river relationships.

However, research also highlights growing development pressures, particularly proposed hydropower projects in the Salween basin, which could alter the natural flow regime of the Nam Pang River. Environmental assessments warn that such changes may negatively impact fish migration, sediment transport, and community livelihoods, making sustainable river management a critical concern (IFC SEA Report, 2021).

In summary, the Nam Pang River is a hydrologically, ecologically, and socially vital river in Shan State. Its role as a major tributary of the Salween River, combined with its importance for fisheries, agriculture, and local communities, makes it a key river system that requires careful conservation and research-based management.

Goal and Objectives

The research will give a base idea on the fisheries of the Nam Pang River by recording the fish species diversity; determining which fish species are valuable or valuable economically, and the greatest threats to such species. At the same time, the study will explore the gender-based roles in fisheries, recognizing that men and women often participate in different but complementary ways, from fishing and gear-making to processing, marketing, and household income management. By highlighting these roles, the research will emphasize the importance of including both men and women in fishery management decisions. It is hoped that the results will be helpful to local stewards, researchers, and conservation collaborators in providing evidence that sound fishery management can lead to biodiversity conservation in Southern Shan State. The main objectives of the research are as follow:

- To identify and collect data of Fish Species in the Nam Pang River, Kunhing Town Area, Southern Shan State.
- To observe what major threats are currently and have impacted economically valuable fish species in the past.
- To analyze the water quality of Nam Pang River near Kunhing Town Area

METHODS

Study Area

The study area was chosen to be in the scope of the BRIDGE Project. This research was conducted along Nam Pang River near Kunhing Town area, which is in the basin of Salween River. Using purposive sampling and snowball sampling, 12 fishermen and 9 fish sellers were

selected for follow-up interviews and were referred as potential participants based on their interview responses and willingness to participate.

Research Methodologies

This research study was conducted through a mixed-methods research design, including quantitative data collection and photo documentations combining with qualitative interviews.

This approach was chosen to obtain measurable trends of the water quality of Nam Pang River, document the fish species living along the research study area and the socio-economic conditions of Kunhing locals.

Data were collected through the following methods:

Environmental Parameter Collection: For the assessment of surface water quality, 25 sampling sites of natural flowing water bodies in the Nam Pang River near the Kunhing town area were selected. Water samples were analyzed from the river's lower bank, the river's upper bank, and the fishing net zone of the Nam Pang River. Water samples were analyzed during our field visit form 11.10.2025 to 17.10.2025. The Global Positioning System (GPS) was used to locate the sampling sites. From GPS data, the geological coordinates of sampling points are obtained as they are provided in Table 1 and Figure 1.

Structured Interviews: Conducted with 21 interviewees to collect socio-economic data of people and their level of environmental knowledge about the Nam Pang River and its biodiversity.

Field-Based Documentation: Photographic documentation of the fish species living along the Nam Pang River near Kunhing Town Area.

Species Identification: The process of determining the documented fish species' taxonomic classification was conducted in consultation with freshwater fishery experts from volunteer-based expert group called Native Species Conservation and Identification (NSCI).

Limitations

This research encountered several limitations during its implementation. Difficulties arose during the field visits, which restricted the full execution of planned research activities. While most outreach activities were conducted as intended, the selection of suitable participants for interviews was challenging due to availability, willingness, and time constraints, which affected the data collection process. Additionally, the fieldwork was conducted outside the main fish farming season, resulting in limited observation and documentation of fish species

during the study period. As a result, only 18 fish species were recorded through direct field documentation, and only 6 species were both recorded and reported out of the 24 species mentioned during interviews. The short duration of the research further limited the scope of the study, as extended fieldwork would have allowed for more comprehensive species identification and ecological assessment. Moreover, environmental data were collected only during the transitional period between the monsoon and winter seasons, which may not fully represent seasonal variations in water quality and biodiversity of the Nam Pang River.

Ethical Considerations

All participants provided informed consent before participating in the interview. Participation was voluntary, and confidentiality was ensured by storing data securely.

RESULTS

Environmental Parameters of the Study Sites

There are six parameters that we analyzed about water quality of Nam Pang River near Kunhing town area during our field visit. They are depth, temperature, pH, total dissolved solids (TDS), salinity and conductivity of the river at 25 sampling points. Minimum, maximum and mean value of water parameters can be observed in Table 1.

Table 1. Minimum, maximum and mean value of water parameters along Nam Pang River

Parameters	Maximum	Minimum	Mean
Depth (ft)	21	0	7.62
pH	8.6	7.25	8.02
Temperature (°C)	28	25.8	26.8
TDS (ppm)	224	163	172.12
Salinity (ppm)	224	163	172.12
Conductivity (σs/cm)	448	330	344.88

The pH levels are between 7.25 and 8.6, with a mean value of 8.02, which means the water is slightly alkaline but still normal for freshwater. The temperature is warm, staying between 25.8°C and 28°C, with an average of 26.8°C. The Total Dissolved Solids (TDS) and salinity both range from 163 to 224 ppm, with a mean of 172.12 ppm, showing that the water has low mineral content. The conductivity values are between 330 and 448 µS/cm, with an average of

344.88 µS/cm, which supports the other results. Overall, these numbers show that the water is clean, fresh, and not polluted, although more tests would be needed for a full water quality check.

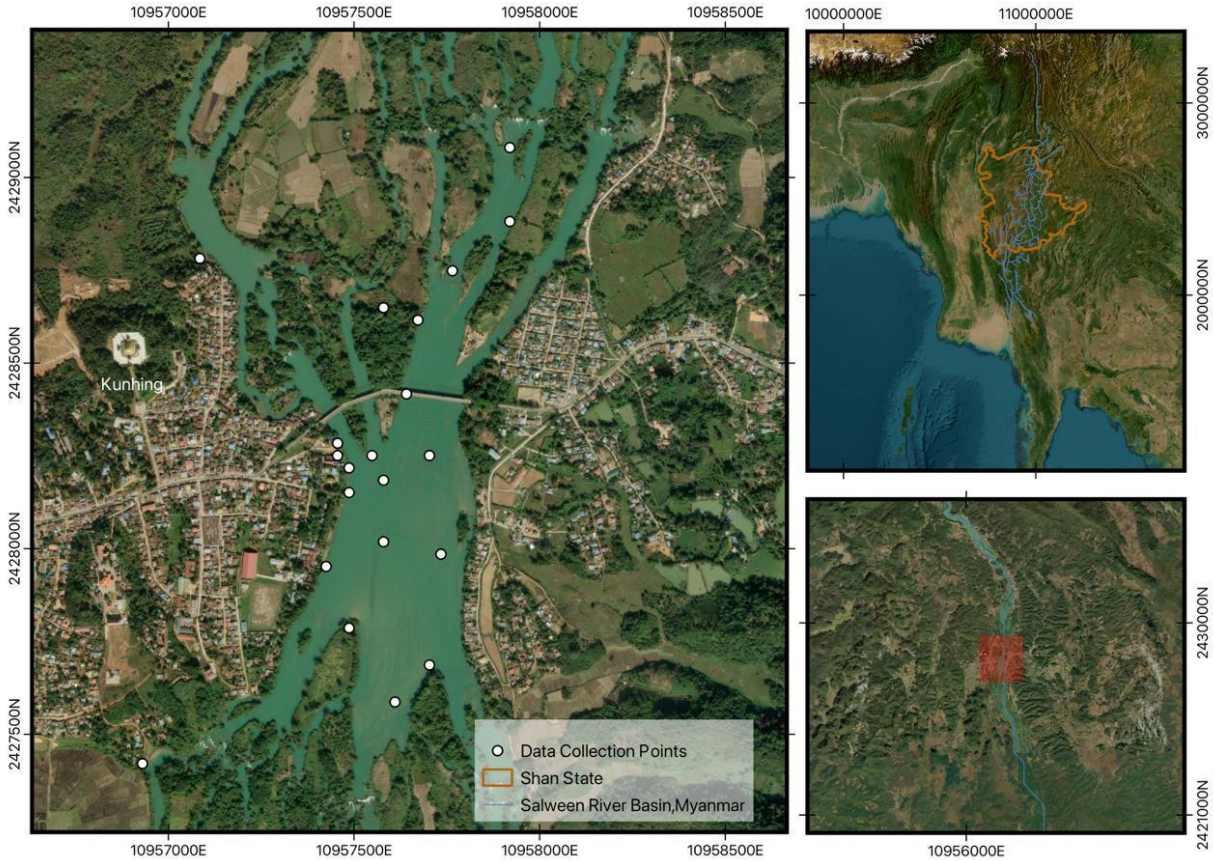


Figure 1. Map of environmental parameter data collection sites in Nam Pang River, near Kunhing

3.2 Fish Species

Observed fish species based on fish IDs and reported fish species based on interviews are listed below in Table 2. In addition, the interviews provided a list of fish species occurred in the river. Due to only provision of local name for the reported species, all of them were not identified. The list of unidentified reported species were in Appendix 1.

During the field visit, 18 fish species were documented via photos and 24 fish species were reported with two different languages, Burmese and Shan, through the interviews. Among the recorded fish species, 6 fish species were both documented and reported. Two invasive species were observed, *Pterygoplichthys disjunctivus* is shown in **Figure 3**, and one invasive species, Nile Tilapia, was recorded from the interview. Moreover, African catfish is banned in Myanmar, which makes it an invasive species (alien species) (Alien aquatic species in Myanmar, U Hla Win.; 2005).

Some of the fish samples recorded by the Nam Pang River and at the markets are described in Figure 2 and 3.

Table 2. List of fish species collected from the study sites (Observed = the researchers recorded photo IDs and identified with fish experts, Reported = the fish species reported by the interviewees during the interviews)

Common Name	**Occurrence**	**Scientific Name**	**Observed**	**Reported**
Featherback	Native	*Notopterus notopterus*	Y	N
African catfish	Invasive	*Clarias gariepinus*	Y	Y
Burmese snakehead	Endemic	*Channa harcourtbutleri*	Y	N
Burmese loach	Native	*Lepidocephalichthys berdmorei*	Y	Y
Common carp	Introduced	*Cyprinus carpio*	Y	Y
Suckermouth armored catfish	Invasive	*Pterygoplichthys disjunctivus*	Y	Y
N/A	Native	*Poropuntius shanensis*	Y	N
Lesser mahseer	Native	*Neolissochilus nigrovittatus*	Y	N
Blue Mahseer Barb	Native	*Neolissochilus stracheyi*	Y	N
Spiny eel	Endemic	*Mastacembelus oatesii*	Y	Y
N/A	Native	*Glyptothorax horai*	Y	N
Burmese trout	Native	*Raiamas guttatus*	Y	N
Catla	Native	*Labeo catla*	Y	N
Brahmaputra labeo	Native	*Labeo dyocheilus*	Y	N

Common Name	Occurrence	Scientific Name	Observed	Reported
Shrimp	Native	*Palaemon sp.*	Y	Y
Salweeni hampala	Native	*Hampala salweenensis*	Y	N
Devario browni	Native	*Devario browni*	Y	N
Asian swamp eel	Native	*Monopterus albus*	Y	N

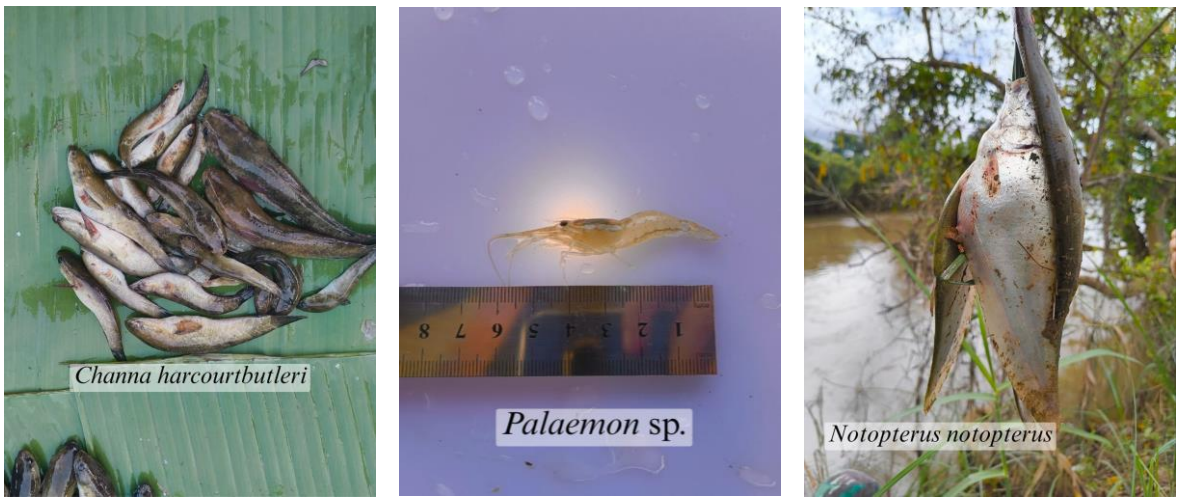


Figure 2. Some of the fish samples recorded by the Nam Pang River and at the markets



Figure 3. The invasive fish species found in the Nam Pang River

Variations of Fish Species and Catches

Variation in fish species and catch over the past five years is described in Figure 4. Based on interview responses, the number of fish species in the study area has significantly decreased. Most fishers reported that they were uncertain about the exact causes of these changes. However, some fishers suggested that the introduction of invasive species, particularly Tilapia, may be a contributing factor. Tilapia is widely known for its high market demand due to its desirable flesh quality, rapid growth, and strong adaptability to different environmental conditions. It is also a major species used in aquaculture and inland fisheries. According to several fishers, these species may have been accidentally released into the Nam Pang River from nearby fish farms. As a result, they may prey on the eggs and larvae of native fish species, potentially contributing to the decline of indigenous fish populations.

In addition, fishers reported that overall fish catches have significantly decreased. This decline may be partly attributed to an increase in the number of fishers during the summer season, while some fishers are not actively engaged in fishing throughout the year. Despite the reported decline in fish species and catch, this study did not identify a clear relationship between species and catch.

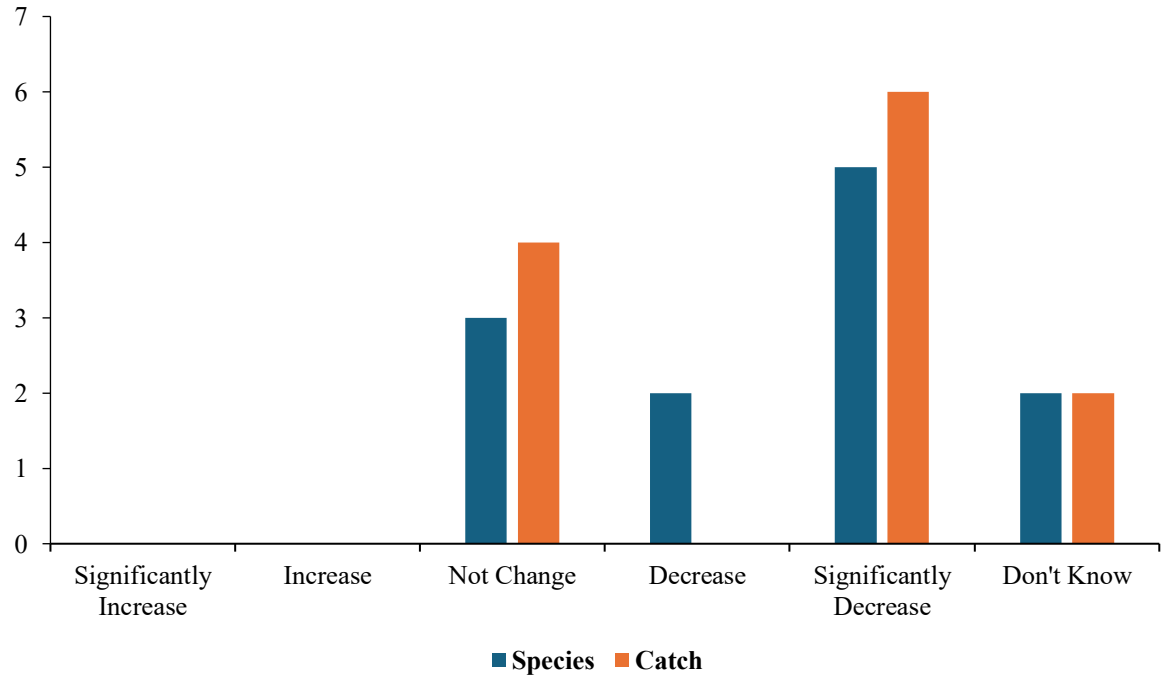


Figure 4. Variation of fish species and catch changes

Fishing Practices

Livelihood Dependency on Fishing

People who live near the Nam Pang River depend on fishing, but they have also learned to change their jobs easily. This helps them stay safe financially, even when there are fewer fish in the river.

When fishermen and sellers do not catch much fish from the river, they have other ways to make money. They do not put all their hope on just fishing.

Selling farm products: when they cannot sell fish, the sellers stop selling fish for a while and start selling crops and vegetables from their farms. This keeps money coming into the family.

Selling fish from aquaculture ponds: If they cannot find wild fish in the river, they buy fish from fish in aquaculture ponds and sell those instead, to able to still work as fish sellers.

Finding food in the forest: If things are very difficult, they walk to the forest to find food like fruits or plants to eat or sell. They also do other jobs to earn money.

For many people, fishing is no longer the main job that brings in the most money. It has become a second job or a side income. If the fishing income goes down, they have other main jobs like farming and it does not affect their family's daily living very much.

Almost all local people along the river are able to fish. According to the interview, the fishers had experience ranging 5-50 years in fishing. In the fish selling factor, they have been doing it from 5 to over 20 years. This means that they have long experiences in fishing and selling. Some figures are described below.

Fishing Seasons

Fishing activity in the Nam Pang River is critically dependent on seasonal conditions and the resultant fish availability. Their decisions to do fishing are related to some factors such as water clarity, current river speed, and fish production rate. The seasonal variation for fishing are as follow:

Summer: The river experiences abundant fish species and clear water in this summer season. Fishers engage in fishing effort more than another two seasons. According to the interview, the average is 9 to 28 times individually in a month.

Rainy: Water turbidity and mountain run-off fluctuate the river's ecosystem. This leads the poor environment and very few fish species. Due to low fish presence, there is very little fishing activity. Their fishing time is minimal, averaging only 3 to 7 per month.

Winter: This season is characterized by scarcity of fish and low fish producing rate. Fishers do not fish much during this season due to low resource availability. However, fish effort is more than the rainy season in comparison, averaging 6 to 20 per month.

Fishing Gears

The primary equipment used in fishing consists of fishing rod, fish trap, and fishing net. Fishing rods and fishing nets are used more than fish traps. There are various fishing nets that differentiate based on the mesh size and the fishermen's target species, mostly 35mm to 60mm and 1" to 2" fishing nets. It is also said that they rarely use explosives to kill fish like dynamite fishing. This shows that it is limited to fishing with dynamite and how much they maintain the resources and species along the Nam Pang River. Some fishing gear is described in Figure 5.





Figure 5. Different sizes of fishing net and floats that are being held in the above picture (Floats are used to keep the net upright and open at the correct depth while making it easy to find on the water's surface.)

Fishing Areas

This section analyses the specific locations where the interviewed fishers go fishing and how often they visit each site. There are two main categories that data show which are Regular Fishing Grounds and Occasional Fishing Grounds. The regular fishing grounds (Appendix 2.) are the main sites visited by the fishers. The numbers represent how many times a fisher went to each location. Along the river bank both below and above the Nam Pang River Bridge and the riverbanks and island edges above that bridge are also included in the main areas for fishing.

The occasional fishing areas are all located in the zones (Appendix 3.) around the Nam Pang River. Fishing activities are concentrated along the riverbanks both above and below the Nam Pang Bridge. Fishers also visit areas where small streams flow into the river (natural ponds) and the riverbanks around islands located downstream from the bridge.

Marketing of Fishing

Fish Selling Practices

Arising beyond the Nam Pang River, in the quiet areas within the river, the selling of fish begins. For the most part, the sources of the purchasing of fish originate from fishermen who come from around a few kilometers of Kunhing Town. The bridge signifies the halfway stage of every journey, since boats leave before dawn and return with what the river offers.

Fishing in this community is the preserve of males. The fishermen that we interviewed said that there were no women involved in fishing. It is the women, however, who sell the fish at the market. Husbands will come home with the fish when the morning catch is sufficient. Wives will take the fish to the market when the morning catch is not enough. The fish will remain in the kitchen for home consumption.

Trade happens when needed. Sometimes women go straight to the fishermen's homes for purchases of the day's catch. If the wife is involved, fishermen will go to the market on their own for the fish. Some fish vendors will wait for the harvest of the river fish at the market, but sometimes they go to the rivers or the fishermen's homes.

When the local supply of fish is less or the demand is high, fish is obtained from local fish ponds and farms. Fish from the farms is purchased only when the need arises. Some fish vendors temporarily and partially depend on large traders from Inle or Yangon, but these sources are not often seen in the local activity that existed during our visit.

With the advent of summer, when the rivers clear, fish traders, along with their long baskets of fish, come to Kunhing and Karli, contributing a new piece of the social fabric of fish trading in the place.

Fish Selling Sites and Selling Techniques

The day begins at the morning market, where the fish trade is centered in Kunhing and Karli. There are no large fish markets, only stalls and open baskets for fish, along with plenty of talk. Prices are determined through the use of scales, which the fish vendors are expert at using.

Door-to-door selling is still practiced. Some women purchase fish from fishermen's homes, and some go around the neighborhood, selling fish from the rivers. It's a selling practice that originated a long time ago.

Virtually all fresh fish are handled by the markets. Dried and salted fish are less sought after, and since these fish are imported and not indigenous to the Nam Pang, they were not considered for analysis.

Observed Gender Information

Based on our interviews, gender plays a significant role in the division of labor within the fishing community.

We interviewed 12 fishermen, and they all stated that fishing is mainly carried out by men. Men are primarily responsible for going out to rivers to catch fish.

We interviewed 9 fish sellers, and they reported that fish selling is mostly done by women. Women are typically involved in cleaning, preparing, and selling the fish in markets. Gender activity in the fishing community is described in Figure 6.

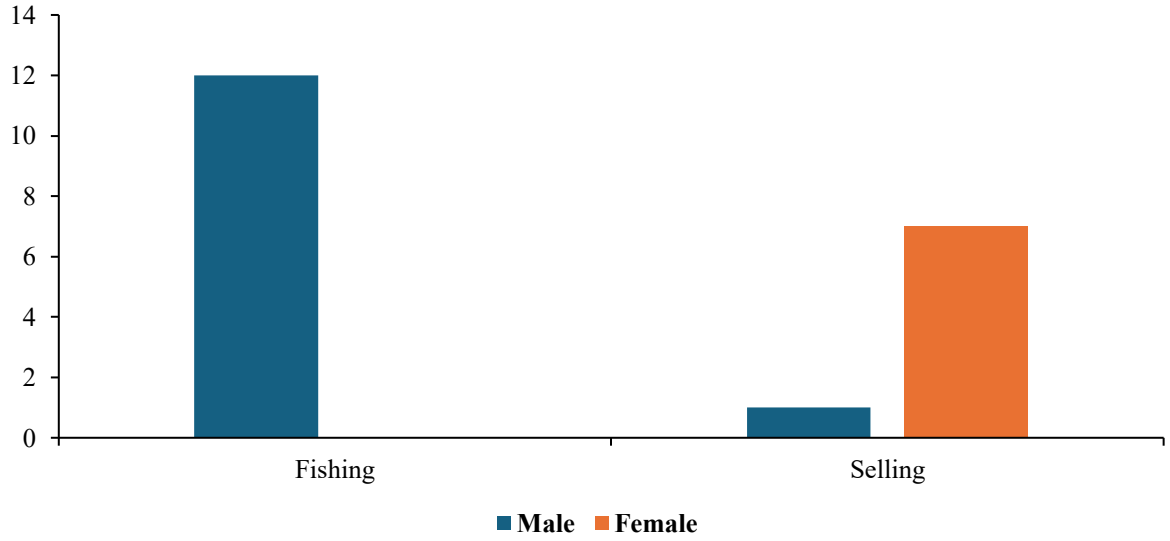


Figure 6. Gender distribution of participants in fishing and selling activities in the research

DISCUSSION

Based on published water-quality studies from the Nam Pong River basin, which has similar hydrological characteristics to the Nam Pang River, reported pH values range from 6.6 to 7.9, indicating near-neutral freshwater conditions (ThaiScience Database, n.d.). Total dissolved solids (TDS) show wide variation, ranging from 32 to 20,566 mg/L, while salinity ranges from 0.04 to 20.70 ppt, reflecting spatial and seasonal differences in dissolved ions and human influences (ThaiScience Database, n.d.; Sangsurasak et al., 2006).

Comparing the species found in Salween basin in Myanmar, 2 out of 18 species observed and two related species to genus " Channa " are also found in the Nam Pang River (Fields Survey of freshwater fishes in Upper Moei River, Sal-ween Basin, frontier of Thailand and Myanmar." Biodiversity Journal 4, 2013.; Kulabtong et al., 2013). Among the species found, African catfish are considered a threat towards the local fish (Alien aquatic species in Myanmar, 2005.; U Hla Win., 2005).

The Salween River Basin is one of the last free-flowing rivers in Asia and is very important for fishing and local livelihoods. Many communities living along the river depend on fish for food,

income, and daily life. Because the river flows naturally, fish can migrate, breed, and maintain healthy populations. The livelihood dependency on fishery along the Nam Pang River in Kunhing area, Shan State is not as essential as other careers which offer more income. Although, it is important to the local people as a side-income according to the fishing season.

However, there are plans to build dams on the Salween River. Dams are often not good for the environment because they block fish migration, destroy natural habitats, change water flow, and reduce fish numbers. This can harm fishing activities and affect food security for local people. On the other hand, dams are built to produce electricity, which is important for development, industries, and communities that lack reliable power. Therefore, if dams are built, environmental factors must be carefully considered. This includes protecting fish migration routes, reducing damage to forests and farmlands, and carrying out proper environmental impact assessments. By balancing energy needs with environmental protection, it may be possible to reduce harm to the Salween River and the people who depend on it.

According to the Shan State Rivers network, compared to the Nam Pang river, it is shown that local people are willing to maintain the river resources as a vital role as the river offers many valuable sources to them. At the same time, using various fishing gear styles proves their advantageous action on the river. If any dam construction will be started on the Nam Pang River, for exporting electricity, this issue will be important because it strongly affects local people's lifestyles and their jobs.

The observation that fishing in the Nam Pang River is not a commercially valuable industry means that river fisheries serves not as an income generating venture but as a means of livelihood and subsistence. Fishing earns income, although most households to be reliant on it properly are related to farming, trade pertaining to aquaculture, collection of forest products, or various other labor types. There is no large-scale consumption or retailing of fish as people may eat it at home or sell it locally in smaller quantities, and when a catch of fish in the river decreases, the sellers can readily switch to factory-farmed fish or farm products. This modest degree of commercialization is an indication that the fishery has little market pressure as does large-scale or export fishery.

Two opposing situations of conservation are implied by this. On the one hand, decreased commercial value can decrease the motivation to extensive exploitation, which can help to avoid overfishing and most fatal exploitation practices. This lack of good profit motives is one of the reasons why destructive practices like dynamite fishing are unusual as also why

traditional gears used seasonally still predominate. Conversely, since fishing is not a significant source of income, the active interest of the community in fishery conservation can be weak. The loss of fish stocks may be accepted or perceived as less immediate when long term viability of river fisheries is not immediately related to livelihoods; moreover, when there are other sources of income.

Conservation motivation in the Nam Pang situation, therefore, is probably influenced by food security, cultural values and attachment to the river but not by economic incentives only. This implies that conservation initiatives must focus on how the river is useful in house nutritions, the ecology, and culture continuity as opposed to acting solely on the economic damages. Conservation strategies, which operate on the community level and which reconcile fishery resources in the form of social heritage and ecosystem provision, can be potentially more effective than market-bound measures.

Recommendations

Future researchers and projects in fisheries management and conservation should consider the limitations faced in this study, particularly time constraints and limited availability of local baseline data. We strongly recommend prioritizing field-based data collection and conducting surveys across different fishing seasons, as fish abundance and species composition can vary throughout the year due to spawning and migration patterns.

Reviewing location-specific literature before fieldwork and engaging with local fishers or experts can improve species identification and understanding of seasonal fishing practices. Additionally, long-term research projects are encouraged, as they allow for monitoring population trends over time and provide stronger support for sustainable fisheries management and conservation decisions.

CONCLUSION

In this research, we had three intersecting approaches. The first approach was a fish survey that had been taken using field observations, documentation, and interviews. We had documented 18 fish species with photos, and 24 fish species were reported through interviews. In the recorded species, some of the species are invasive, while some are introduced and endemic. Furthermore, we took the water quality of the Nam Pang River during our field visit. According to water parameters, the river is slightly alkaline and has low mineral content. According to the data collected, we would like to suggest further study to do research about fish species during the fishing season (from October to May). The livelihood of

Kunhing locals and their dependency on the Nam Pang River were recorded through the interviews of fishers and fish sellers.

ACKNOWLEGEMENTS

First and foremost, we would like to express our profound gratitude to IUCN (International Union for Conservation of Nature) and BRIDGE Salween Youth Program for data collection and identification of fish species in Nam Pang River, Kunhing town area, southern Shan state.

We are deeply thankful to Ma Seint San Zaw, Head of Office- IUCN Myanmar, Ko Wint Hte, Coastal Resources Programme Officer (CRPO) – IUCN Myanmar and Ma Thazin Htet, Programme Associate – IUCN Myanmar for kind permission, insightful suggestions, and support throughout the program.

Special reorganization is given to Ko Wai Hin Arkar (Native Species Conservation and Identification (NSCI)) for his invaluable guidance and support in the fish identification process.

Additionally, we respectfully thank Sai Si Pao and his beloved wife from Kuhing Town for his help in engaging with local people in Kunhing Town. We also would like to thank Shan Taung Dan Hostel for hosting us the whole research journey with warmth.

Furthermore, we would like to extend our gratitude to interviewees in Kuhing and Karli Town for their information through this research.

We would like to express deep appreciation to all individuals who contributed, either directly or indirectly, to the successful completion of this research.

REFERENCES

1. Living Rivers Siam. (2003). The Salween Under Threat: Damming the Longest Free River in Southeast Asia.
2. World Bank. (2018). Sub-Basin Evaluation: Thanlwin (Salween) River Basin.
3. International Finance Corporation (IFC). (2021). Strategic Environmental Assessment of the Salween River Basin.
4. Fields Survey of freshwater fishes in Upper Moei River, Sal-ween Basin, frontier of Thailand and Myanmar.” Biodiversity Journal 4, 2013.; Kulabtong et al., 2013
5. Alien aquatic species in Myanmar, 2005.; U Hla Win., 2005
6. International Rivers. Salween River and hydropower impacts.
7. River Resource Hub. Salween River Basin facts and environmental concerns.
8. World Commission on Dams (WCD). Dams and their environmental and social impact

BUDGEDARY FRAMEWORK

No.	Description	Requested Budget	Expenditure	Balance
1.	Research materials	465,000	449,200	15,800
2.	Transportation	2,300,000	1,595,000	705,000
3.	Meals and allowances	3,570,000	3,633,500	(63,500)
Total Budget		6,335,000	5,677,700	657,300

Note:

Over-expenditure (up to 10%)

- **Delivery** – The expenditure exceeded the budget by 180% primarily because of additional transportation costs to collect all the receipts from individual team members and sending items back from the bus station. Furthermore, some of these costs were higher than initially estimated.
- **Printing Fee** – the printing fee was overspent by 46% due to an increase in the number of interviewees. This required us to print significantly more questionnaire papers than originally planned, leading to an expenditure above 10%.
- **Field hotel** – it exceeded the budget by 15.88% because of two main factors: 1) the need to pay for hotel taxes which were not included in the request budget and 2) extension of the stay duration due to unexpected fieldwork requirements.

Under-expenditure (under 10%)

- **Mask, Gloves, Board, Ruler** – the amount of money was saved because the quantity of materials purchased with our estimated price was sufficient to meet the requirements.
- **Interview & Expert Fee** – the initial allocation for this item was split into interview fee (100,000 MMK) and Expert fee (50,000 MMK). We were able to spend less than 90% of the budget because the amount of materials provided to the interviewees was minimal and the expert only requested the exact required fee.
- **Pilot Taxi** – the expenditure was reduced due to a change in the travel schedule, which subsequently reduced the number of days the taxi service was needed.

- **Boat** – we were able to reduce the cost because the work got done in just one day and it was faster than expected.
- **Pilot Hotel** – the expenditure for this cost item was reduced due to a slight modification in the duration of the trip.

The remaining expenditures are all in 10%.

APPENDIX

Appendix 1. Reported Fish Species

Myanmar Name	Shan Name	Common Name
Ngar Phane	ပၢၼိမ်း	Carp Intha
Ngar Gyin Phyu	ပၢမုၵ်းၵၢဝ်	Carp
Ngar Nat Pyar	ပၢမုၵ်းလမ်	Orangefin Labeo
Ngar Dote Tan	ပၢၶွၼ်ႇ	N/A
N/A	ပၢခိၵ်,ၸ။	N/A
Ngar Mway Htoo	ပၢခ်ိဝ်။	Spiny Eel
Ngar Lin Pan	ပၢၸင။	Mottled Eel
Ngar Phal	ပၢဝၢင်	Bronze Featherback
Ngar Soute Khwat	ပၢဂုဂ်ႈမၢ။	Vermiculated Sailfin Catfish

Myanmar Name	**Shan Name**	**Common Name**
Ngar Gyin Shwe War	ပၢၢ်ၼိး	Common Carp
Ngar Sadin	N/A	Sardine Fish
Ngar Kyar	ပၢၵလၢ့	N/A
Ngar Phyit Salat I	ပၢၸၢတ်,	N/A
Ngar Phyit Salat II	ပၢမေၢ့	N/A
Ngar Tilapia	N/A	Nile Tilapia
Ganan	ပူ	Crab
Pazune	ၵုင်း	Shrimp
Ngar Phyu Salat	ပၢဢိူဝ်,	N/A
Zaedi Kha Yu	ရိုဝ်ၵင်းမူး	Pagoda Snail
Yay Late	တဝ်,ၼမ်ဵ	Turtle

Myanmar Name	Shan Name	Common Name
Ngar Khone Ma	ပၢ်ပွၵ်း	Tongue Sole Fish
Ngar Yant Myo Tae	ပၢ်လမ်	N/A
Ngar Talae Htoo	ပၢ်လူး	Burmese Loach
Ngar Khuu	ပၢ်လူၵ်ꩻ	Catfish

Appendix 1. Regular Fishing Grounds

Most frequent site: Yan Nar Thoe (ယၢၼ်းၼၢးတူဝ်း) and Yan Tsa (ယၢၼ်းသၢꩻ) are visited 4 times each. Yan Kun Lar (ယၢၼ်းဵုၼ်လၢ) is also a key site, a total of 5 times.

Regular sites: Sites like Yan Kun Hmone (ယၢၼ်းဵုၼ်မူၼ်း) and Haung Wun Shin (ရူင်း၀ုၼ်းသျိုၼ်း) show 2 visits.

Other locations: Several other sites are visited once, including Yang Nar Khuu (ယၢၼ်းၼၢးၶူး), Yan That Wayne (ယၢၼ်းတၢတ်,ဝီင်း), Yan Kun Lwane (ယၢၼ်းဵုၼ်လိုင်း), Yan Kun Lwo(ယၢၼ်းဵုၼ်လိုဝ်), Yan Kun Kharr (ယၢၼ်းဵုၼ်ၶၢး), Yan Kun Pu Mite (ယၢၼ်းဵုၼ်ပူ,မီꩻ), Yan Aoie(ယၢၼ်းဢွၵ်း), Yan Mag Gyan (ယၢၼ်းမၢဂ်,ဢ်ငး), Yan Kyaut Than (ယၢၼ်းရွၵ်ꩻတၢၼ်း), and Haung Mat Sauk (ရူင်းမၢဂ်,လွင်ဂ်း).

Appendix 2. Occasional Fishing Grounds

Key occasional sites: Yan Lout (ယၢၼ်းလွတ်း), Yang Nar Khuu (ယၢၼ်းၼၢးၶူး), Yan Longe (ယၢၼ်းလူင်), Yan Aoie (ယၢၼ်းဢွၵ်း), and Yan Tsa (ယၢၼ်းသၢꩻ) are visited 2 times each.

Single visit sites: Locations visited only once include Yang Naung Kwan (ယၢၼ်းၼွင်ၶွၼ်),Yan That Wayne(ယၢၼ်းတၢတ်,ဝီင်း), Yan Kun Lwane (ယၢၼ်းဵုၼ်လိုင်း), Yan Kun Lwo

(ယၢၼ်းၵုၼ်လိူဝ်), Yan Kun Kharr (ယၢၼ်းၵုၼ်ခၢး), Yan Kun Pu Mite (ယၢၼ်းၵုၼ်ပူ့မိ်ဝ်), Yan Mag Gyan (ယၢၼ်းမၢဂ့်ဢ်ငး), Yan Tsa (ယၢၼ်းသၢ့), Yan Nar Thoe (ယၢၼ်းၼၢးတူဝ်း), Yan Kun Lar (ယၢၼ်းၵုၼ်လၢ့), Haung Wun Shin (ရှူင်းဝုၼ်းသျိၼ့်), and Haung Mat Sauk (ရှူင်းမၢဂ့်ထွၵ်း).