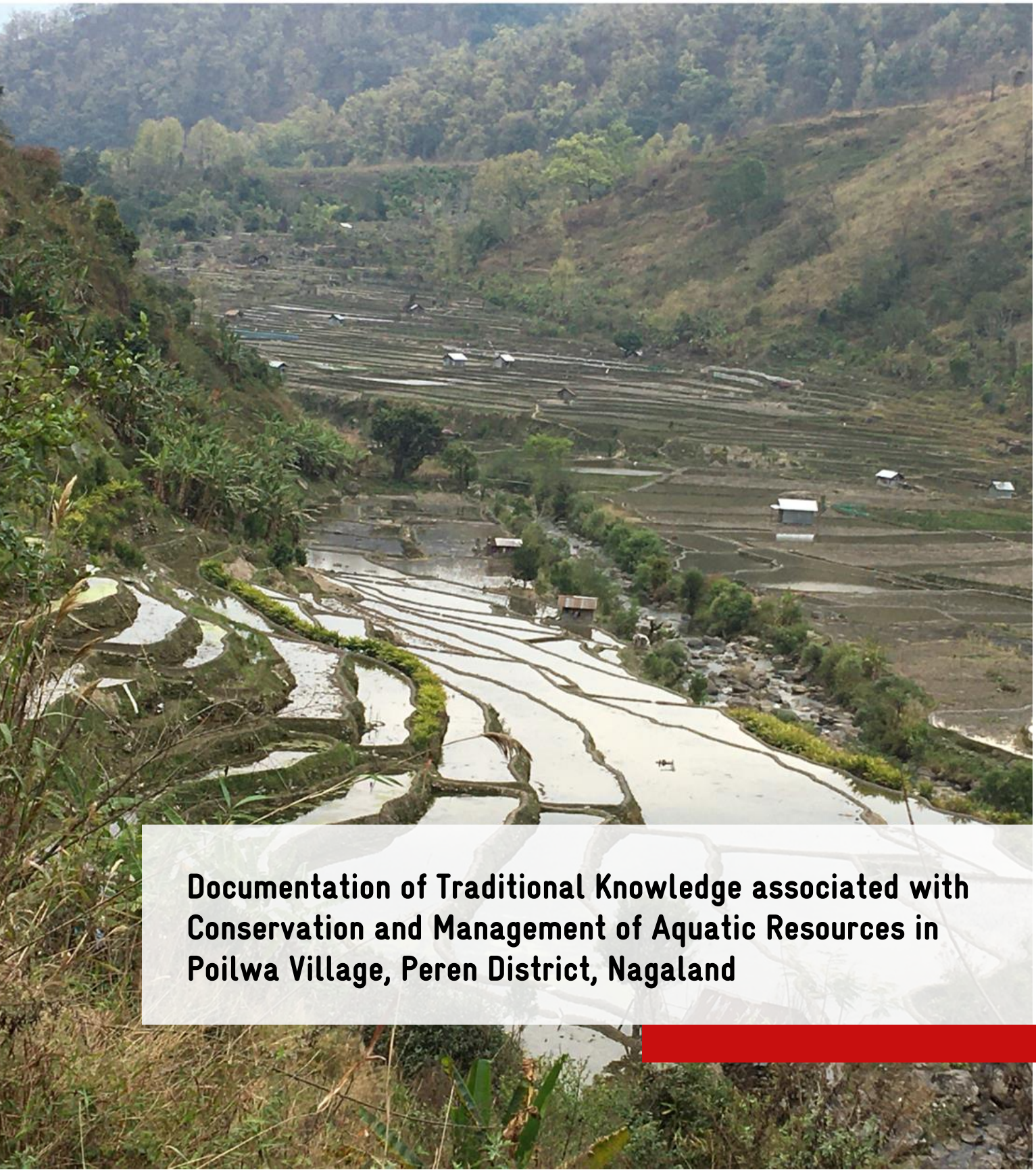


Documentation of Traditional Knowledge associated with Conservation and Management of Aquatic Resources in Poilwa Village, Peren District, Nagaland

Ministry of Environment, Forest and Climate Change

Kohima Science College

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection

based on a decision of the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

Published by
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices:
Bonn and Eschborn

Protection and Sustainable Management of Aquatic Resources in the Northeastern Himalayan Region of India (**NERAQ**)

Guwahati Regional Office
Protection and Sustainable Management
of Aquatic Resources in the North Eastern
Himalayan Region of India (NERAQ)
E: info@giz.de
I: www.giz.de/India

Responsible
Patricia Dorn,
Project Manager, NERAQ

Authors
Kevilhuninuo Nagi (Coordinator)
Samadangla Ao
Ruokuovikho Dominic
Kohima Science College, Jotsoma, Nagaland

Photo credits
Cover photo: S. Ao
Doilum Roi is a major river, situated in the western territory of Poilwa village,
flowing north to southwest that feeds the adjacent wet terrace paddy fields.

GIZ is responsible for the content of this publication.

On behalf of the
German Federal Ministry for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection (BMUV) under the
International Climate Initiative (IKI) New Delhi, 2024

List of Figures

List of Tables

CONTENTS

CHAPTER 1: INTRODUCTION

Traditional knowledge (TK), often referred to as indigenous knowledge or local knowledge, encompasses the wisdom, skills, and practices developed and sustained by indigenous and local communities over generations. This body of knowledge is rooted in the cultural traditions, experiences, and adaptations of these communities to their environments and is transmitted orally from one generation to the next through experience out of curiosity or necessity (Battiste, 2002).

Traditional knowledge is holistic, dynamic, and closely linked to the social, economic, and spiritual lives of the people who hold it. It includes an array of disciplines such as agriculture, medicine, environmental management, and craft. The significance of traditional knowledge lies in its sustainability and adaptability, offering invaluable insights and solutions to contemporary challenges such as biodiversity conservation, climate change adaptation, and sustainable development (Gadgil et al., 1993). It is important to emphasize that TK is not a static phenomenon but a dynamic one that evolves with changes in the internal and external environment of the community concerned (Gorjestani, 2004). Recognizing and integrating traditional knowledge with scientific research and policymaking is crucial for fostering a more inclusive and sustainable approach to global challenges.

Nonetheless, ensuring the continued vitality of TK requires a holistic approach that respects the rights and autonomy of the communities holding this knowledge (Posey, 1996). Efforts to revive and encourage TK are deemed essential for the preservation of cultural diversity and sustainable development (Gorjestani, 2004). Addressing the erosion of TK necessitates a holistic approach that recognizes the interconnectedness of knowledge, culture, and the environment. This involves going beyond documentation and legal protection to actively involve knowledge-holders, promote sustainable governance models, and respect the rights of indigenous peoples and local communities.

The relationship between human societies and aquatic resources has been deeply intertwined throughout history, fostering a richness of TK that encompasses folklore, livelihood practices, and medicinal and healing traditions. Understanding the local perceptions surrounding these aspects is crucial for the sustainable management and conservation of aquatic ecosystems (Smith, 2020).

Conceptual background

Aquatic resources serve as a significant source of food security and provide income for a sizable local population in Northeast India. These resources, however, are under threat due to climate change, pollution, and unsustainable developmental activities. Rapid changing demographics, lifestyle patterns, over- exploitation and neglect of traditional practices are further adding to the woes of already vulnerable and neglected aquatic freshwater ecosystems with devastating consequences for fish and invertebrate stocks and thus livelihoods of the riverine population. There is also a growing requirement for improved cooperation between research institutions and creation of a knowledge base in the region.

Bearing in mind the importance of incorporating traditional knowledge in a holistic strategy for conservation and management of aquatic resource, the Indo-German bilateral cooperation project "Protection and Sustainable Management of Aquatic Resources in the Northeastern Himalayan Region of India (hereinafter referred to as NERAQ Project)" which is being implemented by GIZ in Assam, Manipur, Meghalaya and Nagaland, engaged an inter-departmental team from Kohima Science College (A), Jotsoma, led by the Department of Anthropology, in documenting the traditional knowledge associated with aquatic resource management in Poilwa village, Nagaland. This pilot exercise was carried out using the Methods Manual developed for NERAQ Project. by Dr. Rajindra Puri from University of Kent, UK.

Poilwa, surrounded by rugged peaks and rolling hills, is adorned with lush greenery and diverse flora and fauna. This peaceful village, situated away from the hustle and bustle of city life, allows its residents to live closely with nature. The village is famous for its rare fish delicacy called Snowtrout/Mountain Trout, locally known as *Kahane* and a local brew known as *Zautau*, which is locally said to turn pale cheeks rosy. With initiatives by concerned villagers, Poilwa is anticipated to be recognized as a Heritage Village, preserving numerous antiques and historical treasures. The village

is a true treasure trove, rich in historical monuments, natural wonders, and political events, many of which are unknown to scholars and the younger generation. Although the ancient Naga custom of animism is no longer practiced following the villagers' embrace of Christianity, it is still informally preserved and recorded orally from generation to generation (Zhimomi, 2020).

Poilwa's natural beauty, with its unique topography, stands out among Naga areas and serves as a paradise for migratory birds, especially hornbills (*Herie*), and the habitat of the rare Tragopan (*Ruigau*). The crystal-clear waters of the *Teupuiki* and *Duilum Roi* rivers, home to the *Kahane* fish, flow through the village and join the trans-Mbeuki (Barak) rivers. As one enters Poilwa's natural forest, they are greeted by the chirping of birds and the calls of animals in the rolling hills and dense jungle before reaching the historic village.

Poilwa was originally known as '*Bukpoilwame*' and the meaning of it stands thus: '*Buk*' means *Bungtak*[1] , the original religion practiced by Nagas before the advent of the Christianity, '*Poi*' means the 'Head', '*lwa*' means the 'Range' and '*me*' means the 'People'. Thus, the original meaning of *Bukpoilwame* signifies the range where the patriarch or head of the paternal line lived. It is therefore said that people of Poilwa are from the eldest line of the Zeliangrong family (Diswang, 2010; Mbungcha, 2013).

The two main water bodies of Poilwa village are the *Teupuiki* river and the *Duilum Roi* river.

Folklore, myths, and legends have long been integral components of human societies, serving as vehicles for cultural identity, knowledge transmission, and ecological wisdom. In the context of aquatic resources, communities worldwide weave intricate narratives around their relationship with rivers, lakes, and oceans. This study explores the rich tapestry of cultural narratives surrounding aquatic ecosystems, aiming to unravel the symbolic meanings attached to these environments and their inhabitants (Diswang, 2010; Mbungcha, 2013).

This assignment specifically delves into the multifaceted dimensions of traditional knowledge held by communities living in proximity to aquatic environments. By exploring the influence of local perceptions on TK related to folklore, myths, legends, livelihood, and traditional medicine, the study aims to contribute to a deeper understanding of the intricate connections between human societies and aquatic ecosystems. The multifaceted nature of traditional knowledge, as explored in this context, underscores its importance in guiding communities toward sustainable interactions with their environment (Jones, 2019).

Objectives of the study

a) Describe the current and past uses of aquatic resources by the community of Poilwa.
b) Document the knowledge for underpinning current and past practices, and management of aquatic resources following the methods manual developed by GIZ.
c) Collate materials (Photographs, artifacts, sayings, proverbs, etc.) for display in the proposed Visitor Information Centre in Poilwa.
d) Provide feedback for the methods manual with regards to the language, applicability, explanation of the methods and user-friendliness.
e) Provide inputs and recommendations for preparation of local conservation management plan.
f) Submit a species-based list and findings on TK following PBR format.

[1] Earthly worship

CHAPTER 2: METHODOLOGY

Study area

Poilwa, traditionally a sovereign Naga village with its own territory, stands as one of the oldest and largest Zeliangrong villages, perched on a hilltop. Renowned for its scenic beauty, Poilwa features lush green landscapes, mountain ranges, winding rivers, and valleys. It is surrounded by the Barail ranges of the *Doidirekie*[2] valley, the *Idwalepie* mountain ranges bordering Senapati district of Manipur to the east, Mt. *Langdilwa* (*Pauna*) to the west, *Heuzielebam* to the north, and Mt. *Lwanglolwa* to the south. Geographically, it is located at 93° 54' 28.5" E longitude and 25° 34' 51.5" N latitude. The village is approximately 50 kilometers from Kohima, the capital of Nagaland, 70 kilometers from Peren District Headquarters, and 114 kilometers from Dimapur, the economic hub of Nagaland. Under its jurisdiction, there are two sub-jurisdictional villages: Poilwa Namci and Heunambe village. These two villages are not autonomous as they fall under the governance of Poilwa village. Our study site focused on Poilwa village and Poilwa Namci (Figure 1). According to the 2011 census, there are 384 and 152 households, respectively.

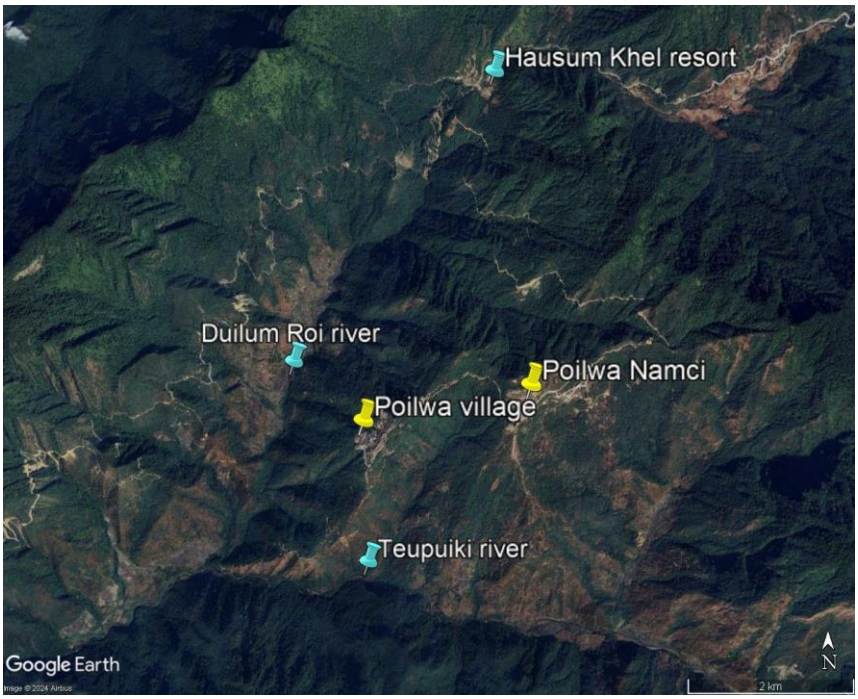


Figure 1. *Google map showing Poilwa and Poilwa Namci and adjacent villages with the Teupuiki and Duilum Roi rivers.*

Poilwa, a heritage village, sits high above the *Doidirekie* Valley, bordering the Zeliangrong areas of Manipur and Peren district. The village was founded by *Hau* and *Hoi*. *Hau* being the elder and *Hoi* being the younger. The village is structured into five khels all of whom descended from the *Hau* and *Hoi* (Table 1). The *Hau* descendants include *Rehangcha* khel and *Hausum* Khels, while the *Hoi* clan consists of *Tangki*, *Mbungcha* and *Ngalui* Khel. There are five khels each with four clans. Namely *Rehangcha* Khel with *Rao*, *Hinglak*, *Poireng* and *Dwaswang* clans; *Mbungcha* Khel with *Hoinrang*, *Nkangchame*, *Hingpuiname* and *Echao* clan; *Tangki* Khel with *Hengwang*, *Kereking*, *Michui* and *Namgi* clans; *Hausam* Khel with *Chuilo*, *Diswang*; and *Ngalui* khel with *Guipeucha*, *Nlang*, *Khate* and *Inim* clans. *Nlang* clan, however, is a descendant of *Hau* instead of *Hoi*.

[2] *Doidirekie* is another term for Dzukou

VILLAGE FOUNDERS			
HAU		*HOI*	
Khels	Clans	Khels	Clans
Rehangcha	*Rao*	*Ngalui-Guipeucha*	*Guipeucha*
	Hinglak		*Nlang (Hau)*
	Poireng		*Khate*
	Dwaswang		*Inim*
Hausam	*Laksemchame*	*Tangki*	*Hengwang*
	Diswang		*Kereking*
	Nbingcha nroibe		*Michui*
	Nbingcha nkangbe		*Namgi*
		Mbungcha	*Hoinrang*
			Nkangchame
			Hingpuiname
			Echao

Table 1. *Table showing the distribution of clans of each khel originating from the founders of Poilwa village.*

At Poilwa Namci, which is an extension or offshoot of Poilwa village, the same structure is followed. Except that some clans of the 5 khels are absent or are very less in number as compared to some clans. Poilwa is the administrative center for Poilwa Namci and all its land and resources are allotted by Poilwa. For all community events such as fishing, they come to Poilwa village.[3]

Study design and data collection

The study was carried out using the Methods manual: Documenting Traditional Knowledge of Aquatic Resources in North-East India by Dr. Rajindra Puri (Puri, 2023). Following the Manual different types of Interview methods were used for data collection. Prior to any interview sessions a community meeting was arranged with the help of the Village Chairman, who had been apprised earlier. During the meeting representatives from all the five Khels of the village attended and the purpose of the present study, the processes for documenting and activities involved, was made known to them. Free, prior and informed consent was thereby sought from the people and acquired. Consent was also sought to take photographs, audio recording and video recording. It was explicitly stated to them that all information collected would be shared with them and authenticated or verified by them before submission to the funding agency. At the same time, all specimens collected, flora and fauna, would be identified as far as possible and given back to the community. All the traditional equipment used in relation to sourcing or accessing the aquatic resources would be presented to them mentioning its utility.

An Interview guide keeping all the relevant topics was prepared (Refer to Appendix 1). Using the Unstructured Interview method, Focussed Group Interviews were conducted among representative samples of the Womenfolk, Menfolk, and the Youth of the village. Personal Interviews with identified knowledgeable elderly persons, both men and women, were carried out. Each of these sessions involved Face to face open ended interviews. Due to language barrier some of the informants were more comfortable responding in their own dialect, as such, Translators were required during the interview sessions. Telephonic interviews were also used to get some minute data and for reconfirmation of the information gathered. The primary data collected in the study was mostly qualitative in nature. Qualitative data is information that is descriptive in nature and characteristic of the process. Walking Interview method was carried out with few informants while going to the field and the river for observation and specimen collection.

The participatory observation method was another way of collecting firsthand information. Samples of aquatic species were collected with field informants. During a Khel fishing expedition, the investigators took active part in the activity, thereby experiencing firsthand how traditional fishing was carried out. Group activities mandated in the Manual were also carried out:

a. Freelisting technique was used to identify all aquatic resources under various domains, both flora and fauna. Blank papers and pens were provided to each group to list out all known aquatic flora and fauna. After

[3] All resources, uses and management of aquatic resources are the same in both the villages as Poilwa Namci is an extension of Poilwa.

collecting the freelist from the womenfolk, menfolk and the youth, the list was compiled and edited with the help of knowledgeable persons to ascertain their domain and the standardized or generally accepted name and spellings of each species.

b. Pilesorts method was done after collecting the freelist. Using both Constrained and Unconstrained pilesorts, the listed species were sorted according to the various local criteria. Here, the names of each species were written on a piece of chart paper and the informants were asked to arrange them according to their similarity and dissimilarity. Through this exercise the local classification system using local criteria on the different domains revealed the folk taxa.

c. Spatial Resource Mapping was executed with the various groups to collect information on the local landmarks and features, the land use and coverage; as well as to locate where resources were available and accessed by the community. Chart papers and colored sketch pens were provided to each group for this purpose. This exercise helped in bringing out a collective mapping from the different groups and their knowledge on the various features and resources.

d. Temporal Resource Mapping was carried out through which seasonal calendars and historical timeline documenting variation in size, abundance and behaviour of the Aquatic resources as well as the patterns of human use over time was recorded. For this, the Data collection sheet for seasonal calendar (Puri, 2023) was applied to the informants.

Specimen collection

Multiple on-site visits to the rivers were performed to collect specimens of aquatic fauna and flora. Specimens were collected from the rivers, paddy fields adjoining the rivers and streams within the study locations. Collection of piscicidal plants was performed with the assistance of a local guide by visiting different sites around the villages.

Technical Aids

Technical aids such as mobile phones, digital cameras, microscopes, GPS were used during the process of data collection for taking audio and video recordings. These recordings were further transferred to a personal computer for transcription of the data and microscopic image processing was performed using ImageJ software.

Materials used

The material used for collection of plants includes gloves, containers, herbarium press, herbarium sheets, formalin, spray bottle, newspaper, field notebook and pen. Any information or observation that caught the attention of the investigators was noted. During interview sessions, although audio recordings were done, certain points which needed more clarification were noted down to be asked later so as not to break the flow of narration of the informants. Chart papers were used during group activities such as mappings and pilesortings. The collected plant samples were sprayed with formaldehyde[4] and pressed using herbarium press and newspaper. Specimen were identified following: The flora of Assam (Kanjilal et al., 1934a; 1936b; 1936c; 1938d; 1938e; 1940f), The flora of China (Wu & Raven,1994a; 1994b; 2003c; 2006d; 2010e) and The flora of British India (Hooker, 1881a; 1884b; 1888c; 1893d).

The material used for collection of animal samples were specimen bottles, magnifying glass, forceps, gloves and field notebook. Fish, aquatic insects and other fauna were collected with cast net and scooping net. The collected animal samples were preserved in 5% formaldehyde and stored in labeled bottles at the library, Poilwa village. All specimens collected were sorted, enumerated, and identified with the help of available taxonomic keys. Specimens were identified following Subramanian & Sivaramakrishman (2007), bugguide.net and inaturalist for aquatic insects; Jayaram 1999, Talwar & Jhingran, 1991 and Alfred, 2005 for fishes and other relevant literatures for amphibians and crustaceans.

Meeting with the community

On the initial day at the research site, a meeting was convened where the chairman of the village council and representatives from all the khels attended (Figure 2). A concise overview of the project was presented to them and

[4] Formaldehyde was prepared using 60% Formalin and 40% Alcohol.

their consent to carry out the work was sought. The chairman, alongside with other members present, expressed their full willingness to cooperate with the project. Representatives from all the khels, as well as the chairman and council members, signed the consent form.

Figure 2. *Meeting of Project team members (i) with the Poilwa Village Council Chairman, members and Khel representatives apprising them of the project (ii). Meeting with the womenfolk and youths at Poilwa (iii).*

Group activities: Mapping, Freelisting and pile sorting

The following day, group activities were carried out. Initially, women and youth gathered at the Chairman's residence for a free listing session (Figure 3). The research team provided instructions on conducting the free listing, distributing paper and pens. Since few women were comfortable to write, the youths assisted in listing the aquatic resources named by the women during the free listing. These resources were later recorded on paper chips in preparation for pile sorting.

On the following days, men and a few youths assembled at the Hausum Khel Morung. They were divided into groups, one group focused on village mapping while the other engaged in pile sorting (Figure 4, 5). Given their extensive knowledge, the men corrected spelling errors and performed the pile sorting activity. This process allowed them to work on the traditional classification of aquatic resources into distinct groups based on local knowledge.

Figure 3. *Freelisting group activities carried out with the womenfolk and youths of Poilwa village (i) & (ii).*

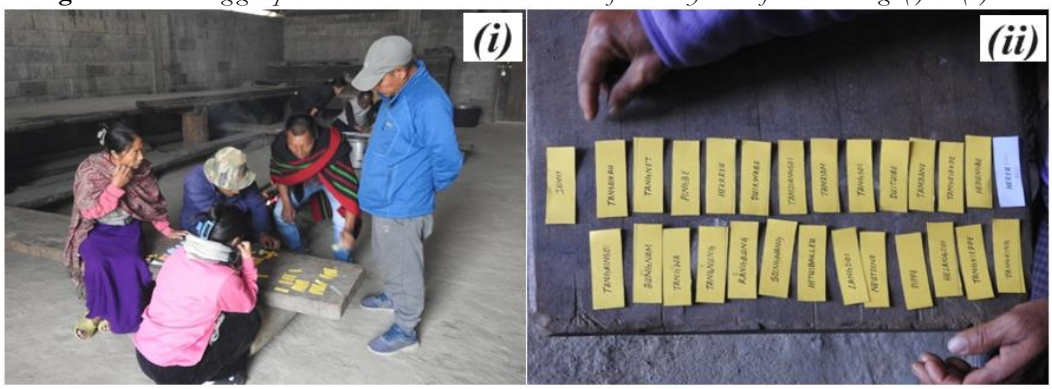


Figure 4. *Pilesorting group activity was carried out with the womenfolk and menfolk of Poilwa village (i) & (ii).*

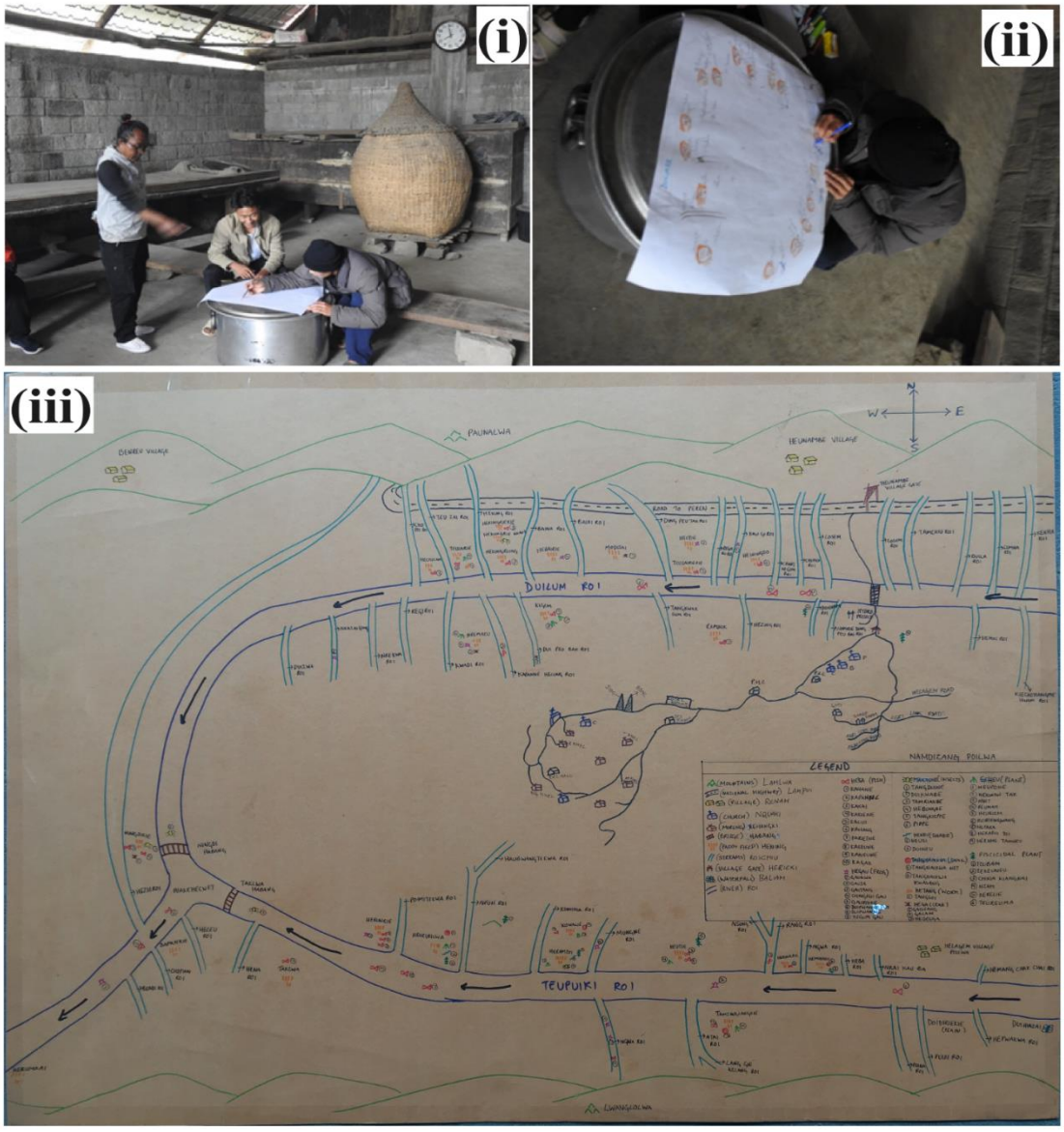


Figure 5. *Poilwa Village Mapping was carried out with the womenfolk and menfolk of Poilwa village (i) & (ii) (see appendix 11). The 'master map' after compiling all the maps drawn by the different groups on aquatic resources (iii).*

Interviews

During the free listing and pile sorting sessions, a few resourceful people were identified having substantial knowledge about traditional aquatic resources. Prior appointments were scheduled with those individuals and conducted interviews at their homes with the assistance of a local guide (Figure 6). Additionally, elderly citizens of the village were interviewed with the help of a translator to ensure better communication.

Figure 6. *Interview sessions with knowledge keepers at Poilwa village. Usually in villages the ideal place for entertaining visitors or guests is around the hearth (i) & (ii). Interview sessions with informants at Poilwa Namci (iii).*

CHAPTER 3: STUDY FINDINGS

Several group meetings were held during which free listing and pile sorting activities were conducted to collect information on various aquatic resources of the Poilwa community. During these sessions thorough studies of the different water resources and diversity within and around the vicinity of the village were carried out. Domains were assigned as aquatic plants, insect, worm, crab, snail, snake, bird, frog and fish. After the free listing was done, sub domains were identified by each group based on important applications related to each of the domains. Some of the sub-domains used were feeding habit, habitat, size of the organism, medicinal uses, edibleness, indigenous variety, appearance, size and color.

Water bodies

Within the Poilwa jurisdiction (Poilwa and Poilwa Namci), there are two major water sources, *Teupuiki* and *Duilum Roi* rivers and several small streams (Figure 7). The two river sources feed permanent wet terrace farms located adjacent to the rivers and downstream of the rivers. The aquatic fauna and flora known to be found in these rivers were listed and specimens were collected.

Teupuiki River

The people of Poilwa village believe that *Teupuiki* river and *Barak* River in Manipur flow parallel to each other in search of one another. It is said that *Teupuiki* traveled a long distance searching for *Barak* River before they finally merged. Hence *Teupuiki* was a river that "searched and searched" for Barak. The starting point of *Teupuiki* is *Duihiazaipoi* near Viswema village, Kohima. The water flow in *Teupuiki* river increases during daytime compared to morning and evening, due to the melting of ice upstream in the Dzukou valley. The tributaries contributing to *Teupuiki* apart from the mainstream Dzukou river include *Bendi Roi, Chopian Roi, Haubwangtekwa Roi, Heba Roi, Heleu Roi, Hemang Chak Chai Roi, Hena Roi, Hepwakwa Roi, Hezau Re Roi, Kumihia Roi, Lang Gie Kelang Roi, Makau Tia Roi, Muibe Ki Roi, Mungne Roi, Ngwa Roi, Npün Roi, Nrai Kau Ba Roi, Nsung Roi, Ntai Roi, Poimitekwa Roi, Puidi Roi, Puina Roi, Pung Kie Roi and Rang Roi* (Table 2).

Duilum Roi River

Duilum Roi in Zeliang means 'warm water', as the water is much warmer compared to the *Teupuiki* river. The starting point of *Duilum Roi* river is *Tsinrangbum* between Khonoma and Dzuleke, Kohima. The tributaries contributing to *Duilum Roi* apart from *Duila Roi*[5] are *Baidi Roi, Baina Roi, Ching Hegum Roi, Cho Poi Roi, Chopien Roi, Ding Peu Tak Roi, Dui Peu Bak Roi, Duinnam Roi, Duizwa Roi, Hebai Roi, Hekung Roi, Hemoi Roi, Hezie Roi, Hezing Roi, Kapanne Helung Roi, Kau Gi Roi, Kenhia Roi, Kiechohangme Hwam Roi, Kolobe Helau Roi, Kwadi Roi, Kwasum Roi, Losem Roi, Lumna Roi, Mwaswang Tak Roi, Namrieding Peu Bai Roi, Nrazaigung, Nrekwa Roi, Regi Roi, Regoi Ro Roi, Rezaikie Roi, Tamchiu Roi, Tangdeuke Gie Roi, Tangkwak Sum Roi and Teu Zai Roi*(Table 2).

[5] Referring to Dzuleke River.

Figure 7. *The two major water bodies, (i) 'Duilum Roi' & (ii) 'Teupuiki' river meet at the (iii) 'Hiakehecwet' which runs towards Dimapur. The rich water source irrigates adjacent 'Hening'='paddy fields'(iv).*

	Major Rivers		
	Teupuiki	***Duilum Roi***	
Tributaries	*Bendi Roi*	*Baidi Roi*	*Namrieding Peu Bai Roi*
	Chopian Roi	*Baina Roi*	*Nrazaigung*
	Dzukou river	*Ching Hegum Roi*	*Nre*[2] *Kwa Roi*
	Haubwangtekwa Roi	*Cho Poi Roi*	*Regi Ro*[3] *Roi*
	Heba Roi	*Chopien Roi*	*Regoi Ro Roi*
	Heleu Roi	*Ding Peu Tak Roi*	*Rezaikie Roi*
	Hemang Chak Chai Roi	*Dui Peu Bak Roi*	*Tamchiu Roi*
	Hena Roi	*Duila Roi*	*Tangdeuke Gie Roi*
	Hepwakwa Roi	*Duinnam Roi*	*Tangkwak Sum Roi*
	Hezau Re Roi	*Duizwa Roi*	*Teu Zai Roi*
	Kumihia Roi	*Hebai Roi*	
	Lang Gie Kelang Roi	*Hekung Roi*	
	Makau Tia Roi	*Hemoi Roi*	
	Muibe Ki Roi	*Hezie Roi*	
	Mungne[1] *Roi*	*Hezing Roi*	
	Ngwa Roi	*Kapanne Helung Roi*	
	Nptin Roi	*Kau Gi Roi*	
	Nrai Kau Ba Roi	*Kenhia Roi*	
	Nsung Roi	*Kiechohangme Hwam Roi*	
	Ntai Roi	*Kolobe Helau Roi*	
	Poimitekwa Roi	*Kwadi Roi*	
	Puidi Roi	*Kwasum Roi*	
	Puina Roi	*Losem Roi*	
	Pung Kie Roi	*Lumna Roi*	
	Rang Roi	*Mwaswang Tak Roi*	

[1]also known as *Nmungne;* [2]also known as *Nrieh;* [3]also known as *Hero*

Table 2. *Major rivers of Poilwa village with their tributaries or feeder rivers/streams.*

Lakes and ponds

Poilwa Village boasts several historic lakes and ponds that have served various purposes over the years (Table 3). Among the notable lakes are *Nangwahing Zai*, *Puiziulungbe Zai*, *Hianoi Zai*, and *Hengwangduime Zai*. The village also has numerous old ponds that were essential for drinking, cooking, rituals, and bathing. However, many of these ponds were either destroyed due to development or neglected, especially after the introduction of water supply in 1977. Some of these ponds, *tekwa*, include: *Hemoing Tekwa*, *Hezwaning Pui Tekwa*, *Nrai Bing Tekwa*, *Kwak Cwale Tekwa*, *Kenling Tekwa*, *Zatiak Tekwa*, *Kwadi Tekwa*, *Miroing Tekwa*, *Kwak Sum Tekwa*[6], *Hecha Zai Tekwa*, *Poimi Tekwa*[7], *Hangbung Tekwa*, *Nrai Bwang Tekwa*, *Hairieng Tekwa*[8], *Nlang Tekwa*, *Nriebung Tekwa*, *Mirning Tekwa*, *Zeupen Tekwa*, *Ehoing Tekwa*, *Pauraingpui Tekwa*, *Hetsazai*[9], *Kwasum Tekwa*, *Nchenziu Tekwa*[10], *Zatiak Tekwa*.

[6]Also known as *Kwasum*

[7] Also known as Poilwa's pond, as it existed when the village was first formed.

[8] Before water supply was introduced, this pond was known for its good water quality.

[9] Also called as *Tsazai*

[10] This pond was formed during the initial settlement of the people at Poilwa.It is located in *Rehangcha* Khel.

	Poilwa		Poilwa Namci
Sl. No.	Old ponds no longer in use	Restored ponds & New ponds	Ponds in use
1	*Hemoing Tekwa*[1]	*Nkangbe Kie Tekwa*	*Swada Tekwa*
2	*Hezwaning Pui Tekwa*	*Nroi Be Kie Tekwa*	*Hezwanghing Pui Tekwa*
3	*Nrai Bing Tekwa*	*Nbingchalwa Tekwa*	*Namgwamhing Zai*[4]
4	*Kwa Cwale Tekwa/Kenling Tekwa*	*Herie Lwa Tekwa*	*Hairoilung Pui Tamba*[5]
5	*Zatiak Tekwa*	*Langzangbe Tekwa*	*Puiziulungbe Zai*
6	*Kwadi Tekwa*[2]	*Kisum Tekwa*	*Hianoi Zai*
7	*Miroing Tekwa*	*Kwadi Tekwa*[2]	
8	*Kwak Sum Tekwa*	*Hengwangki Zie Tekwa*	
9	*Hecha Zai Tekwa*	*Poirencha Lwa Tekwa*	
10	*Poimi Tekwa*	*Raomenaki Zie Tekwa*	
11	*Hangbung Tekwa*		
12	*Nrai Bwang Tekwa*		
13	*Hairieng Tekwa*		
14	*Nlang Tekwa*		
15	*Nriebung Tekwa*		
16	*Mirning Tekwa*		
17	*Zeupen Tekwa*		
18	*Ehoing Tekwa*		
19	*Pauraingpui Tekwa*		
20	*Hetsazai*[3]		
21	*Kwasum Tekwa*		
22	*Nchenziu Tekwa*		
23	*Zatiak Tekwa*		

[1]*Tekwa* means pond/well; [2]Old ponds which have been restored; [3]dipping in this water when one is sick recovers from sickness; [4]*Zai* means lake; [5]*Tamba* means bamboo used to channel water.

Table 3. *'Ponds', locally termed 'tekwa', and 'lakes' termed as 'zai' which had been either destroyed due to development especially after the introduction of water supply in 1977 and newly formed ponds in both Poilwa village and Poilwa Namci village.*

In the past, some ponds were exclusively for men, including *Nroibuing Tekwa*[11], *Nrekwa Tekwa*[12], *Laseng Tekwa*[13], *Haubwang Tekwa*, and *Rahancha Tekwa*[14]. Several neglected and filled ponds have been restored, such as *Kwadi Tekwa* and *Hinglakpechame Tekwa*. Additionally, new ponds have been formed, including *Nkanghe*[15] *Kie Tekwa*, *Nroi*[16] *Be Kie Tekwa*, *Nbingchalwa Tekwa*, *Herie Lwa Tekwa*, *Langzangbe Tekwa*, *Kisum Tekwa*, *Hengwangki Zie Tekwa*, *Poirencha Lwa Tekwa*, and *Raomenaki Zie Tekwa*. In New Poilwa, six ponds are located within the village, namely *Swada Tekwa*, *Hezwanghing Pui Tekwa*, *Namgwamhing Zai*, *Hairoilung Pui Tamba*, *Puiziulungbe Zai*, and *Hianoizai*.

[11] Also known as *Nroibum Tekwa*, where men bathe.
[12] Also known as *Nrentekwa*
[13] Also known as *Langsen Tekwa*.
[14] Located at the Present Dispensary site.
[15] '*Nkang*' is locally translated as Downside.
[16] '*Nroi*' Is locally translated as Upside.

Aquatic Flora and Fauna

With the villages bound by water bodies, it is rich in aquatic resources. For the purpose of finding and identifying the aquatic resources, the informants representing the village were grouped according to their gender and age. The groups comprising Womenfolk, Menfolk and the Youth, were made to carry out various activities where they were asked to list out all aquatic flora and fauna which were later sorted according to their domains and local characterization. Through these activities several names of aquatic resources were collected, however, there were also several which were missed out in the group activities and came to light during interview sessions and specimen collection expeditions.

During this study, on-site specimen collection of aquatic flora and fauna was conducted with the help of local guides. Group discussions and personal interviews were held for free listing of aquatic resources. Through on-site surveys 30 fauna and 25 flora were collected. During the free listing exercise 26 flora and 73 faunas were listed. The on-site collected specimens were taken to the village elders and guides for further identification by vernacular names. Many of the names listed in the free listing were not found because some of the specimens were not available during the season the data was collected (late March to May). Additionally, more extensive field visits could have allowed the collection of some of the free listed flora and fauna. But time constraints and unavailability of field guide limited further specimen collection.

As given in Table 4, 26 numbers of flora were listed from the different groups. However, several aquatic floras, 21 numbers, which were not listed in the group activities were also documented in the process of specimen collection and interview. So, altogether a total of 47 numbers of aquatic flora have been recorded. (Further details can be found in Appendix 2.a)

Sl. No.	Name	Category	Domain	Sl. No.	Name	Category	Domain
1	*Dui Gineu*	Flora	AqFl[1]	25	*Tambet Ne Gineu*	Flora	AqFl
2	*Dui Heu*	Flora	AqFl	26	*Tangki Nloi*	Flora	AqFl
3	*Hekwak Gi*	Flora	AqFl	27	*Hebui Teula*	Flora	UFl[2]
4	*Hekwen Tak*	Flora	AqFl	28	*Hechingmeteuchi*	Flora	UFl
5	*Hepapadi*	Flora	AqFl	29	*Hecwenne Gineu*	Flora	UFl
6	*Herame Tamheu*	Flora	AqFl	30	*Hedeuheu*	Flora	UFl
7	*Herame Tamheu Keu Ciem*	Flora	AqFl	31	*Hedeupa*	Flora	UFl
8	*Herarui Toi*	Flora	AqFl	32	*Hedoipa*	Flora	UFl
9	*Heupone*	Flora	AqFl	33	*Hekapoingegi*	Flora	UFl
10	*Heurah Radiak*	Flora	AqFl	34	*Hekarai Pui Gineu*	Flora	UFl
11	*Heurah Rai*	Flora	AqFl	35	*Hepara*	Flora	UFl
12	*Heuriem*	Flora	AqFl	36	*Herame Tamheu Kedi*	Flora	UFl
13	*Kebeu*	Flora	AqFl	37	*Herame Tamheu Taeda*	Flora	UFl
14	*Kerlinepuigi*	Flora	AqFl	38	*Hetsiokap*	Flora	UFl
15	*Kwenchangnegi*	Flora	AqFl	39	*Heurah Rage*	Flora	UFl
16	*Nham Ne Gineu*	Flora	AqFl	40	*Heza Heuring*	Flora	UFl
17	*Niare*	Flora	AqFl	41	*Hezai Hereu*	Flora	UFl
18	*Nrau*	Flora	AqFl	42	*Kisiak*	Flora	UFl
19	*Nset*	Flora	AqFl	43	*Ndencineu*	Flora	UFl
20	*Pui He No Heu*	Flora	AqFl	44	*Nsang Gineu*	Flora	UFl
21	*Reumah*	Flora	AqFl	45	*Pui Noheu*	Flora	UFl
22	*Rezai Heu*	Flora	AqFl	46	*Sopa*	Flora	UFl
23	*Ruigie Pui Heu*	Flora	AqFl	47	*Tampoi Poidi*	Flora	UFl
24	*Ruiriengwang*	Flora	AqFl				

[1]Aquatic flora; [2]Uncategorized flora

Table 4. *Compiled freelisted aquatic flora with the various groups at Poilwa and uncategorized flora collected through interviews and specimen collections.*

From the compiled freelisted aquatic flora the informants were asked to find similarities and differences based on their local criterion/criteria. Accordingly, the flora was grouped and segregated (Figure 8). Altogether 25 of the plants are autochthonous with only 1, i.e., the *Rezai heu,* which is said to have been brought from another place. Here, 9 of the flora were edible while 4 were used as medicinal plants. These plants are collected from the perennial paddy fields, rivers, ponds and streams. The data indicates that aquatic flora also contributes to the diet of the people and is also a good source for health remedies.

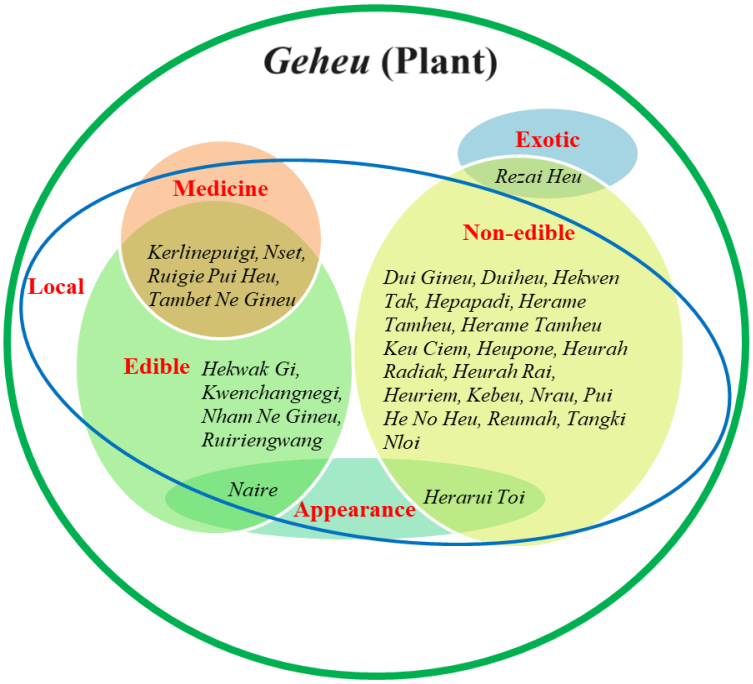


Figure 8. *Aquatic flora sorted with local criteria viz. edibility, appearance, nativeness and medicinal properties.*

Table 5. Compiled freelisted aquatic fauna with the various groups at Poilwa and uncategorized fauna collected through interviews and specimen collections.

Sl. No.	Name	Category	Domain	Sl. No.	Name	Category	Domain	Sl. No.	Name	Category	Domain
1	*Bungnam*	Fauna	Insect	27	*Tangnet*	Fauna	Insect	53	*Kagak*	Fauna	Fish
2	*Duikwabe*	Fauna	Insect	28	*Tangnwa*	Fauna	Insect	54	*Kahane*	Fauna	Fish
3	*Duituibe*	Fauna	Insect	29	*Tangrung*	Fauna	Insect	55	*Kahang*	Fauna	Fish
4	*Hebungbe*	Fauna	Insect	30	*Tangsoi*	Fauna	Insect	56	*Kakai*	Fauna	Fish
5	*Hechokwap*	Fauna	Insect	31	*Tangsoikau*	Fauna	Insect	57	*Kakiene*	Fauna	Fish
6	*Hekareu*	Fauna	Insect	32	*Heroi Naikwa*	Fauna	Snail	58	*Kalem*	Fauna	Fish
7	*Helangdoi*	Fauna	Insect	33	*Hezananaikwa*	Fauna	Snail	59	*Kaneune*	Fauna	Fish
8	*Hereukau*	Fauna	Insect	34	*Tangnaikwa Kwasang*	Fauna	Snail	60	*Kapanne*	Fauna	Fish
9	*Hetuibakleu*	Fauna	Insect	35	*Tangnaikwa Riingtie*	Fauna	Snail	61	*Karietne*	Fauna	Fish
10	*Langdoi*	Fauna	Insect	36	*Gachang*	Fauna	Crab	62	*Poige Ne*	Fauna	Fish
11	*Neutoine*	Fauna	Insect	37	*Gachiine*	Fauna	Crab	63	*Chingkui Gau*	Fauna	Frog
12	*Ngakbezang*	Fauna	Insect	38	*Galam*	Fauna	Crab	64	*Duipwanne*	Fauna	Frog
13	*Pingbe*	Fauna	Insect	39	*Ganuane*	Fauna	Crab	65	*Duipwanne Pui*	Fauna	Frog
14	*Pippe*	Fauna	Insect	40	*Gariane*	Fauna	Crab	66	*Gaudiak*	Fauna	Frog
15	*Rengbung*	Fauna	Insect	41	*Hedeuga*	Fauna	Crab	67	*Gauja*	Fauna	Frog
16	*Rinambe*	Fauna	Insect	42	*Duineu*	Fauna	Snake	68	*Gaukwa*	Fauna	Frog
17	*Soingwang*	Fauna	Insect	43	*Neusi*	Fauna	Snake	69	*Gauroine*	Fauna	Frog
18	*Tambane*	Fauna	Insect	44	*Duiruibe*	Fauna	Bird	70	*Gautang*	Fauna	Frog
19	*Tamdiangsoi*	Fauna	Insect	45	*Herarui*	Fauna	Bird	71	*Hegum Gau*	Fauna	Frog
20	*Tamriakbe*	Fauna	Insect	46	Heron (English name)	Fauna	Bird	72	*Tangduine*	Fauna	Frog
21	*Tamriam*	Fauna	Insect	47	*Jiangmuibe*	Fauna	Bird	73	*Tangngak Pe*	Fauna	Frog
22	*Tangainsoi*	Fauna	Insect	48	*Kireng Buisoi*	Fauna	Bird	74	*Chippai moship*	Fauna	Ufa[1]
23	*Tangdeukau*	Fauna	Insect	49	*Loze Ruine*	Fauna	Bird	75	*Nchankang*	Fauna	Ufa
24	*Tangkieppe*	Fauna	Insect	50	*Ngonane*	Fauna	Bird	76	*Tambane-kenzing*	Fauna	Ufa
25	*Tangking*	Fauna	Insect	51	*Ruibane*	Fauna	Bird	77	*Tangnaikwa-net*	Fauna	Ufa
26	*Tangkwanie*	Fauna	Insect	52	*Tangchaine*	Fauna	Bird	78	*Tangnung*	Fauna	Ufa

[1] Uncategorized fauna.

As seen in Table 5, a total of 78 numbers of aquatic fauna were recorded in the study. Out of these 73 numbers were listed from the different groups during group activity. About 5, which were not listed in the group activities were also documented in the process of specimen collection and interview. The groups also categorized the listed fauna according to their domain. Out of the total fauna recorded, about 39% (31 numbers) fall under the insect domain while the snails form 5% of the total number of faunas. (Further details can be found in Appendix 2.b)

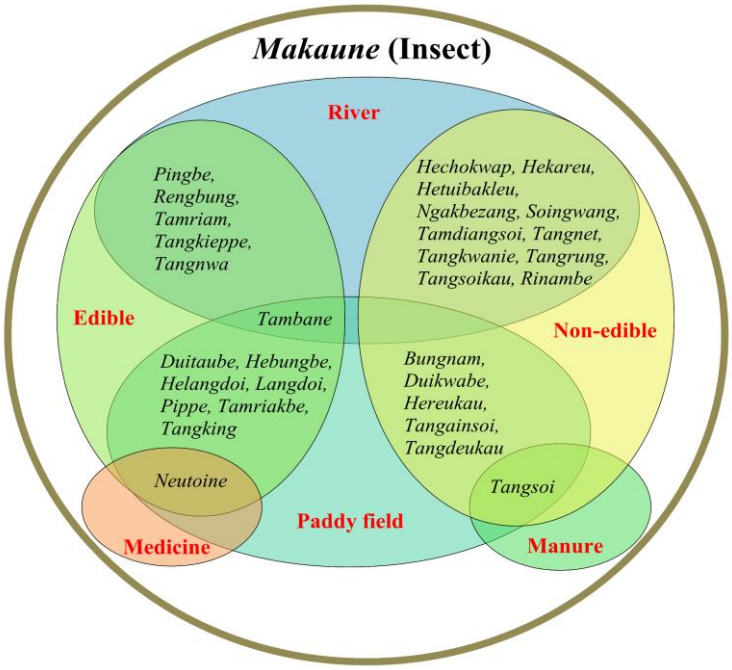
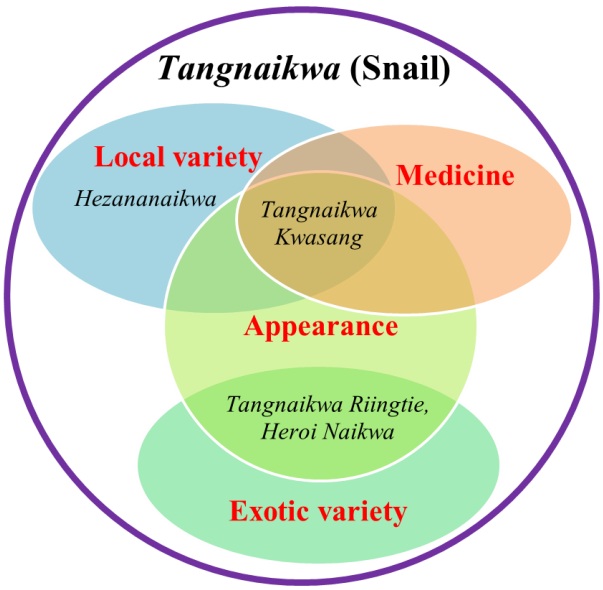


Figure 9. *Insects pile sorted with local criteria viz. edibility, habitat, manure uses, and medicinal uses.*

The varieties of insects known locally as *Hetam/Hetzo*, (*'He'*[17], *'Tam/Tzo'*='insect') have been segregated based on several local criteria. As seen in Figure 9 the insects are found in both rivers and paddy fields. Nearly half of the listed varieties are consumed as part of their diet while the other half are non-edible. One of the edible varieties found in the paddy fields viz, *Neutoine*, is used for medicinal purposes. *Tangsoi* which is a non-edible variety also found in paddy fields is said to produce good manure. (Further details can be found in Appendix 6)

Figure 10. *Snails pile sorted with local criteria viz. variety, appearance and medicinal uses.*



[17] *He* is used as a bound morpheme which itself does not have a particular meaning but is affixed as part of a larger expression.

It is seen in Figure 10 that different criteria were used to combine or segregate the snails known locally as *Hekwa*, (‘*Kwa*’=‘snail’). Out of the 4 varieties of snails available it is seen that two of them, although different in appearance - one being flattened and the other being globular shaped, are autochthonous or indigenous. The other 2 varieties which have been introduced to the land are similar in appearance to the globular autochthonous variety. All the snails are found in the paddy fields. According to informants, the exotic species cannot move upstream whereas the local varieties can move in either direction, and thus flourish in a wider area.

Since the water source is perennial, they have paddy fields where water does not dry up and so the snails are found in abundance throughout the year. The snails remain dormant under the soil during winter and during spring when fields are filled with water for transplantation of paddy, the snails emerge from the soil and continue the life cycle. Since all the snails are edible, although forming the least (5%) number of the total fauna (Table 5), snails form a good source of food. It is said that the quality and taste of the snail of Poilwa village is very good and sought after by people near and far. The fact that it is abundantly available throughout the year and sought after makes it commercially viable. (Further details can be found in Appendix 9)

Figure 11. *Crabs pile sorted with local criteria, viz. habitat, variety, size and medicinal uses, recorded at the study site.*

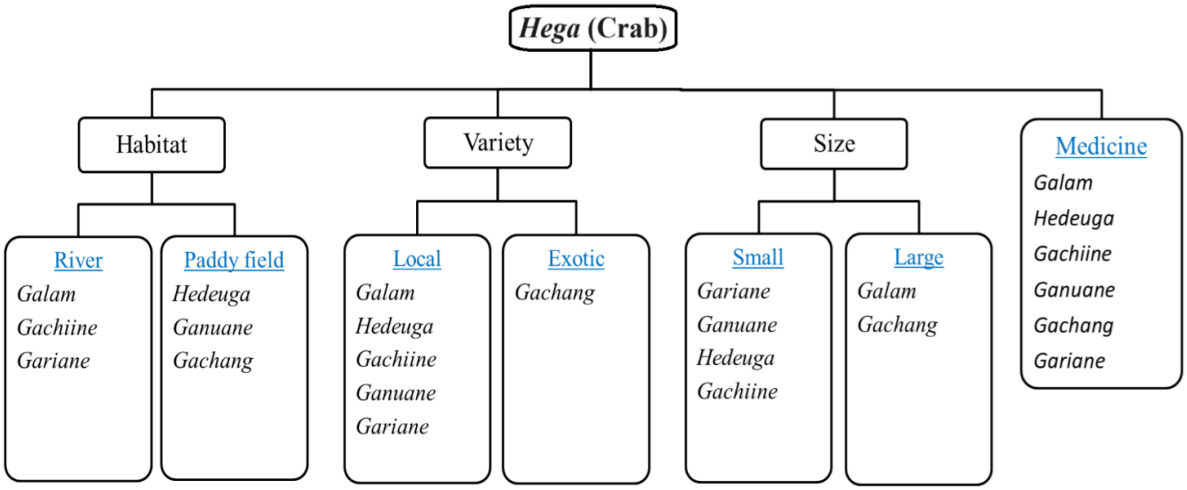
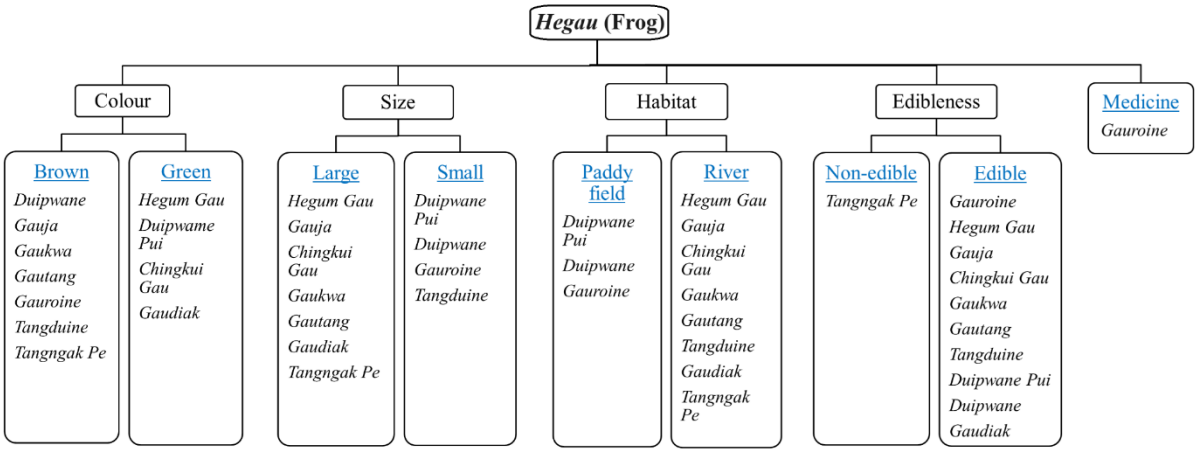


Figure 11 shows that, of the 6 varieties of crabs known locally as *Hega*, (‘*Ga*’=‘crab’) 3 of them are found in the rivers and 3 are found in the paddy fields. Of these, 5 are indigenous while 1, *Gachang*, has been brought from other places. However, all the crabs available have medicinal properties and form a good source of food too. Their sizes may vary from small to large, with small crabs measuring around 2 cm in length and the big crabs measuring around 6 cm length. *Ganuane* is believed to reduce fertility if consumed by young men. *Gachang*, which is an exotic variety, damages crop by creating numerous holes in fields, making it unfriendly to farmers. Its culinary appeal is less favorable than other crab varieties. The crabs are most abundant in the months of August, September and October. (Further details can be found in Appendix 8)

Figure 12. Frogs pile sorted with local criteria viz. edibility, habitat, size, colour and medicinal uses.



Based on the local criteria, frogs known locally as *Hegau,* (*'Gau'*='frog') can be differentiated based on their colour, size, habitat, edibleness and medicinal uses (Figure 12). As can be seen in the above Figure 12, two colours, i.e., brown and green, can be used to distinguish the frogs. Under the brown-coloured frogs two tadpoles viz., *Duipwanne* and *Tangduine* and the toad i.e., *Tangngak Pe* are included. Under the green coloured frog the *Duipwanne Pui* which is considered as the older/adult version of the *Duipwanne* is included. The sizes of the frogs vary from small to large, with small frogs measuring around an average of 2 cm in length and a large frog measuring around an average of 8 cm in length. Of the 11 numbers only 4 varieties are found in the paddy fields while the rest are found in the rivers. *Gauroine, Hegum Gau* and *Chingkui Gau* are abundant during the months of April to July whereas *Gauja* and *Gautang* are abundant in the months of August and September. All the frogs except one, i.e., the toad or the *Tangngak Pe*, are edible. So, frogs also form a vital source of food. The *Gauroine* variety is used for medicinal purposes. (Further details can be found in Appendix 7

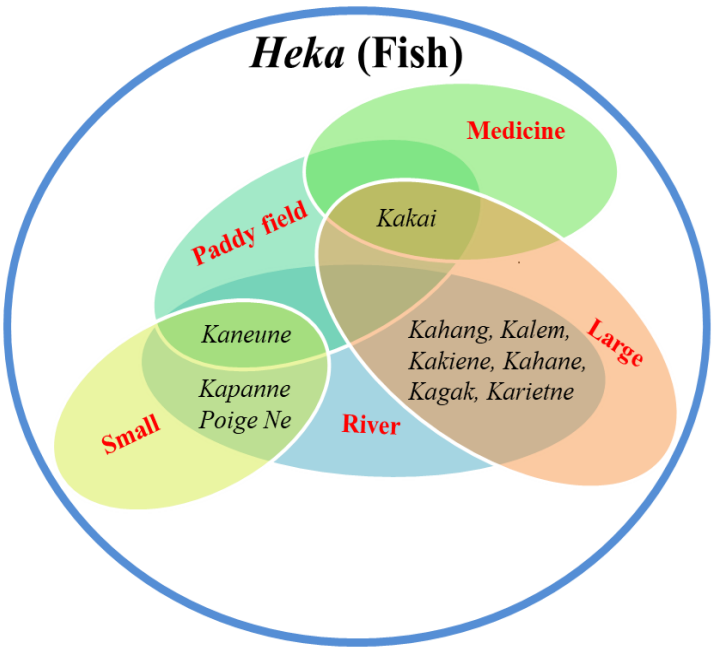


Figure 13. *Fishes' pile sorted with local criteria viz. habitat, size and medicinal uses.*

It is seen in Figure 13 that 9 out of 10 varieties of freshwater fishes known locally as *Heka*, (*'Ka'*='fish'), are found in the rivers except for *Kakai* which is found in the paddy fields. They vary based on their size, with 3 varieties coming under the small category and 7 varieties coming under the large category. The small varieties would have an average length of 4-6 cm while the large variety would have an average length between 13-15 cm. *Kakai* is believed to aid in wound healing and is often consumed for its high vitamin content and *Kahane* is used to treat fever. *Kahane* fish is a much sought after fish because of its delectable taste and is said to be expensive compared to other fish species. *Karietne* are caught in maximum numbers since they spawn in groups, and it resembles a snakehead. When they are found in abundance, they are called *Kalui*. *Kagak* is the largest fish in terms of size among the other fish species and can weigh up to 2-3 kgs when fully matured and is caught by using a bigger fishing trap called *Bah*. *Kakiene* is the smaller size of *Kagak*. Kahang (*'ka'*=fish, *hang*=jump/leap). The fish is known to climb or jump onto rocks with its flesh sticking to the rocks. It is also referred to as a "human turned fish" due to its connection to humans. It is believed to have flesh like that of humans beneath the ventral side of the mouth. (Further details can be found in Appendix 5).

Only two varieties of aquatic snake known locally as *Heneu,* (*'Neu'*=snake) have been listed during free listing exercise (Table 5). In Figure 14, it is seen that the snakes are differentiated based on their edibility. The *Neusi* which feeds on fishes is edible for humans also while *Duineu* is inedible. (Further details can be found in Appendix 10).

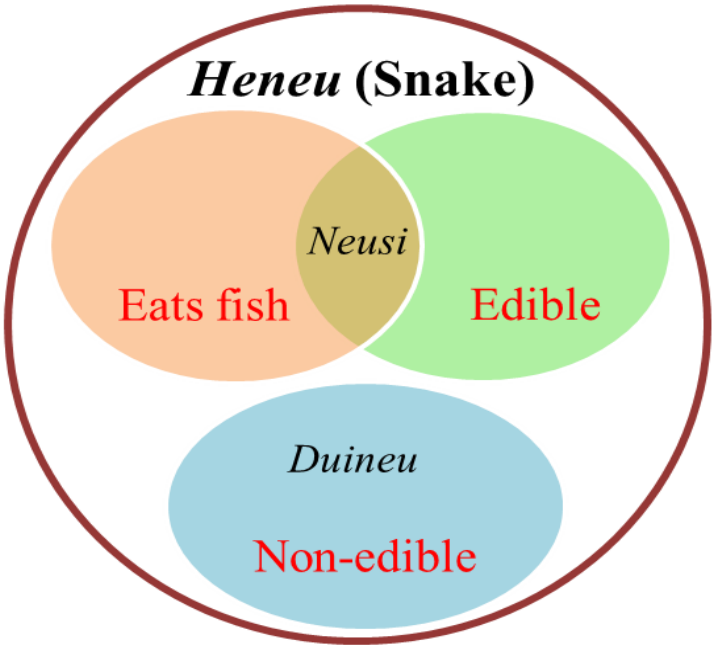


Figure 14. *Snakes pile sorted with local criteria viz. edibility and diet.*

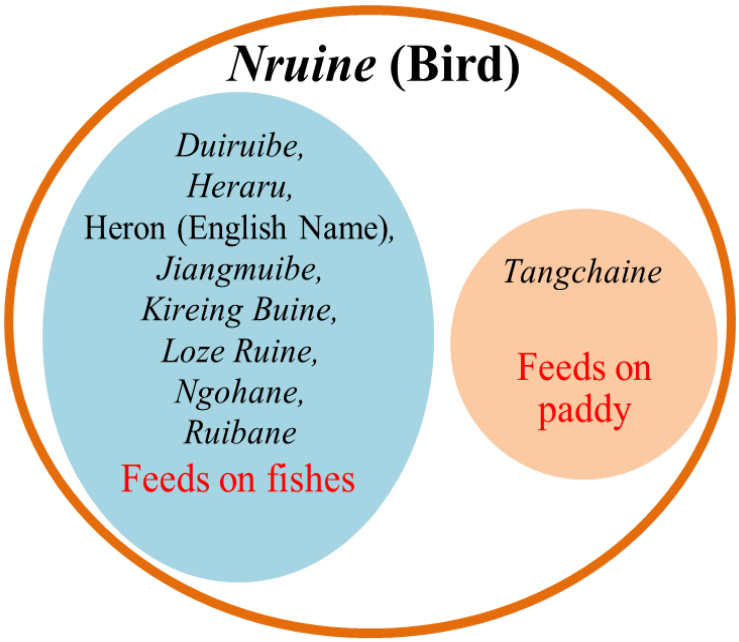


Figure 15. Birds pile sorted with local criteria viz. feeding habits.

In Table 5, 9 numbers of birds were listed under aquatic fauna. The people categorize them based on their feeding habits. Out of the 9 birds 8 numbers feed on fish while one feeds on the paddy (Figure 15).

Medicinal uses

Flora

1. *Mpuiheu* ('U'[18]) : This plant is usually found in a swampy area or on the riverbed, and is used as medicine by the local community of Poilwa village for various illnesses such as fever and shivering, ease delivery while parturition etc.. The root of the plant is extracted, boiled and the soup is served as medicine. Because of its instant effectiveness the villagers commonly use the plant as medicine.
2. *Tambet Neginеu (Plantago asiatica* (L)): This plant is found in abundance in swampy areas or in dried paddy fields. This plant is used for treating kidney-related problems. All the parts of the plants are used. The method to prepare this medicine is simply boiling the plants with no additives. It can be kept and consumed for weeks.
3. *Hechingmetenchi (Ranunculus cantonensis* DC.*)*: This plant is also found in abundance in swampy areas and bunds of the paddy fields. It is used to remove clotted blood and wounds. It is prepared by simply mashing the leaves of the plant into paste and applied to the affected part of the body. After some time, it will swell, and one must prick it to release the bad blood. In one instance it was also used to repair an Achilles tendon rupture. The plant was burnt and stepped on with the injured leg as instructed by an herbalist and the healing took around 2-3 days.
4. *Karaing Puigineu (Centella asiatica* (L.) Urb.*):* This plant is found in swampy areas, and it is good for hypertension (high BP), fever, etc. All parts of the plants are used, they can be boiled or taken raw.
5. *Tambomah/Beneu* ('U') : These plants are found in both swampy areas and dry land, they are good for stomach ache and dysentery etc. Both the leaves and the roots are used. The leaves of the plants can be boiled, and the soup is served, the roots of the plants can be mashed into powder and taken.

[18] 'U' stands for all Unidentified plants. Although the specimen was mentioned by informants it could not be collected in the field and so could not be scientifically identified.

.

6. *Reluk* ('U'): This plant is found in both swampy areas and drylands. They are good for gastric, stomachache, and headaches and are believed to purify bad air inside the human body. The leaves and stems can be eaten raw, boiled for soup or even mashed and applied to the head to relieve headaches.

7. *TammangMangdi* ('U'): This plant is found in both swampy areas and dryland. It is good for swelling, joint pains and nerve problems. The leaves and the stem of the plants are burned and applied on the affected area.

8. *TammangMangciem* ('U'): This plant is found in both swampy areas and drylands. It is good for heart ailments. The plant is mashed, and the juice is extracted. For elderly people, they serve two teaspoons, however for children they give one teaspoon.

9. *Hera-heu*: This plant is also found in both swampy areas and dryland. The plant is good for toothache and bleeding. One can chew the leaf for toothache and spit it out without swallowing; for bleeding, one can mash it and paste on injuries or wounds to stop bleeding.

10. *Tampoi Paidi* ('U'): They are found in both dryland and swampy areas, however, more abundant in drylands. This plant is good for treating severe headaches and stops nose bleeding. The plant is mashed and applied on the head.

11. *Hekabenatak* ('U'): They are found in swampy areas. This plant is used to kill insects that cause itches and sores between the toes. They are burned in ash and applied between the toes.

12. *Nset (Houttuynia cordata* Thumb.*)*: They are found in swampy areas, in the bunds of paddy fields and even in drylands. This plant is used for purification of blood and stomach ailments. All parts of the plant are used and can be eaten raw or boiled. They are also used for healing joint pains, bones, and nerves. They are consumed and made into a paste by adding a little bit of water and are then bound to the targeted areas.

13. *Ntempuigineu* ('U'): This plant is found in both swampy areas and dryland. It is good for gastritis, purification of blood, heart pain, good for digestion, etc. The leaves of the plants can be taken raw or boiled.

14. *Kiza* ('U'): The plants are found in swampy areas. This plant is good to treat cough, fever, headache, etc. They can be taken either raw or boiled depending on age. Elderly people can take two teaspoons and children can have a teaspoon.

15. *Terainpuigineu* ('U'): The plants are found in both swampy areas and dryland. It is good for the kidney, purifies blood, etc. It can be taken raw or boiled.

16. *Heramipiu*: The plants are found in both swampy areas and dryland, they are good for headaches, they can be taken either boiled or raw.

17. *Kebeu* (*Equisetum arvense* L.): The plants are found on the banks of the rivers and bunds of the paddy fields. When a person has urinary problems, this plant is boiled, and the soup is served.

18. *Kwangchang*[19] *Negi (Persicaria runcinata)*: Found in swamp areas. The leaves of this plant are used as medicine for gastritis, fever, body ache, etc.

19. *Hepara* (*Spirogyra*): Algae are green colored, small fibrous or hair-like organisms found on the rocks in the water bodies. It is used for clotting blood flow from cuts.

20. *Zaringheu* ('U'): It is an aquatic plant used to treat stomach problems like constipation and detoxifying poisons from the body.

21. *Ruigie Puiheu (Sonchus* sp.): It helps in blood clotting and relieves stomachache. For clotting of blood, the leaves of the plant are crushed and applied directly on the wounds whereas for stomachache the whole plant is freshly crushed, boiled and drunk. According to our observation, as soon as it is applied on the wounds the blood stops flowing out and for stomachache, it takes around 1-2 hours.

22. *Nham Negineu (Chaerophyllum* Sp.*)*: It is used to treat hypotension. All parts are boiled and consumed to increase the blood pressure; therefore it is not advisable for patients with hypertension.

[19] According to the Zeme dialect, '*Kwangchai*' means '*Kuki*'. Since the plant is believed to have been introduced by the Kukis, the name is given after the Kukis.

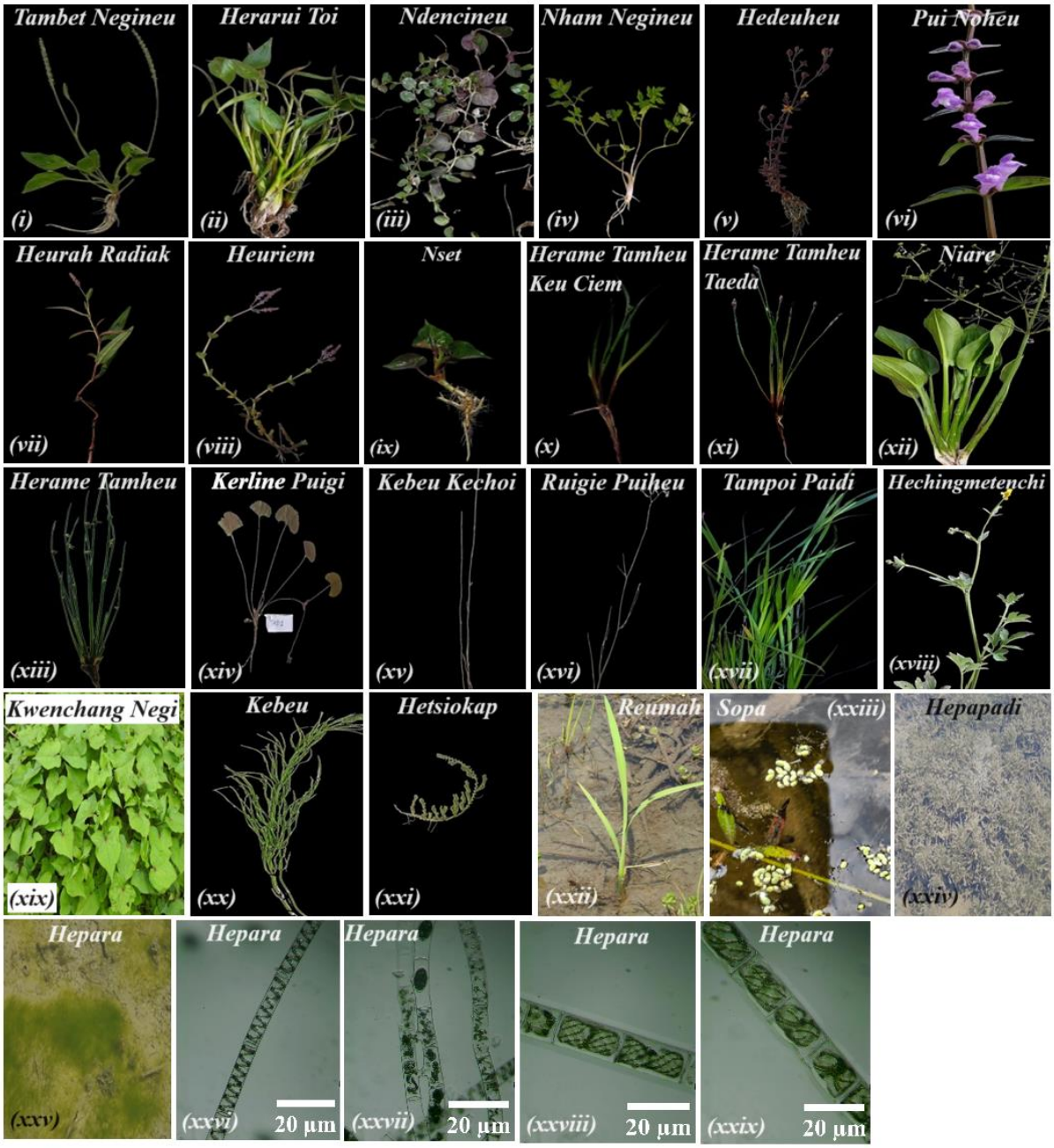


Figure 16. *Pictures of varieties of aquatic flora collected from project sites during specimen collection. Vernacular names of the fauna are given in the picture.*

23. *Hekariupuigineu* ('U'): Found beside water bodies, swampy areas. It purifies blood but people having toothache are advised to avoid it as it is said to aggravate the pain.

24. *Taman Heu* ('U'): It grows beside small streams. It is used for treating gastritis. It can be eaten in raw or cooked form, crushed into a paste and consumed.

Fauna

1. *Kahane* (*Schizothorax richardsonii*): It is considered to be the most attractive and the tastiest among the fishes. This fish is believed to nourish body strength and is good for fever among children. The method for preparation involves simply boiling the fish without salt or any spices and the soup is served as medicine for fever. Also, the fish is roasted and consumed to treat diarrhea in children. It is also said to be used for fast healing of wounds. For this the fish is boiled with a little bit of salt and the soup is drunk after which the meat is further cooked with a little bit of spice and partaken.

2. *Kakai* (*Channa* sp.): It is the one and only fish found in the paddy field and the soup of this fish is good for healing open wounds and for nourishing the sick. It is also consumed by lactating mothers to produce more milk.
3. *Hega*: *Hega* or Crabs, are found in abundance in Poilwa village and they are believed to have multiple health benefits such as treating cough and fever etc. The crab is believed to have healed kidney related problems and nourishes the internal organs of the body including respiratory problems. However, the crab that is captured by digging the mud does not possess these medicinal values. The method of preparation involves mashing the crab and extracting the juice after which the extracted juice is consumed as medicine, sometimes the juice after extraction is boiled with a little bit of salt; the crab can also be cooked to produce soup. *Galam* (*Indochinamon* sp.) is commonly used for medicines. It is used in treating Asthma, stomachache and body ache to strengthen the body. *Ganuane*, which is also used to cure fever in children, has a soft carapace. They are cleansed, made into a paste and boiled; the soup is then consumed. The *Gachang* which is reddish in colour can be a pest to the paddy. However, it is known for its medicinal properties and is used to treat cough and respiratory problems for all ages. It is prepared by crushing it into a paste either by boiling or raw and the water is then drunk.
4. *Nchangkang* ('U'): It is an insect found underneath the rocks on the banks of rivers. It is used for treating diabetes. The insect is either eaten raw or burned and consumed.
5. *Neusi*: it is a water snake whose gallbladder is used for treating burns, even the oil of this snake is used to cure burns by applying it to the skin. The fat of the snake is good for itchiness in pigs. It is cooked and fed to the pigs which is said to relieve them.
6. *Hechingkwap*/*Hechokwap* ('U'): An aquatic insect used for treating nerve related pains. They mash the insect into paste and apply it on the affected area.
7. *Tangnaikwa Kwasang (Cipangopaludina* sp.*)*: The snail is good for eyesight and healing wounds. The snails should be thoroughly cleansed and cooked. It is used to treat sore eyes. The apex ends are cut, and the slime is dropped into the eyes.
8. *Frogs (Euphlyctis cyanophlyctis)*: The skin of the frogs are said to be good for blood clotting and healing wounds. It is used to treat the burns, the skin is peeled and laid over the burnt area.

Figure 17. *Pictures of varieties of aquatic fauna collected from project sites during specimen collection. Vernacular names of the fauna are given in the picture.*

Aquatic flora and fauna have been a vital source in traditional healing practices throughout the generations. Because of its effectiveness and availability through the ages, the people resort to local medication rather than biomedicines. Even though they also seek professional medical help their first resort to the health care system happens to be the traditional healing methods. It is informed that the efficacy of traditional medicines in treating health problems is high and as such is still very much prevalent among the people. The community considers that the use of aquatic resources in health care is as effective as allopathic medicine.

The knowledge about traditional healing has been passed down by the parents or herbalists through demonstrations or through oral instructions of how to prepare and where to apply. At present there is a herbalist in the village who uses aquatic plants for producing herbal medicines. Although almost everyone knows and can practice the traditional healing methods there are some risks of overdose in the use of medicinal plants if not taken in correct dosage. There are no threats regarding the conservation of the aquatic resources for medicinal purposes because the plants are continually available; even when the fields are cleared, the plants continue to sprout again. But the availability of some medicinal plants like ginseng has decreased.

Based on the interviews conducted among the resource persons the following Figure 18 shows the themes comprising weather conditions and availability of the aquatic resources at different seasons in an annual calendar. It throws light on the activities which take place based on the knowledge people have on their resources.

THEME	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Rain				Starts		Peak						
Temp.	Cold			Warm			Peak			Cold		
Wind			Windy									
Fish migration								Migrates downstream				
Fish spawning		Spawn										
Community fishing		Clan fishing starts	Community									
Fish traps	Use									Use		
Paddy fish											Abundant	
Festivals				Trout & snail festival								
Snails												
Tangnaikwa kwasang					Abundant							
Hezananaikwa												
Heroi naikwa												
Tangnaikwa riingtie												
Frog												
Hegum gau				Abundant								
Gauja								Abundant				
Gauroine						Abundant						
Gautang									Abundant			
Gaukwa	Abundant											
Chingkwa gau						Abundant						
Crabs												
Galam									Abundant			
Gachang	Abundant											
Hedeuga												
Snakes												
Neusi						Abundant						
Duineu												
Insects												
Pingbe	Abundant											Abundant
Tangkwanie												
Riemnmambe												
Tangkieppe												
Neutoine	Abundant year long											
Tangsoi												
Hebungbe												
Tamgriakpe						Abundant						
Duikwabe	Abundant year long											
Tangdeukau						Abundant						
Tangking								Abundant				
Bungnam	Abundant year long											
Pippe					Abundant							
Langdoi	Abundant year long											
Tambane					Abundant							
Plants												
Ruiriengwang								Abundant				
Heurah radiak					Abundant							
Hekwan tak						Abundant						
Rezai heu					Abundant							
Nset												
Tangki nloi				Abundant								
Pui he no heu	Abundant year long											
Tambet negineu					Abundant							
Niare						Abundant						
Dui gineu				Abundant								
Nham negineu	Abundant year long											
Heupone						Abundant						
Hepapadi						Abundant						
Nrau							Abundant					
Herarui toi										Abundant		
Kwenchangnegi						Abundant						
Kebeu	Abundant year long											
Hekwak gi			Abundant									
Hekarai pui gyi				Abundant								

Figure 18. *Seasonal calendar, based on interviewees, showing temporal patterns of aquatic species and relationship between the various annual cycles.*

Figure 19. *'Teupuiki' river spawning grounds. Investigators try capturing the spawning places along the river (i), (ii) & (iii).*

Spawning of fish

Spawning of fish is the process by which fish reproduce. During spawning, female fish release eggs into the water and male fish fertilize them externally. This process can occur in various environments such as rivers, ponds and lakes depending on the species of fish. Environmental factors such as temperature, light, and season often trigger spawning. Fish may also engage in specific behaviors such as migrating to spawning grounds to ensure the success of their offspring. These spawning times are closely tied to the survival and growth of the offspring and the overall health of the fish population. According to the informant the villagers continue to catch fish even during the spawning period. Since the overall fish population remains stable over time there is no ban for catching fish even during the spawning period. Spawning takes place on the bank of the river when the water level is low. *Kahane* spawns during the months of September and October. The spawning time for *Kakai* is during the months of July and August. *Kaneune* spawn during May and tend to migrate towards fresh, clean water. *Karietne's* spawning time is during the months of September and October. The prediction of spawning times based on moon phases mainly applies to *Kalui*. *Kahang* spawns at the end of March and April. *Poige ne* spawns during the month of August. (Further details can be found in Appendix 5).

Harvesting tools and techniques

Based on generations of experience the people have knowledge on the availability of resources; at what time to collect and how to collect. Simple fishing traps such as *Sen* and *Hebah*, which are locally manufactured tools, are used to harvest aquatic resources. Since these simple implements do not catch many fish at a time, according to informants the use of these do not harm the overall population of the fish species.

March to June is the season for catching snails since they are found in abundance during this period. The springtime called *Heriakting* ('*ting*'= 'time') is the season for a good harvest of snails. When fields are filled with water for transplantation of paddy, the snails emerge from the soil underneath and when the weather gets warmer the snails increase in number. The snails are collected with bare hands from the paddy field and are stored in a traditional basket called the *Rekak* which is carried around the waist.

Crabs are found during the winter season underneath the rocks, some say their abundant period is during August and September. Crabs are usually found on the banks of rivers and on paddy fields. The crabs are caught bare handedly or using baits like burned meats. The ideal season to catch crabs is in September, the crab *Galam* is found to be more in abundance.

There is no specific season for fishing in individual owned water bodies, but it is usually done during the dry season before monsoon starts, i.e., December to April, and also during September after paddy transplantation when there is low rainfall. When the river is low, the river is diverted for harvesting the fish. There are several techniques used in fishing:

Diversion of the river

The water is diverted using barriers such as weirs made of bamboo, timbers, thatch, etc. during the dry season, i.e., December to April. The diverting of a river is called *Ahen*, for fishing in the rivers the water is diverted by letting one side of the river flow through while the other side dries up. Everyone who knows can take part in preparing the diversion. This diversion is done to block one side of the river and divert the flow of the river to the other side to trap the fishes flowing downstream using fishing traps such as *Sen* and *Hebah*. The men oversee constructing the fish weirs.

Figure 20. *Images showing the setting of fish weirs at Duilum Roi (i) and Teupuiki river (ii) & (iii). Informant demonstrating how thatch is used to block one of the openings of 'Sen' (iv); and strategically positions the 'Sen' in an inverted manner in the river, securing the trap with rocks on the side (v) & (vi).*

Use of piscicidal plants

For community fishing, they use piscicidal plants. Plant parts such as leaf, bark, roots and fruits are used to treat the water. Some of the common piscicidal plants used by the village community are *Chikia Kiangnai, Kerelie, Njam, Tekeuneu, Teubam* and *Teureuma* (Table 6). *Teureuma* is highly effective and is said to have effects like bleaching which is why its use has been discouraged. While the use of other piscicidal plants does not affect the crabs, this plant affects even the crabs and all other aquatic organisms. Another piscicidal plant called *Chikia Kiangnai* is known as an itchy tree which has an aftermath of itchy throat when the fishes caught using this plant are consumed, so the villagers normally don't use *Chikia*. As these piscicidal plants have varying seasons, they are gathered according to their availability. All the piscicidal plants that the community mentioned are available in their area. Mostly, the men and the youths are the one who collect it and the women folk help in pounding a day prior to when they go to fish.

Sl. No	Vernacular name (common name)	Scientific name	Family	Order	Class	Parts used
1	*Teukeuneu* (Walnut)	*Juglans regia*	Juglandaceae	Fagales	Magnoliopsida	Leaf, Root
2	*Chikia Kiangnai* (Needlewood)	*Schima wallichi*	Theaceae	Ericales	Magnoliopsida	Bark
3	*Kerelie* (Rusty mimosa)	*Acacia pennata* (L) Wild.	Mimosaceae	Fabales	Magnoliopsida	Bark
4	*Njam*	Unknown	Unknown	Unknown	Unknown	Bark
5	*Teubam*	Unknown	Unknown	Unknown	Unknown	Bark
6	*Teureuma*	Unknown	Unknown	Unknown	Unknown	Root

Table 6. *List of piscicidal plants.*

Figure 21. *Some piscicidal plants traditionally used in fishing (i), (ii), (iii), (iv), (v) & (vi). Informants demonstrate how the plants are processed for fishing (vii) & (viii). Vernacular names of the plants are inserted in the pictures.*

Fishing implements

The implements used for fishing includes: Fishing traps=*Sen* and *Bah*/*Hebah*, fishing hook=*Katoi*, fishing baskets=*Rekak* and *Hekwabing*, scoop net=*Kachwarak*, sieving basket=*Hekareu*, and a tool used to lift or move rocks called *Jinja*. For harvesting fishes, fishing traps such as *Sen* and *Bah* are used by males. Fishing baskets namely *Rekak* are carried by the males or by both the genders while the smaller one *Hekwabing* is carried by the females (See Figure 22).

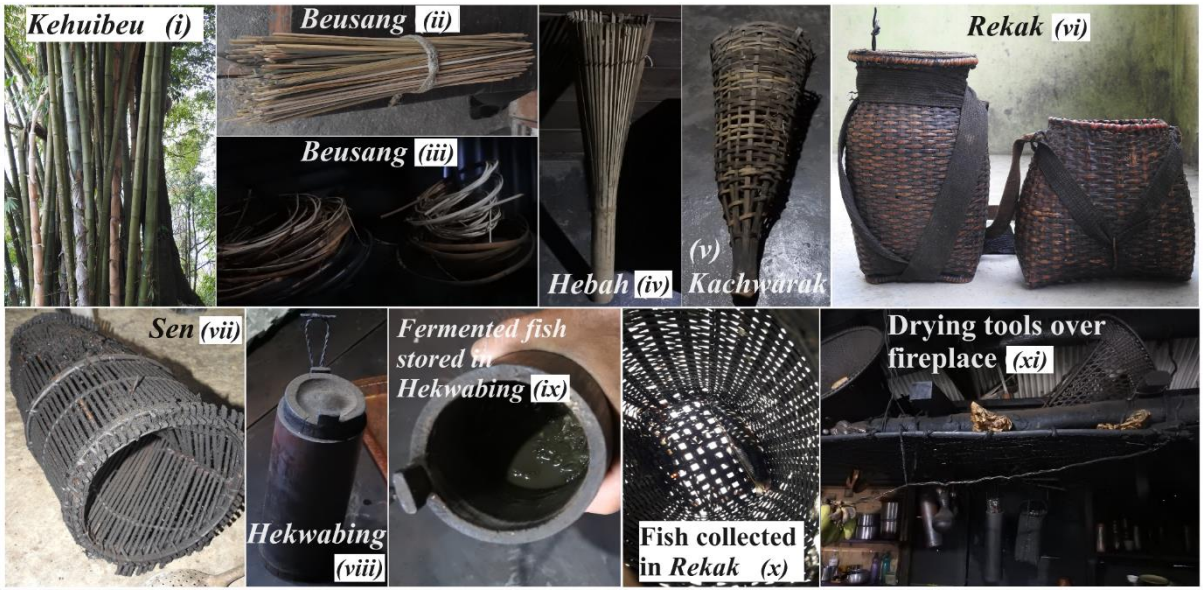


Figure 22. *Traditional implements are used for harvesting and preserving aquatic fauna. (i) Bamboo grove from where raw material is extracted for crafting of various tools; (ii) & (iii) Processed raw material; (iv), (v), (vi) & (vii) Implements used for collecting aquatic fauna; (viii) & (ix) Storage for fermented fish; (x) Fish collected in 'Rekak'; (xi) Method of conserving the tools above the hearth were it is smoked and dried for durability and protection from insects and environmental factors. Vernacular names are inserted in the pictures*

Sen is a short fish trap which is usually placed in an inverted low position to capture fishes swimming upstream during the spawning time or used at all the seasons. *Sen* is cylindrical in shape with openings at both ends. One end opens with a 'V' shaped inlet valve and the other is blocked or covered with thatch. The length may be around 3 ft. *Sen* is made from *Beusang* bamboo. *Hebah/ Bah* is longer in length than *Sen* and its head is positioned upright at a higher angle than *Sen's*. This orientation allows the river's current to pass directly through it, enabling the capture of fish swimming downstream. It is kept during the wintertime or used in summer, motly from August to October. *Hebah* is of two types depending on size, one is a smaller vesion which is used in paddy fields and a bigger and longer version is used in the rivers. *Hebah* is conical in shape; the length may be around 6 ft. *Hebah* is made from the bamboos *Beusang* and *Kehuibe*. *Rekak* and *Hekwabing* are baskets tied around the waist for collecting fishes, frogs, snails, etc. *Rekak* is made from *Tangpeu* bamboo and *Hekwabing* is made from the two bamboos *Beusang* and *Kehuibe*. *Kachwarak/ Kachorak* is a scooping net which is a handheld meshed basket with a metal loop, used during community fishing. *Hekareu/Hekwareu/Kakwareu* is a sieving basket used by women to capture the aquatic organisms. In the olden days it was mostly made of *Tangpeu b*amboo, these days iron net is being used. *Katoi* is a fishing hook made of metal.

Except for the *Katoi,* the above-mentioned implements are made of bamboo. The larger-sized bamboo is called *Kehuibe*, introduced from Kohima. The smaller-sized bamboo known as *Beusang*, is indigenous, and it is from this bamboo that most tools are made and *Tambeu/ Tangpeu b*amboo is highly flexible which is used for weaving tools and is preferred over the other two as it is easier to work with. The tools are made by the villagers themselves.

For individual fishing, piscicidal plants and some of the implements such as *Sen* and *Bah* are used. While in community fishing, khel fishing and clan fishing piscicidal plants along with the tools other than *Sen* and *Bah* are used. Those who do not have the tools have to buy it from the villagers who make it. Even those staying in towns may buy the tools to take part in the community fishing. These implements are used because they are easily available since it is locally produced and at the same time does not threaten the aquatic population in a large way. There are no restrictions on who can make the tools regardless of genders, but most of the time, the menfolk are involved in tool making. The tools last for years if it is dried by smoking, placing them over the hearth or the fireplace (See Figure 22 (xi)). Nowadays the prices of the tools are said to have increased, more than INR 1000, if they are well crafted.

Upgraded or alternative use of tools

The scooping net *Kachwarak* was previously made only with bamboo but is now upgraded with a metal loop with meshed material for longer durability. The collecting bamboo baskets that are tied around the waist are also mostly replaced with plastic containers as they are lighter in weight and therefore more convenient to carry around. All tools are now being replaced by the ones brought from the markets as they are more convenient. While some say other than *Hekaren*, the sieving basket which is being replaced with iron mesh, the others remain the same. Another reason for the upgrade of the tools is the lack of skills to make them and even when there are skilled men they don't get paid enough.

Baits used for harvesting aquatic resources

In the summer, chillies and tomatoes are mostly used as bait for catching fish. During this season almost all households grow them in the fields and gardens so they are available in abundance. Even rats and meat of an animal are burned and hung on a bamboo stick to use as bait to attract the fishes and crabs.

Prediction used to harvest aquatic resources

To predict the time of harvesting fish, the moon, flies and rock surfaces are observed. Diversions of the rivers are made and the harvesting traps like *Sen* are placed in the river after which, by checking the phases of the moon and the presence of an increased number of tiny yellowish flies, locally termed as *Maisungne* hovering around the river, the people predict the spawning time of the fishes and harvest them. Fishing is performed during the full moon or the beginning of the moon phase and new moon around August and September, this is mostly regarding the fish *Kalui*. The *Kalui* tend to gather for spawning, therefore this is the best time to keep traps for the fishes. *Kalui*, at the time of spawning, display certain spawning behavior where they tend to actively chase each other, so if one fish gets inside the trap, all the other fishes follow and several of them get trapped.

When the rocks in the river have a slippery coating of algae, it signifies that there will be fishes. But when the rocks have rough surfaces then it is considered as not the right time to fish. Another way to know the right time for fishing is by observing whether the water is clear or muddy. It is said that, when the water in the river is clear it indicates that there are not many fishes around but when the water becomes muddy it indicates that there are many fishes. Taking this as an indicator, the people usually choose the muddy sides to fish. During fishing when the catch is low, rainfall is predicted to occur. When there is heavy rainfall, it is not advisable to use piscicidal plants for harvesting and people usually avoid fishing during heavy rainfall. These predictions using signs are still in use.

Khel fishing

Each of the five khels has their own strip of the river. Khel fishing day is organized once a year, and all members of the khel, including those who have migrated to other parts of the state, participate. The fishing takes place on the khel's designated part of the river. For example, during the *Hausum* khel fishing day, the part of the river at *Henumbe* village, owned by them, is used. Participants are expected to contribute by bringing their own share of rice. The khel members gather by the river, prepare, and eat a light breakfast. Following this, the male members, both young and old, go to the initial point of the river that marks their boundary and begin pounding piscicidal plants into the water with sticks to release the toxin. The women carry *rekak*, i.e., the harvesting bamboo baskets for collecting small aquatic resources and wait about half an hour for the toxin to take effect on the fish and other aquatic fauna. Meanwhile, some women prepare a meal for everyone present.

Once the toxin has taken effect, the remaining women and the men start catching the fish from the site just below where the piscicidal plants were applied. The affected fish float and drift downstream, and everyone collects the fish and tadpoles along the way. All the collected fish, crabs, tadpoles, and other aquatic resources are cooked together by the older women using traditional ingredients such as ginger, salt, chili, and water. The mixture is cooked until the water dries up, and then it is divided equally among the participants. Everyone eats the meal prepared by the women. After the meal, those who wish to catch more fish can return to the river. Any fish they catch this time belongs to

them and do not need to be shared. Upon returning home, participants must share a portion of their cooked fish with their parents as a sign of seeking blessings before they consume their share.

Challenges of using traditional fishing practices in modern day

While some say that there are no challenges affecting the use of traditional methods, most of them agree to have challenges since the upgraded implements using metal loops, mesh nets and plastic containers are more convenient and effective and result in a bountiful catch. Also, the effects of piscicidal plants are limited only to the specific area where it is used, unlike the upgraded tools that can cover large areas. People are opting for more upgraded implements procured from the market such as the scoop nets and plastic containers as they are more convenient, labor efficient and more durable, whereas the tools that are traditionally made don't last long if not maintained well. These days most of the tools are replaced with more advanced fishing gears but as the traditional tools are biodegradable their use is encouraged.

Preservation of traditional methods

The community sustains aquatic resources by feeding the snails and fishes in the paddy fields with cow dung, dried leaves, branches, and rice husks. Periodically shaking stones in riverbeds prevents fish suffocation, ensuring resource sustainability which is a traditional technique for effective resource management. Adherence to long standing conservation rules promote effective approach for long term sustainability. (Further details can be found in Appendix 3 and 4).

Informants understand that the use of chemicals to capture huge amounts of fish like lime, bleaching and modern technologies affects all stages of fish while degrading the river and the aquatic systems, so, they maintain that the use of traditional methods should be preserved and encouraged. Traditional techniques target a specific area and therefore, do not affect the upstream and downstream of the rivers. They also assert that to preserve these traditional methods, the younger generations, especially the ones studying outside the village should be informed about the use of these methods and make them understand the value to ensure their awareness of a sustainable future.

Commercial aspects

The villagers' resort to wildcrafting of aquatic resources to sustain their livelihood. The commercial sector, like other parts of the state, is dominated by the women folk but there is no such thing as gender specific for this sector. The primary focus of the womenfolk in this sector is to make ends meet in the family, to provide for their children's education and other family needs. The most common aquatic resources they sell are their local snails and fishes. Other resources are edible greens like *Nset* and *Tambet Negineu* which they obtain from riverbanks and paddy fields. The fish and snails for sale during the annual 'Snail & Trout Festival of Poilwa' are collected from the individually owned river sites and not from the community owned sites.

The rates of the snails are fixed by the Women's Society in consultation with the village council. The rates of the fish and other animals are fixed by the village council. Once the rates are laid by the in-charge, if rates are altered by any individual without the knowledge of the concerned authority, then the person is penalized with a fine of INR 5000 and prohibited from commercial activity for 3 years. For males, an additional prohibition of hunting for 3 years. The rate fluctuates according to the season and the availability of resources. The rate that is most common is listed below:

Snails are kept dry without soaking in water when the quantity is small and are sold fresh. In the village, it is sold for INR 70 per cup while outside the village, it is sold for INR 100 and during off-season, it can cost around INR 120-130. Fishes are sold fresh where one aluminum cup (500ML) is INR 300; when cooked using traditional methods where chili, ginger and salt are added may be sold at the rate of INR 2500 per kg. In the drying process, the resources are smoked, and the duration depends on the intensity of the fire. The dried fish are sold according to pieces or size in a bunch. For transporting fresh products, baskets lined with banana leaves are used and transported through local taxis.

Snails per cup = INR 70 (INR 60/-) in the village and INR 100 outside the village.

a) Fishes per kg = INR 1000 (Fresh) and INR 2000(Dry)
b) Fishes per cup = INR 300(Fresh) and cooked INR 2500 per kg

Kalui are sold at INR 300/ cup, *Kahane* at INR 1500/ small-sized basin, *Kahang* sold at the same price as *Kahane*.

Most commercialized (dried) fish = *Kahane* 6 or 7 pieces for INR 1000

Kalui -10 to 12 pieces for INR 1000

Kahang- 13 to 15 pieces for INR 1000

Aquatic resources play a significant role in tourism activities. Many tourists visit to eat, catch, and observe, with a particular interest in fish and snails. The Rhododendron Adventure Club in Poilwa organizes an annual festival called the Trout and Snail Festival, first launched in 2020. The festival aims to highlight their renowned fish, *Kahane* (Trout), and a local snail variety known as *Tangnaikwa kwasang*. Held every April, the event attracts numerous local and international tourists. It serves as an opportunity for the community to generate income by selling aquatic resources such as snails and fish, as well as edible aquatic plants like fish mint and water celery, alongside other local delicacies. The festival includes activities in which tourists can participate, such as snail eating competition, catapult shooting and riding indigenous go-karts. There has been an increase in tourist influx as awareness of the festival and the surrounding landscapes has grown. This festival enhances the community's visibility among tourists, directly contributing to the economic prosperity of the villagers. Also, student groups often visit to appreciate the landscapes, while older individuals are drawn by the aquatic resources and some by terrestrial animals.

In 2023, an organic stall was opened in Kohima to sell village products. Two women from Poilwa who are settled in town oversee selling these products. They purchase goods from villagers upon receiving orders from the vendors and sell them to the vendors. According to informants the opening of this stall has increased commercial activity.

Governance and management

In the past, when the Morung was active, it served as a hub for teaching various skills including fighting techniques, folk songs, folklore, and life skills. Specific places like *Releuki* (dormitory for girls) and *Rehangki* (dormitory for boys) were designated for teaching traditional knowledge. Discussions among men often took place at a local patio called *Reneu*, where women were not allowed due to concerns over confidential matters, which may be related to warfare strategies, being disclosed to a possible enemy. Currently, institutions such as Morungs have observed a decline in their conventional roles, with traditional knowledge (TK) increasingly transmitted through alternative channels. Rather than relying solely on institutional settings, TK is now disseminated through literature, cultural festivals, and family traditions. Various venues serve as platforms for passing down TK in the present era. Churches occasionally host seminars that underscore the significance of traditional methods, while cultural dances, folklore, and folksongs experience resurgence through competitive events. The Poilwa Students Union has taken proactive steps by organizing multiple seminars aimed at raising awareness of traditional practices. Their efforts have been fruitful, evident in the recent seminar held on Teachers Day, where the entire village gained insights into traditional fishing methods, including sanctioned and prohibited practices (source). Consequently, these initiatives have ignited a renewed interest in traditional methods, particularly among the younger generation. In current times, younger individuals frequently accompany elders during community or family fishing events to glean knowledge of traditional techniques firsthand. Elders, revered for their expertise, willingly share insights when approached about traditional practices. This exchange not only enhances understanding but also underscores the benefits and relevance of traditional methods in contemporary contexts. As a result, younger generations increasingly advocate for the application of these methods in modern times, ensuring their preservation and adaptation for future use.

Initiatives to preserve aquatic resources are led by Dr. Limatemjen from Kohima Science College Jotsoma, focusing on conserving indigenous resources by distributing fingerlings and providing financial incentives for preserving local snail species. Local efforts, as mentioned above, enforce fishing and hunting regulations, complemented by church-led awareness campaigns on resource preservation. Currently, there are no specific external partnerships aiding aquatic resource preservation in the community. Preservation efforts are driven by local initiatives and supported by GIZ

through educational seminars and documentation. While Poilwa Village has numerous preservation initiatives, residents of Poilwa Namci have yet to access these opportunities.

Ponds owned by khels, clans, or families are maintained and cleaned by their respective owners, contributing to the overall cleanliness and management of aquatic habitats. During community fishing events, rocks and stones in rivers are cleared to enhance fish settlement areas, demonstrating localized efforts to improve aquatic environments. According to some informants, there are no structured community-wide initiatives for feeding or cleaning aquatic resources. Instead, responsibility for maintaining ponds typically falls on the respective owners, whether clans or Morung, based on ownership rather than centralized coordination.

Poilwa village maintains a traditional system of river ownership, where different sections are owned by various individuals or clans, a practice inherited across generations since the village's establishment. Ownership passes down through generations within bloodlines or clans, typically from parents to their children. Generally, rivers are passed to male children, while daughters receive lands. In cases with multiple male children, the eldest inherits the best fields and the parental house, while the second receives the remaining house/s. Ownership of the river is jointly held by all male children, who must share it among themselves. According to informants, such systems likely originated to manage resources and delineate responsibilities, ensuring each clan or family a stake in maintaining and using aquatic resources, thereby preventing disputes.

The majority of villagers at Poilwa and Poilwa Namci directly or indirectly own parts of the river, such as sections owned by khels or clans. For those who do not individually possess parts of the river, there is no direct inheritance, but they may acquire ownership by purchasing it from current owners. The selling of rivers occurs when families migrate to other villages or towns, or in cases where they require financial support. However, it is always advised to sell the river to close cousins or relatives with the intention of repurchasing it when financially stable. Alternatively, rivers can be sold to their own clan to prevent fragmentation of water ownership within the village. However, selling to outsiders, i.e., non-villagers is not allowed by the village.

In certain situations, a family may own paddy fields near rivers owned by other families. Paddy fields require consistent water supply throughout the season, necessitating the diversion of river currents to their fields. In such scenarios, the paddy field family compensates the river owner with money, paddy rice, or vegetables to channel the river flow to their fields.

There are also rules and regulations governing river use that villagers adhere to. The use of harmful chemicals, batteries, and fishing nets is prohibited as they significantly diminish fish populations and other aquatic flora and fauna. Chemicals also wash downstream to riverbanks where paddy fields are situated, affecting snails and paddy rice cultivation

Since administering office in 2021, the current Poilwa village Chairman, Mr Rangsam, has enforced strict adherence to rules in the village. The use of modern tools has been discouraged and completely banned since 2022, with a return to traditional methods. As a result, informants claim that positive changes have been observed, such as increased fish harvests following a period of low productivity. Individuals who violate the rules established by the village council face penalties, including monetary fines or bans from fishing for the season. The council oversees regulations concerning hunting and fishing, implementing penalties for the offenders. Those found in violation face a fishing ban in the area for the following year, often extending to three years, along with a fine of INR 5000. Additionally, any products and benefits obtained through the violator's activities are confiscated. For repeated offenders or severe cases, a fine of INR 10,000 may be imposed.

In cases where individuals collect or hunt aquatic resources from areas belonging to others, they are expected to resolve the matter directly with the river or field owner. If the situation escalates, they should approach the village council or Gaon Buras (GBs). The penalty imposed on the violator will vary based on the discretion of the river or field owner, ranging from monetary fines to potential land demands in cases of repeated offenders.

In the olden days, before the formation of the Council, rules in the village were administered Khel-wise through Khel meetings. The village Headman (leader) would go outside, announce the *tingnah*, a religious sanction prohibiting field

activity and when nobody was allowed to leave the village; thus, on such days, they refrained from going to the fields. Anyone who defied this declaration faced punishment from the entire village for disobeying its rules. During those times, adherence was strict; transgressions could result in death or in being treated as less than human, with everyone condemning the offender, leaving no escape. However, such severe measures are no longer practiced today.

CHAPTER 4: FOLKLORES ON AQUATIC RESOURCES

Folk lore of the rivers in Poilwa

According to lore, the story of *Teupuiki*, *Duilum Roi* and Barak rivers goes this way: The two rivers- *Teupuiki* and Barak rivers, had a talk and decided to meet at a particular place. However, they were not able to meet because they misunderstood each other about the designated place of their meeting. *Teupuiki* river, feeling betrayed, decided to fight Barak River. As *Teupuiki* ran in search of Barak it met *Duilum* river flowing towards Dimapur crossing Mount Pauna. *Teupuiki* river insisted that it alone could not fight Barak River. So, the two rivers decided to join at the *Hiakehecwet* and ran towards Dimapur in search of Barak River. However, it is said that to this day the *Teupuik*i river and the Barak River were not able to meet and is not expected to happen till the end of the earth.

The moral of the story, as interpreted by the locals, is that the misunderstanding between the two rivers stemmed from a lack of proper communication. Just like in human relationships, clarity and conciseness in communication are essential to prevent conflicts and misunderstandings.

***Tangkwakrezai* (The Legendary Lake)**

A long time ago there was a baby who was crying continuously, no matter what the elders fed the baby. However, a red rat/mouse[20] brought a paddy plant from the legendary/imaginary lake that is towards the *Teupuiki* river before reaching the Dzukou waterfall and fed the baby, and suddenly the baby stopped crying. It is believed that the paddy was first discovered/ located from this lake. According to legend, there was a lady who practiced witchcraft who received a handful of this rice stock from the guardian of the lake and was the one who distributed the seedlings to the villagers. Everyone has been using this variety of paddy for generations and the husk is said to be winged. The rice was deep red in color. The villagers said that the rice was too hard to consume so they gradually replaced it with varieties much softer to consume that were introduced from other villages. So, the variety is no longer in use today. The legendary lake to this day remains a mystery as the villagers and even the neighboring villagers tried to track down the exact location, but the lake could not be found. According to the Poilwa Namci Chairman, "*We have heard stories about the imaginary lake, so the villagers decided to search and locate it. We came across a lake, and we believed that to be the imaginary lake.*"

Stories related to perennial/seasonal ponds

***Kenling-tekwa* pond**

There is a story about a pond named Kenling-tekwa, located below Dwaswangchame Hangsiuki (Morung) in the R. Khel area of the village. A man named Nkham of the Hau clan, along with his nephew Kenling of the Hoi clan, were searching for a place to settle. They were instructed by the man's daughter to do nothing except to create a small pond with clear water wherever they found water on the land. When they reached the present location of Poilwa, they discovered a patch of land that was consistently wet due to the continuous oozing of water from the ground. This characteristic of the land likely influenced their decision to settle in that area, as access to water would have been crucial for their survival and daily activities. Consequently, the nephew created a pond, which was named Kenling-tekwa after him.

***Tsazai* lake**

Another lake named *Tsazai* (*Tsa*=in short for *Hetsa* which stands for Python, *zai*=lake) was formed during the time of Rani Gaidinliu in the village. When Rani came to the village, she initiated a movement that became a revival, attracting many people to join in and celebrate. During this time, a man from the village brought a python from another village and needed a place to keep it, so he created the lake called *Tsazai*. This lake is still in use today.

[20] Locally known as *Zakene* in the Zeme dialect.

Traditional Rituals

Hepumzwa/ Mpungzwa (community fishing)

In all important rituals, the *Hau* and *Hoi* clans play significant roles as they are considered as the superior clans from which all the present clans descended from. With *Hau* being the older clan that leads and Hoi being the younger one that follows. The *Hau* clan includes *Rehangcha* khel and *Hausum* khels, while the *Hoi* clan consists of *Tangki, Mhungcha* and *Ngalui* khel .

During the months of March to April, the village of Poilwa engages in a community fishing ritual called *Hepumzwa* or *Mpungzwa*, where the entire village participates. The area where the fishing takes place stretches about 2 kms and the starting point is known as *Dapkaikie* and it ends at *Herumzai*. The preparations for the fishing event begin days earlier, with villagers gathering piscicidal plants. Youths collect these plants from the jungle, while the elderly gather them from near the village.The women folk would pound the piscicidal plants using a wood used for pounding rice.

This event is preceded by a specific ritual known as *Hekakchaiteu* which means: 'catching of the dead fish', performed by two selected individuals from the *Hoi* and *Hao* clans[21]. These individuals are chosen for their physical fitness, purity and proper marital status, and the selection is based on the community's observation of their lives. In the past, people who eloped or did not have proper marriage ceremonies were not allowed to perform these rituals.

Figure 23. *Community fishing at Hekakchaiteu. (i) & (ii) shows the menfolk and womenfolk stationed along the river for the catch. Also seen is the foam produced by the application of piscicidal plant which is neurotoxic for fishes. (iii) & (iv) Fishes caught are cooked by the womenfolk and apportioned to all participants. (Photo credit Irangswang (i) & (ii)).*

[21] Some informants mentioned that it is two married couples of the *Hoi* and *Hao* clan.

On the morning of the ritual, all the villagers go down to the community fishing spot, *Hiachui/ Hiakehecwet*. An activity called *Kanam* is performed during harvesting, where a weir is created in the river using stones, thatchs, bamboo called *Beusang* and *Tangpeu* tied together with ropes along with a specific wood called *Nbem*, to ensure that no fish escape. Before the meal, all the villagers keep away from the river and are not supposed to watch the two married men perform the ritual as both are to perform naked. The two selected married men from these clans enact a symbolic act where one acts like a fish swimming downstream, and the other catches him, pretending to have caught a big fish (Some informant narrated that the wives of the 2 married men are also involved in the ritual and they are supposed to watch their husbands perform the ritual and are not supposed to laugh at them as it is believed to result in poor catch).After the ritual, the two men will have a meal, followed by the community partaking in the meal that was prepared beforehand at home. Once everyone has eaten, fishing will commence. It is believed that if individuals who are considered impure perform the ritual, the fish caught will be less abundant. Only men, particularly the youths, would participate in pounding and releasing the toxins from the piscicidal plants such as scraping out the bark of the stem/trunk or crushing the leaves and hitting it with a log or stone. The elder people would stand downstream to catch the fish but also would wait until the poison is being released all over the water body, while women folks would also watch and start fishing only when the elders give permission. The community uses traditional tools like *Kachwarak*, *Rekak*, *Hekwabing* or make use of their own hands for catching and collecting the fishes (Figure 22 (v), (vi), (viii)). The community members are not allowed to use *Sen* and *Bah* which are also harvesting tools as they are fishing traps which are meant to be laid down within the river where a whole lot of fish get trapped. The main reason for the prohibition is to make sure that everyone present in the fishing gets their share because all the villagers are participating, and it is not possible for everyone to lay down the traps all over the river.

If anybody fails to catch any fish, they must kill a chicken for dinner that night as a sign of seeking blessings for better luck next time. The next day, villagers refrain from leaving the village, going to the fields, or working. The fish caught are cooked and shared among relatives and the community. With the advent of Christianity, traditional rituals as narrated above are no longer performed; instead, prayers are made before community fishing events. These events typically occur once a year, usually before the paddy season starts and before the rains come when the water level is low.

In the present day, there is no specific time for community fishing, but an announcement is made beforehand in the months of April and May before the rainy season starts. Young and fit men are assigned to construct boundaries in the fishing area, with men staying overnight to construct the *kanam*, i.e., the weir, before the community fishing event. Other than this, there is no specific division of labor for harvesting. Generally, men are responsible for bringing piscicidal plants, while women pound them in the Morung prior to the fishing day. There are no restrictions on how much fish one can harvest during community fishing. In the past, fish were hand-gathered during community fishing. Nowadays, tools like scoop nets made of mesh material are used. The fish caught during community fishing are said to be less tasty due to the extensive use of piscicidal plants. For outsiders, once introduced by their guardian or guide, there are no restrictions on catching fish.

Nlau (sanctification ritual for the young)

During the *Rünet*, animist/pagan, period the villagers of Poilwa performed a ritual called *Nlau* for the sanctification of a child at birth. This ritual was performed for the youngest of the family to bestow blessings, and it was repeated each year for the youngest child. This ritual can be performed thrice a year and during the *Milenyi* festival under the decree issued by the village chief. On the day of the ritual, the parents do not go to work. A day prior to the ritual, known locally as *Nlauhet* ("*het*" refers to the materials used for the ritual), women collect the necessary items from the fields and rivers. They go to the river to catch fish, but if the river current is too strong, they gather the required resources from the smaller rivers/tributaries of the *Teupuiki* and *Duilumroi* river.The preparation of rice beer, integral to the sanctification process, is given specific time and attention. This ritual involved using a particular clay pot called *Lisang*, made of black soil and believed to keep food from spoiling, to cook the food for the ceremony. The pot is locally manufactured and exclusively used during rituals.

In this ritual, only food obtained from water bodies, such as fish and crabs, was consumed, as these were considered clean. Snails, however, were deemed unclean and were not eaten. Some jungle animals, like deer and birds, were also consumed, but domestic animals like chickens and ducks were avoided due to their feeding habits. Ginger was

excluded from the dishes, as it was believed to cause heavy feet, making one lazy or unable to walk long distances. The food was served in a plate called *Hebungkwak* which was made of *Hela*[22]. They were considered clean and cleaned with bamboo leaves. The dishes used in the ritual were first served to the grandparents as a sign to give their blessings to the grandchild. According to tradition, any leftover food must be discarded before the next sunrise.

Food preparation was done separately for the father and other family members and the mother with the child who is to be sanctified. In some cases, the father is away from home and stays at the Morung. The water used in the ritual is fetched by the mother from ponds early in the morning before any other villagers. It is usually collected from the pond *Kwadi tekwa*, as its water never dries up. A specific leaf called *Tambui* was folded into a cone to carry the water while some say banana leaves were used, with the central midrib cleansed with freshwater. The mother dipped the leaf in the water and sprinkled it on different parts of the child's body – toe, knee, hip, rib, wrist, arm, and head – to bless the child with good health, prosperity, and long life. The blessing included wishes for the child to own a good paddy field like *Hekungriekie*, *Teuzairiekie* and *Ningdikie*[23], have hands filled with gold ornaments, and when the last drop of water is placed on the head the child is to be blessed saying: "As long as there is smoke coming up from this world let my child live." While some people say: "Bless my child with as many children as the fishes and crabs."

Nlau ritual was also performed for the child when they attend the appropriate age to move to *Releuki* and *Rehangki*. The child can be as young as three years old. The child is supposed to move to the Morung or Dormitory when another sibling is born in the family. The sanctification of the child is done by the father if the child is a male and if the child is a female, the mother does it. The dish involved preparing fish dishes, chicken and consumed on that day, with any leftovers discarded before the next sunrise. Other meat was prohibited. Once the men entered Morung, they spent most of their days there. Sometimes, when they go home for work and do not return to the Morung on time, they are teased as a man who is afraid of his wife.

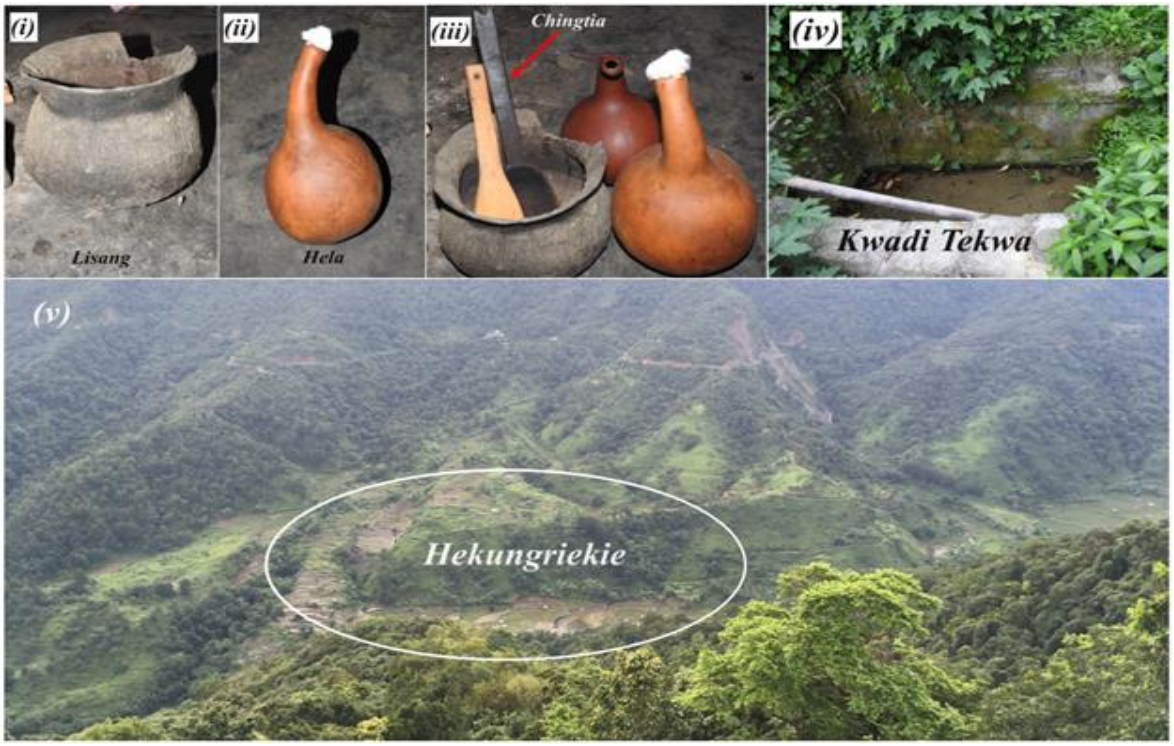


Figure 24. *The clay pot, 'Lisang' (i), the dried bottle gourd, 'Hela' (ii), and wooden spoons, 'Chingtia' (iii) used during 'Nlau' ritual. These utensils are not used for any purpose except the 'Nlau' ritual. The pond, 'Kwadi tekwa' where the water never dries up and from where water is collected early in the morning (iv). 'Hekungriekie' is an example of a good paddy field the parents wish for their child to own during Nlau performance(v).*

[22] Dried bottle gourds.

[23] These paddy fields were probably mentioned because of the rich harvest they could get from the fields.

***Leungni* (sanctification ritual for the adults)**

The *Leungni* ritual is one of the major rituals performed. During this period the men slept in their Morung and did not associate with the women, as women are considered unclean. This ritual is performed once a year to sanctify themselves during head-hunting period. In a year the ritual is performed just once and during this period all the men sleep together in the Morung. Their diet consists of meat and fish as it is considered clean.

This ritual is practiced even today to preserve the tradition and keep the younger generations aware but not as strictly as in the past. In the present day, this ritual is still practiced where all the men folks gather in the Morung and have a feast. Meanwhile, the female members of the family also gather in the house of the eldest member of the maternal side of the family, where a feast consisting of chickens, fish and other meat are prepared. Everyone in the village takes part in this ritual.

***Lodoipun Heranbin* (Ritual for bountiful harvest)**

Lodoipun Herabin is a ritual performed by the entire Poilwa community to invoke blessings for good harvest. This ritual normally occurs in a span of 15 to 20 years. The need to initiate this ritual arises when the farmers experience gradual decline in their farm harvest over the years. As a part of this ritual, the entire villagers gather in a common place, usually the community ground, to discuss and choose a young maiden who will represent the community to perform the ritual. On the first day of the ritual, villagers are prohibited to go to their fields except for the chosen maiden. Early in the morning, the maiden goes to the field alone, hand harvest three stalks of rice, put it in a *Kelua*[24] and brings it back to the village. In some instances, if the young maiden is afraid to go to the field alone, she can be accompanied by someone, but she should not engage in conversation at any point throughout the execution of the ritual. During the observation of this ritual, she is supposed to eat only fish dishes and no other meat. The following days, starting from the day after the initial ritual, all the villagers should also bring home 3 stalks of rice from their own paddy fields. If this ritual was performed with sincerity, the villagers are said to harvest double their previous year. All the villagers contribute rice grains after harvesting the crop to the young maiden because she took the burden of performing the ritual. And if the maiden did not perform the ritual correctly, she would face misfortune. The community believed that, if the ritual was performed correctly, some people who were poor would also become rich due to abundant harvest and bear more children.

***Zaulo* (Feast of merit)**

When an individual decides to give a feast to the villagers as a sign of his rich possessions, harvesting of fish is necessary and a fish item should compulsorily be a part of the feast. So, on the day when the villagers go fishing for the feast, they make the fish weir. The first fish caught is burnt and made into pickles and the fishermen consume it and only after that the fishing proceeds.

Beforehand all the fishing traps are laid in the river, so before checking the traps, the fishermen smash ginger and wrap it in a banana leaf after adding salt and chili. They smear the mixture on the mouth of the basket (the fishing trap) after which the trap is removed. It is believed that it blesses the fishermen to trap more fishes and crabs.

***Npum Zoi* (A ritual for the control of drought and rain)**

The *Npum Zoi* ritual is performed when the land becomes excessively dry and parched which becomes unsuitable for cultivation of paddy plants or when they face excessive rainfall. Through the ages, the villagers occasionally experience prolonged torrential rainfall and drought situations which seriously affect the life of farmers. The prolonged torrential rainfall adversely affects the farm activities due to flood, landslides and soil erosion. On the other hand, the drought situation also severely affects crop yield. So, the story tells that mankind could not do anything to alter the natural course of weather. However, a soothsayer by the name *Rorieng* of Poilwa accidentally happened to come across a weird plant of cane, locally called *herui*, which crept up to the top of the tree. The strange characteristic of the plant was that it did not have any inter node along the entire stretch of its length. A strange natural phenomenon of weather took

[24] A traditional basket.

place the moment he cut off the cane. It so happened that a great thunder came roaring across the sky and subsequently there was heavy rainfall. He noticed supernatural power being embedded in the cane plant. As the plant was found to be so different from others, he brought it home and kept it securely. Whenever the cane stick was dipped into a wooden drum, *duipup,* containing water, there used to be sudden rainfall in the region which enabled the farmers to transplant the rice plant in their terrace field from the nursery bed. Another secret of the cane stick was that when it was put above the fireplace during excessive rainfall it dispersed clouds and made the rain stop. Such was the strange effect of the cane which enabled him to have control over the weather. For some years, weather was closely monitored by the soothsayer, and he advised the villagers to perform a ritual of rain in a particular lake call "*Hezauzai*", which is situated at *Teupuiki* river in *Pumzwale*[25], traditionally preserved for villagers' mass fishing occasion. He further advised the village folks to control excessive rain by making fires over his grave so that destruction of standing crops and vegetable plants by rainwater would not occur. The practice of rain and drought control ritual has been performed by this village after the demise of Rorieng. Vividly it could be recollected that the rain invoking ritual was last performed by the villagers in the mid-1980's. Amazingly, the ritual was a successful one.

Initially to perform this ritual, the villagers will select two pious males. The village is broadly divided into two major clans, that is the *Hau* and *Hoi.* One person each from the *Hau* and the *Hoi* clan will be selected from both the clans to perform the ritual. When proper selection of the two male is done, a particular day is fixed for *tingnah*, (a religious sanction prohibiting field activity) and a female piglet is given to the village high priest. Having arranged all this, on the day of *tingnah*, the selected person with the village high priest will go to *Hezauzai* (a Lake in *Teupuiki* river). Along with them will be their tiffin which will contain only fish or venison with rice and a gourd filled with wine. It is a taboo to work in the field or garden, neither weaving and crafting nor hunting and fishing. The villagers will observe absolute rest, *Ntem*, while remaining inside the village gate.

The first rite performed by selected persons is the eating of their tiffins as ritual tasting called "*ma msi* ". After finishing their tiffin, the selected persons will gradually remove all clothes and remain naked, they then manually make their respective canal near the lake. Mock fighting starts by blocking and damaging each other's canals as a sign of scarcity of water. When this mock fighting starts,they pretend to argue saying 'Why did you touch my water? Why have you taken my water?' and the village high priest begins to intervene and make peace by shouting a slogan "*Hiet Tingherang-Tingherieng Nang ting teu rui gaiboi mai mina dui ga eh dui nsa eh caikap lai zoi loi*" which means "Oh God, you will have to send the rain, if not there is scarcity of water and people are fighting and dying for it". After this the three of them will tie the piglet and suspend it above the lake. Finally, the high priest will invoke rain by pronouncing "God of Rain, downpour torrential rain till the river water carries away the piglet". With this pronouncement, the rituals come to an end. There is evidence that the rain starts falling before the performers reach the village. This is a unique *genna* observed and performed by the community of Poilwa village.

Folklores and sayings on aquatic fauna

Kahang, human turned fish: This fish has skin like that of a human underneath the ventral side of the mouth, hence they are called human turned fish and are said to be related to humans.

Story of a crab and its mother

Once upon a time, a mother crab scolded her baby, "why don't you walk straight?". The baby crab answered, "I walk sideways because you do too". The mother crab did not walk straight so even the baby crab walked like its mother. This story reflects that if the parent is not righteous or an honest person then even their children are likely to become like them.

Male crab

It is said that when a male crab is found with a missing leg, it is said that it has broken off one of its legs to give as a bride price to the female crab for engagement or marriage. The tradition of giving the bride price is still practiced to this day.

[25] The exact location of the community fishing.

Ganuane

Ganuane is a crab with a soft carapace that sheds its shell (molting). So, they are usually called snake crabs. They mostly live in moist mud and below rocks. Youths are not advised to eat this crab as it is said to reduce their fecundity. However, there is no strict restriction for that, but it's said that the soft-shell crab is meant for elderly people and the hard-shelled crab is made for young people.[26]

Beliefs/ perceptions/ symbolic sayings

- Water does not wash words: As far as possible, do not speak ill of someone or never let your words be out of anger, let your words be clean because things that we use or clothes that we wear can be cleansed with water, but your words once spoken can never be cleansed by water.
- A crab called *Ganuane* which has a soft carapace is advised not to be eaten by young men because when they are consumed by young men, they are believed to reduce fecundity. It is said that crab with soft carapace is meant for elderly people and the crab with hard carapace is meant for young people.
- When someone returns home from the field and if he/she encounters a toad, it is believed that their whole day's hard work is gone in vain. But if they meet *Neu Tharene* (a salamander gold color with black stripes), it signifies that the workday wage is going to be good, or their harvest will be good. It is also used for medicinal purposes. Boiling and consuming it is good for treating coughs.
- ***Kakai*** - *Poilwa heninglo nze ngau lo kela kakai (heka) pepoitak swet nah pepau ndui swet. Cine misam pung kemak me nah samzai teukemame ze kakai poi ketak nzwa dela.* This saying is about the fish *Kakai* which is found in the paddy fields of Poilwa village, and which has a hard head and a slippery body. People who do not listen to others or who do not behave well are compared or likened to this hardheaded, slippery *Kakai* fish.
- ***Duitaube*** - *Duitaube duiroi tauliem gesiu cui de duinci to laila. Nah tau kebam nide dui nci bam da de cilo la de makecime rangla.* This saying is about folk knowledge on dragonflies. Wherever there are dragonflies on the water, that area is considered the cleanest and purest water. As dragon flies are good bioindicators of water health which is scientifically proven.
- ***Nneu kela pui*** - *Mipui nneu kelame heneu gi neu laila. Kedane mene, pena mna loge heneu zai nah pekwa reli di la kesiu ziebene.* This saying prohibits a pregnant woman to kill snakes (any kinds of snakes), as it is said that the baby in the womb would imitate the hissing of the snake once they grow older.
- Back when the only form of occupation was farming for the villagers, they used to compare the wealth of one's family with the size and the quality of the paddy field. During those days, when a man is engaged to a woman, the lady will become the talk of the village and they will ask around for her status. It is believed that when the woman's paddy field is covered with *azolla* (*sopa*) the field is considered as a good field. The villagers believe that *Sopa* is only found in fields that have clean water. So, the lady is considered as a good catch for the man.

Taboos relating to aquatic resources

- There are certain ponds where women are strictly restricted namely *Nroibuing Tekwa*, *Nriekwa Tekwa*, *Langsen tekwa*, *Haubwang Tekwa and Rahancha Tekwa*. These are ponds where men usually take bath naked, so women are prohibited from making use of these ponds. So, when men are taking baths and women come to the pond, the men can molest them or violate their modesty. However, no penalty would be imposed against the men as the pond is already prohibited for women.
- During the sanctification ritual of a child called *Nlau*, only aquatic resources like fish are consumed as these are considered clean and the others are prohibited like *Hega* (crab) and even *Tangnwa* (insect) as they are too soft.

Folk Songs

1. There is a song about the rivers of Poilwa. This song is usually sung by the villagers while working in the fields during the summer, around June and July. The song roughly translates to: "Other villages are struggling

[26] According to the respondents there are many folklores, songs and rituals related to aquatic resources. However, they are unable to recollect it as such knowledge and practices have long been abandoned due to various factors such as modernizations, Christianity, etc.

with water shortages and lack paddy fields, whereas our village lies between two rivers, so we have sufficient water for farming. Therefore, we don't face any water shortages and have several paddy fields."

2. There is a song associated with a stream called *Hezaroi* which evoked emotion. This song was composed for a woman who was to be betrothed to someone from another village and was sung as she was being escorted there. The villagers sang many songs for her, but none of them made her cry or touched her heart. However, when they finally sang a song about her leaving the village with the *Hezaroi* stream, where there are many fish, she cried. The *Hezaroi* stream borders Old Poilwa and Benreu villages.

3. There is a particular song about aquatic resources that is not supposed to be sung during community fishing, as it is believed to bring bad luck and result in a poor catch. The song translates to: "We went to the river to catch many fish, but we only caught a single *Kapanne*[27]."

[27] It is considered as the smallest fish in their community.

CHAPTER 5 :CONCLUSIONS

Recent years have seen an increase in aquatic resource abundance following the prohibition of harmful modern tools like chemicals, bombs, nets, and bleaching agents. The informants have expressed that the ban has positively impacted local livelihoods and resource populations, although species like *Kahane and Hedeuga* have decreased, possibly due to construction of roads, buildings and ecological changes. As time passes, younger generations are increasingly exposed to the world beyond the village, pursuing studies and jobs elsewhere. Consequently, village practices are becoming more lenient, influenced by external norms infiltrating the community. Despite their literacy, many are losing knowledge of their mother tongue and forgetting the traditional ways of village life. There is a need for the preservation of traditional healing practices involving aquatic resources as the younger generations have little knowledge about it. Understanding the importance of this knowledge, the parents take them to the fields during vacations to teach them about the medicinal purposes of aquatic resources.

Despite efforts, decline in resources, especially snails, is observed which could be attributed to chemical runoff from upstream agricultural areas. Informants claim that continuous harvesting by villagers and potential weather changes could also be contributing factors to the decline in abundance of aquatic resources. Community members identify commercialization and external export of aquatic resources as significant challenges to preservation, suggesting alternatives within the village to support livelihoods. According to them, historically, challenges included sustainability disputes and limited awareness. But at present, increased awareness due to modernization and impacts of climate change encourage conservation efforts. No major concern or challenges to preserving aquatic resources have been identified in the study.

The importance of documenting TK of aquatic resources lies in preserving and passing them down to the younger generations. This documentation serves as a vital source that will ensure the preservation of the unique heritage and traditional practices of the community, despite evolving societal trends and technological advancements.

To achieve this preservation goal, the Poilwa community emphasized several key strategies:

1. Recognition & Documentation of Cultural Heritage: Documenting TK acknowledges the cultural significance embedded in practices related to aquatic resources. It reinforces the identity and roots of the community, fostering a sense of pride and continuity among its members. As younger generations become more exposed to modern influences, there is a risk of TK fading into obscurity. Documentation acts as a safeguard, ensuring that these practices are not lost but instead accessible for future learning and continuity.
2. Educational Resource: Documented knowledge becomes an educational resource for teaching younger community members about sustainable practices, ethical harvesting techniques, and the spiritual or cultural values associated with aquatic resources. It bridges generational gaps and promotes understanding of environmental stewardship.
3. Adaptation to Changing Conditions: In the face of environmental changes, documented knowledge offers insights into adaptive strategies developed over generations. This includes understanding how to sustainably manage resources amidst fluctuating availability or climate-induced impacts.
4. Community Empowerment: Through documentation, communities empower themselves by retaining control over their narratives and practices. It enables them to share their wisdom with broader audiences while asserting their rights to cultural heritage and sustainable livelihoods.

In conclusion, the act of documenting traditional knowledge of aquatic resources is not merely about preserving the past but ensuring resilience and continuity for future generations. It underscores the importance of cultural preservation, sustainability, and community resilience in an ever-changing world.

Recommendations

1. **Assessment:** Conduct thorough surveys of aquatic biodiversity, habitat conditions, and water quality.
2. **Stakeholder Engagement:** Involve local communities, scientists, and policymakers for inclusive decision-making.

3. **Threat Identification:** Identify and prioritize threats such as pollution, habitat loss, invasive species, and climate change. In this age where use of non-degradable plastics, disposable plastics, Styrofoam cups and plates form convenient tableware for outdoor events it becomes a hazardous waste for all living creatures when people do not clean up their litter.
4. **Protection Strategies:** Use of chemicals such as lime and bleaching agents, batteries and fishing nets can result in a huge catch thereby decreasing the huge population of fishes and affecting all stages of the fishes at the same time degrading the biodiversity of the river. Piscicidal plants which are not lethal can be identified and used for harvesting aquatic fauna. Implement measures like habitat restoration, pollution control, and sustainable fishing practices. Regular clearance of rivers such as the stones and boulders could enhance fish settlements.
5. **Monitoring:** Establish regular monitoring programs to track progress and adapt strategies as needed. Community bodies can be the agents to execute and enforce the traditional conservation management plans.
6. **Education and Outreach:** Educate communities on the importance of conservation and their role in sustainable resource management. Documentation of traditional methods can safeguard and ensure continuity of these practices.

Limitations

In order to capture the entirety of the aquatic resources within a given community longer duration is required for data collection and understanding the *in-situ* behavior of the aquatic flora and fauna and how the people source and manage them. Aquatic resource availability may be influenced by seasonality in the life cycle of the organisms and climatic variations. The outcome may vary depending on the spatial coverage of the study area. In this study due to the limitation in time we were not able to capture the diversity of the entire aquatic organism of the study area. For more detailed documentation, a longer-term study incorporating both spatial and temporal variations is needed to capture the species distributions of Poilwa and Poilwa Namci villages. Additionally, when an area is subjected to several similar projects the people tend to have a lackadaisical attitude towards the project. This can compromise the collection of accurate information. A similar situation was faced by the present team; however, the trust and cooperation of the people was ultimately acquired after much deliberation and persuasion.

Debriefing

After completing the field data collection, data were evaluated, and a preliminary draft was prepared. A visit was arranged with the Chairman of the village and the community members for verification of the collected information before the final report was prepared. During the meeting, elders, young adults and women were present. Using the draft, herbaria of plant specimens, preserved faunal specimens and initial mapping, verification and clarification of names and terminologies were conducted (Figure 25). This was a useful, productive, and satisfactory meeting which helped the investigators to clarify several doubts and make necessary corrections in the draft.

Figure 25. *Debrief meeting with the community member for final verification of information written in the report, clarification of specimens collected, and submission of herbariums and faunal species collected from the aquatic sources for safekeeping in their museum. (i) project coordinator explaining the purpose of visit, (ii) community member verifying the specimens, (iii) & (iv) handing over of the faunal and floral specimens for Poilwa community museum, (v) members present during the meeting (vi) herbaria of plant specimens and (v) preserved faunal specimens.*

Having completed all the verifications, a total of 27 herbaria and 25 faunal specimens were presented to the community. A consolidated map of the aquatic resource mapping was handed over for display. A brochure on folklore and proverbs of aquatic resources collected from Poilwa community and a species-based list and findings on TK following PBR format were submitted. The following tools and implements for fishing have been identified for display in their museum: *Hebah, Kachwarak, Rekak, Sen* and *Hekwabing.*

References

Alfred, J.R.B. 2005. Fauna of Nagaland, State Fauna Series. Zoological Survey of India. **12**:1-620

Ao, S., Dey, S.C., Sarmah, S.A. 2008. Fish and Fisheries of Nagaland, Kohima: Department of Fisheries, Government of Nagaland.

Battiste, M. 2002. Indigenous Knowledge and Pedagogy in First Nations Education: A Literature Review with Recommendations National Working Group on Education and the Minister of Indian Affairs and Northern Affairs Canada (INAC). **30**.

Brown, R., and Garcia, S. 2018. Community Folklore and the Establishment of Marine Protected Areas. *Marine Policy*. **92**:164-172.

Diswang, N. 2010. Poilwa Youth Organization. 25th Anniversary. p6.

Gadgil, M., Berkes, F., & Folke, C. 1993. Indigenous Knowledge for Biodiversity Conservation. Ambio, **22** (2):151-154.

Gorjestani, N. 2004. Indigenous Knowledge for Development: Opportunities and Challenges in *Indigenous Knowledge: Local Pathways to Global Development*.World Bank. **63**:1-4.

Hooker, J. D. 1881a. The Flora of British India. Volume **3**: Asteraceae. London: L. Reeve & Co.
1884b. The Flora of British India. Volume **4**: Plantaginaceae. London: L. Reeve & Co.
1888c. The Flora of British India. Volume **5**: Saururaceae. London: L. Reeve & Co.
1893d. The Flora of British India. Volume **6**: Pontederiaceae. London: L. Reeve & Co.

iNaturalist. Available from https://www.inaturalist.org. Accessed June 4, 2024.

Jayaram, K.C. 1999. The fresh water fishes of India, region. Narendra Publication House. Delhi 110006 (India).

Jones, P. 2019. The Role of Traditional Knowledge in Environmental Sustainability. *Journal of Environmental Management*. **234**: 59-67.

Jones, P. and Brown, R. 2019. Folklore and Sustainable Resource Management: Implementing Conservation Measures in Fishing Communities. *Journal of Sustainable Fisheries*. **15**(2):112-128.

Kanjilal, U. N., Kanjilal, P. C., Das, A., De, R. N., & Bor, N. L. 1934a. Flora of Assam. Volume **1**: Ranunculaceae and Sellaginaceae. Shillong: Assam Government Press.
1936b. Flora of Assam. Volume **2**: Lythraceae. Shillong: Assam Government Press.
1936c. Flora of Assam. Volume **2**: Onagraceae. Shillong: Assam Government Press.
1938d. Flora of Assam. Volume **3**: Apiaceae. Shillong: Assam Government Press.
1938e. Flora of Assam. Volume **3**: Campanulaceae. Shillong: Assam Government Press.
1940f. Flora of Assam. Volume **4**: Juncaceae. Shillong: Assam Government Press.

Mbungcha, S. 2013. Baptist Church Poilwa. Platinum Jubilee Souvenir. 28-29th December. .

Posey, D. A. 1999. Cultural and Spiritual Values of Biodiversity. United Nations Environment Programme (UNEP). **83**(1): 102-105.

Posey, D.A. and Dutfield, G.1996. Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities. International Development Research Centre (IDRC), Ottawa: International Development Research Centre. **1**: 95-112.

Puri, R. (2023). Methods Manual. Documenting Traditional Knowledge ofAquatic Resources in North-East India. Deutsche Gesellschaft für, Internationale Zusammenarbeit (GIZ) GmbH. New Delhi.

Sharma, B.D., Balakrishnan, N.P., Rao, R.R, and Hajra, P.K. 1993. *Flora of India*. Botanical Survey of India, Kolkata.**1**

Smith, A. 2015. Symbolic Significance of Fish Species in Indigenous Folklore. *Anthropological Quarterly*. **88**(3):701-718.

Smith, A. 2017. The Power of Storytelling: Myths about Sacred Fish and Community Perceptions of Water Bodies. *Cultural Anthropology*. **32**(4): 542-558.

Smith, H. 2020. Indigenous Knowledge and Aquatic Resource Management: Lessons from the Field. Sustainable Development Press. **7**: 102-118.

Subramanian, K.A. and Sivaramakrishan, K.G. 2007. Aquatic Insects of India- A field guide. Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore, India. **62.**

Sumi, T. 2018. Indigenous Knowledge of Weather Prediction among the Sumi Naga Community: Insights from Folklore and Traditional Wisdom. *Journal of Indigenous Studies*.**12** (1):45-62.

Talwar, P.K. and Jhingran, V.G. 1991. Inland Fishes of India and adjacent countries Oxford and IBH Publishing House. **2**:11-58.

VanDyk, John, ed. 2023. BugGuide.Net: Identification, Images, & Information For Insects, Spiders & Their Kin For the United States & Canada. Iowa State University. Accessed June 4 2024. https://bugguide.net/.

Wu, Z. Y., Raven, P. H., & Hong, D. Y. (Eds.). 1994a. Flora of China. Volume **2-3**: Equisetaceae. Science Press and Missouri Botanical Garden Press.
1994b. Flora of China. Volume **17**: Lamiaceae. Science Press and Missouri Botanical Garden Press.
2003c. Flora of China. Volume **5**: Polygonaceae. Science Press and Missouri Botanical Garden Press.
2006d. Flora of China. Volume **22**: Poaceae. Science Press and Missouri Botanical Garden Press.
2010e. Flora of China. Volume **23**: Alismataceae. Science Press and Missouri Botanical Garden Press.

Zhimomi, V. 2020. Poilwa: A Heritage Village of Nagaland. *Journal of Northeast Cultures*, **12**(1), 45-59.

Appendix 1

Interview Questions

1. Could you identify and describe the water bodies found in your community?
-the locations of the water bodies (rivers,streams)
-how have these water bodies evolved overtime? {Are some water bodies say ponds closed down for urbanization}

2. Are there any stories/songs /folklore related to it?

3. What are the common or useful aquatic species both flora and fauna found in the local water bodies?

-
{fauna} Can you specify its behaviors like what they feed on, how they spawn, when (season/month) where, what kind of habitat they prefer, any kind of changes observed in their appearances due to seasonal variation?
- {flora} which month/season are they abundant? What kind of habit and habitat preference do those plants have?
4. How and why do you use the aquatic resources {for consumption, rituals, medicinal uses, commercial purpose, symbolic?)

A) Consumption
-Can you describe the various ways in which aquatic resources are consumed by the community members?
-How are they prepared?
-Are there any restrictions for consumption of any specific species of aquatic resources? State the reasons. (Myths related to it)
-How do you preserve the abundant harvest? (Steps) any unique methods or common methods used? How long is the preservation process?
-How long do the preserved resources last?

B) Rituals -Do you used aquatic resources for rituals in the past or are there any specific rituals that are still practiced? If so, name them. State the reasons for each.
-Are there rituals that are not practiced nowadays? If so, why.
-And if some specific rituals are still in practice, what is the significance of these rituals that still prevail to this day?
- Is the ritual practiced the same way as in the past or are there any changes made in the process of the ritual? (Like simplifying the process after Christianity) -
How do they use the mentioned aquatic resources for rituals?

C) Medicinal uses
- Do you use any aquatic resources for traditional medicine or healing practices?
- What are the different aquatic resources used?
- How are the aquatic resources obtained for use as medicines?
- For what kind of sickness are they used for?
- How are they processed/ prepared?
-How are they administered in healing practices?
- How important is the use of aquatic resources in these traditional healing practices? - who can perform these rituals and how?
- Are there any individuals involved in traditional healing practices in your community using aquatic resources?
-How important is the use of aquatic resources in these traditional healing practices?
-How has the knowledge about the use of aquatic resources in traditional healing passed down through generations?
-Are there any challenges or threats to the continued use of aquatic resources in traditional healing practices?

-How has the availability or quality of these resources changed over time?
-How do community members perceive the effectiveness of traditional healing practices using aquatic resources?
-do you think there is a need for preservation of traditional healing practices involving aquatic resources? Why?

D) Commercial benefits:
-Do you get any commercial benefits from aquatic resources? If yes/no what or why?
- How do you commercialize the product? (Fresh/ dried/processed and how are they transported).
-What is the price of the product per kilo/cup/bunch?
- Who fixes the rate of the products?
-What are the benefits of selling the product?
- What are the challenges faced during commercialization?
-Do aquatic resources bring any tourist/tourism activity to the village? If yes/no. What and why?
- What are the different methods used for attracting tourists to the village?
- Are there any changes in the influx of tourist activity in relation to the aquatic resources in the past 5 years?
- Has Covid-19 affected the commercial factor in any way?
- How were the challenges overcome?
- Is the commercial sector gender specific? (Men/women) Why?

E) Symbolic as reflected in proverbs:
-do aquatic resources have any symbolic meanings or proverbs reflecting to society or people etc.?
-If yes, what are those and what do they symbolize?
-what is the meaning of such saying/proverbs?
-What message does those proverbs, or species signify or give to the people?
-what is people's perception of those proverbs? Do they believe that? If yes/no, why and how?

F) Harvesting tools and techniques:
- What are the different traditional methods used in harvesting aquatic resources?
- Are there any specific roles given to different genders or age groups or clans (Which includes fishing, baiting, catching, cleaning, cooking, eating etc.) - Explain the different methods?
- Do you think that the traditional techniques for fishing should be preserved? Why and how would you preserve it? - With modernization, are there any challenges of using the traditional fishing practices? - Were there any methods that were practiced in the past but not anymore? Why? - Who can participate in these methods? If there are any restrictions…Why? - What are the different tools used for harvesting? - What are these tools made of and how are they obtained? Elaborate each tool.
-Do they manufacture the tools or buy them? - Who can make the tools? Are there any restrictions? If yes, why? -Is there any upgrade of the tools or is it the same as used in the past or are there any tools that are no longer in use or alternatives to the tools? -Are there any specific signs or indications in nature that your community uses for harvesting aquatic resources, predicting the weather change, water quality or fish spawning? - Are there any specific seasons for fishing, catching snails, crabs, etc.? - Are there any rituals for harvesting? If yes, can you name them?
- How are these rituals performed? What is the meaning of the rituals?
- Who can perform these rituals and why? - Do these rituals still perform today? If yes/no, why?

G) Belief systems:
-Were there any restrictions or taboos relating to aquatic resources?

-Why so? What is the reason behind this?
- Is there any historical event that leads to this restriction or taboos?
- Were there any folktales or songs related to water bodies or other aquatic species?
- Can you tell us those stories and the meaning of those stories?
- What message do those stories give to the people?
- If you know any songs related to water bodies or aquatic species, can you sing them?
- Can you tell us the meaning of these songs? What message does it convey?
- Is it necessary to preserve this knowledge?
- How can you preserve it?
- How are the folklores, songs, etc passed down from generations?

H) Governance:

- Are the water bodies owned by the community or an individual?
-If it is owned by individuals, how was the division done?
- How are they passed down in due course of time?
-Do you still practice the ownership system or are there any changes? If yes, how, and why?
- Is there any specific place where the traditional knowledge is passed down to the younger generation by means of demonstrative or oral method? (Morung)

- How have the roles and functions of this institution evolved over time? Why?
- What are the different institutions used for passing down the TK in the present day? (fishing spots, seasonal pattern)

- Are there any rules for using the aquatic resources?
- If yes, who administers these rules? How?

- Are there any instances where a person violated the rules? What was the penalty or what could be the penalty for violating the rules?

-What is the reason behind the abundance of aquatic resources in your community to this day?

- Are there any traditional methods for conserving and managing aquatic resources? If yes, what and how?
-How is your community contributing to activities regulating aquatic resources? (Such as feeding, cleaning, etc) is there any specific time/season for doing it?

-What are the threats and challenges you encounter for preserving the aquatic resources?

-How do you and your community rely on the local aquatic resources for your daily needs?

-Are the abundance of aquatic resources increasing or declining? Why?
- How does it affect your community?
-Have you noticed any changes in the behavior of aquatic resources over the years? What could be the reason?

-Are there any initiatives or partnerships that have or are helping in preserving aquatic resources? If yes, who and how?

- Do you think it's important to document the traditional knowledge of aquatic resources of your community?
-In your opinion, how can traditional knowledge be preserved and passed down to the next generation?

Appendix 2.a :Samples of Aquatic flora collected at the study site

Sl. No	**Vernacular name (common name)**	**Scientific name**	**Family**	**Order**	**Class**	Uses
1	*Kebeu* (Field Horsetail)	*Equisetum arvense* L.	Equisetaceae	Equisetales	Equisetopsida	unknown
2	*Hechingmetenchi* (Canton Buttercup)	*Ranunculus cantonensis* DC.	Ranunculaceae	Ranunculales	Magnoliopsida	Used for treating clotted blood and wounds.
3	*Kebeu Kechoi* (Himalayan Horsetail)	*Equisetum diffusum* D. Don	Equisetaceae	Equisetales	Equisetopsida	Used for treating urinary problems.
4	Hetsiokap (Spikemoss)	*Selaginella* sp.	Selaginellaceae	Selaginellales	Lycopodiopsida	unknown
5	*Kebeu Kechoi* (Soft Rush)	*Juncus effusus* L.	Juncaceae	Poales	Liliopsida	weeds
6	*Tambet Negineu* (Asian Plantain)	*Plantago asiatica* L.	Plantaginaceae	Lamiales	Magnoliopsida	Consumption and used for treating kidney related problems
7	*Nham Negineu* (Chervil)	*Chaerophyllum* sp.	Apiaceae	Apiales	Magnoliopsida	consumption
8	*Niare* (Water Plantain)	*Alisma plantago-aquatica* L.	Alismataceae	Alismatales	Liliopsida	unknown
9	*Nset* (Fish Mint)	*Houttuynia cordata* Thumb.	Sauraraceae	Piperales	Magnoliopsida	Consumption and used for purifying

						blood and for stomach ailments.
10	*Ndencineu* (Trailing Lobelia)	*Lobilia nummularia* Lam.	Campanulaceae	Asterales	Magnoliopsida	unknown
11	*Heurarui Toi* (Pickerel Weed)	*Pontederia vaginalis* Burn. f.	Pontederiaceae	Commelinales	Liliopsida	unknown
12	*Herame Tamheu Kechoi* (Wallinch's Rush)	*Juncus wallichianus* J. Gay ex Laharpe	Juncaceae	Poales	Liliopsida	unknown
13	*Heuriem* (Roundleaf Toothcup)	*Rotala rotundifolia (*Bunch.-Ham. Ex Roxb.) Koehne	Lythraceae	Myrtales	Magnoliopsida	unknown
14	*Heudeuheu* (Perennial Water-Primrose)	*Ludwigia Perennis* L.	Onagraceae	Myrtales	Magnoliopsida	unknown
15	*Herame Tamheu Taeda* (Rush)	*Juncus* sp.	Juncaceae	Poales	Liliopsida	unknown
16	*Kwenchang Negi* (Hooked Persicaria)	*Persicaria runcinata (*Buch.-Ham. ex D.Don) H. Gross	Polygonaceae	Caryophyllales	Magnoliopsida	Used for treating gastric,fever and body ache.
17	*Pui Noheu* (Glandular Skullcup)	*Scutellaria glandulosa* Hook.F.	Lamiaceae	Lamiales	Magnoliopsida	unknown

18	*Heurah Radiak* (Slender Knotweed)	*Persicaria decipiens* (R.Br.) K.L.Wilson	Polygonaceae	Caryophyllales	Magnoliopsida	unknown
19	*Ruigie Puiheu* (Sow Thistle)	*Sonchus* sp.	Asteraceae	Asterales	Magnoliopsida	unknown
20	*Reumah* (Rice)	*Oryza* sp.	Poaceae	Poales	Liliopsida	consumption
21	*Tampoi Paidi*		Poaceae	poales	liliopsida	weed
22	*Karaing Puigineu* (Indian Pennywort)	*Centella asiatica* (L.) Urb.	Apiceae	Apiales	Magnoliopsida	Consumption and used for treating
23	*Sopa* (Duckweed)	*Lemna* sp.	Araceae	Alismatales	Liliopsida	unknown
24	*Hepara* (Pond Silk)	*Spirogyra* sp.	Zygnemataceae	Zygnamatales	Zygnematophyceae	Use for blood clotting.

Appendix 2.b : Samples of Aquatic fauna collected at the time of sample collection in the study site

Sl. No	Vernacular name (Common Name)	Scientific Name	Family	Order	Class	Uses
1	*Helangdoi* (Water scorpion)	*Ranatra* sp.	Nepidae	Hemiptera	Insecta	Consumption
2	*Duikwabe* (Water strider)	*Aquarius* sp.	Gerridae	Hemiptera	Insecta	Unknown
3	*Duikwabe* (Water strider)	*Metrobates* sp.	Gerridae	Hemiptera	Insecta	Unknown
4	*Hebungbe* (Water Scavenger Beetle)	*Hydrophilus* sp.	Hydrophilidae	Coleoptera	Insecta	Consumption
5	*Hebungbe* (Diving beetles)	Unknown sp.	Dytiscidae	Coleoptera	Insecta	Consumption
6	*Hechokwap* (Whirligig beetles)	Unknown sp.	Gyrinidae	Coleoptera	Insecta	Unknown
7	*Neutoine*(Mole cricket)	*Gryllotalpa* sp.	Gryllotalpidae	Orthoptera	Insecta	Consumption
8	*Tangking*(Cricket)	*Teleogryllus* sp.	Gryllidae	Orthoptera	Insecta	Consumption
9	*Tangnwa* (Tabanid larva)	Unknown sp.	Tabanidae	Diptera	Insecta	Unknown
10	*Tangnung* (Larva of crane fly)	*Tipula* sp.	Tipulidae	Diptera	Insecta	Unknown
11	*Tambane-kenzing* (Minnow mayfly nymph)	Unknown sp.	Baetidae	Ephemeroptera	Insecta	Consumption
12	*Hechokwap* (Flathead mayfly nymph)	*Stenonema* sp.	Heptageniidae	Ephemeroptera	Insecta	Consumption and used for treatment of nerve pain.
13	*Tambane*(Nymph of Damselfly)	*Nehalennia* sp.	Coenagrionidae	Odonata	Insecta	Consumption
14	Chippai m*oship*(Earwig)	*Labidura* sp.	Labiduridae	Dermaptera	Insecta	Unknown
15	*Tangkieppe*(Hellgrammite)	Unknown sp.	Corydalinae	Megaloptera	Insecta	Consumption

Sl. No	Vernacular name (Common Name)	Scientific Name	Family	Order	Class	Uses
16	*Galam*(Freshwater crab)	*Indochinamon* sp.	Potamidae	Decapoda	Malacostraca	Consumption and Used to treat burns.
17	*Tamriakbe* (Wolf spider)	*Pardosa* sp.	Lycosidae	Araneae	Arachnida	Consumption
18	*Tangsoi* (Red worm)	*Eisenia* sp.	Lumbricidae	Opisthopora	Clitellata	Unknown
19	*Tangnaikwa-net*(Freshwater jawless leeches)	Unknown sp.	Glossiphoniidae	Rhynchobdellida	Hirudinea	Unknown
20	*Tangnaikwa-riingtie*	*Bellamya bengalensis*	Viviparidae	Mesogastropoda	Gastropoda	Consumption and commercial
21	*Tangnaikwa Kwasang*	*Cipangopaludina* sp.	Viviparidae	Mesogastropoda	Gastropoda	Consumption, commercial,used for treatment of sore eyes and healing of wounds.
22	*Hezananai Kwa*(Pond snail)	*Lymnaea* sp.	Lymnaeidae	Basommatophora	Gastropoda	Unknown
23	*Gauroine*(Indian skipper frog)	*Euphlyctis cyanophlyctis*	Dicroglossidae	Anura	Amphibia	Consumption, treatment of burns and quick healing of wounds.
24	*Kahane* (Alwan Snowtrout)	*Schizothorax richardsonii*	Cyprinidae	Cypriniformes	Actinopterygii	Consumption, commercial , treatment of fever, diarrhea and healing of wounds.
25	*Karietne*(Cauvery garra)	*Garra mcclellandi*	Cyprinidae	Cypriniformes	Actinopterygii	Consumption and commercial

Sl. No	Vernacular name (Common Name)	Scientific Name	Family	Order	Class	Uses
26	*Kaneune*(Stone loach)	*Schistura* sp.	Nemacheilidae	Cypriniformes	Actinopterygii	Consumption and commercial
27	*Kapanne*(Sisorid catfish)	*Exostoma* sp.	Sisoridae	Siluriformes	Actinopterygii	Consumption and commercial
28	*Kakai*(Snakeheads)	*Channa* sp.	Channidae	Channiformes	Actinopterygii	Consumption, healing of open wounds and helps the lactating mother to increase milk production.
29.	*Tangduine*(Tadpole)	Unknown sp	Unknown	Anura	Amphibia	Consumption
30	*Duipwanne*(Tadpole)	Unknown sp	Unknown	Anura	Amphibia	Unknown

Appendix 3

Data collection sheet on historical timeline

Time	Events	Impact on Community	Impact on environment	Local responses
2024	Total ban on hunting	Positive impact		
2022	Rules and regulations on	Positive impact	Increase in the resources	Seeing the increase in the resources, the villagers support the rules sanctioned

Time	Events	Impact on Community	Impact on environment	Local responses
	hunting and fishing strictly imposed			
After Pandemic 2020	Flood near the river side	Fields were destroyed, affecting the community	Aquatic life was disturbed. Population of the snails were affected.	Repairing of the field by the community, financial Aid was given by the Disaster Management, Government of Nagaland
2019	Construction of Jio Tower	Better reception signal in the village		It reliefs the community for better communication
2015	A minor earthquake in the village	Not much impact	Not much impact	
2010	Construction of BSNL Tower	Better reception signal in the village		It reliefs the community for better communication
2000	Road construction of asphalt and concrete	Ease of transportation	Clearing of land	Better road connectivity
In the 1980's	Flood in the paddy fields	Minimal effect on the community	Field destroyed and washed away	
1977	Flood in the paddy fields	Ponds have been neglected.		
After 1963	Formation of the Panchayat	Help in the decision making of the village community.		
1961	Government High School	Increase in literacy rate		
1950	Road construction in the village	Transportation to other towns was made possible. Ponds have been destroyed and blocked.	Negative impact on the environment by undergoing deforestation	Road connectivity has help in commercialisation of the resources of the village to the other towns
1946	Government Primary School	Increase literacy rate		

Time	Events	Impact on Community	Impact on environment	Local responses
1938	Baptist Church Poilwa	Rituals have gradually ceased with the coming of Christianity.		
After 1938	Cholera	Affected the health of the village community.		

Appendix 4: Data collection sheet on Trends

Time (years ago)	Rainfall	River levels/quality	Population (Old Poilwa)	Fish population	Fishing yields	Forest Cover	Agricultural productivity
Today	Lesser rainfall	River level decreasing	Stable	*Karietne* and *Kalui* population is increasing. *Kahane* population is decreasing.	Increasing	Increasing	Stable

5	Average	River quality and level remain the same	Stable	Stable	Decreasing	Forest cover started to improve as people started leaving Jhum cultivation	Stable
10	Average	River quality and level remain the same	Stable	Stable	Decreasing	Forest cover started to improve as people started leaving Jhum cultivation	Stable
20	Average	River quality and level remain the same	Stable	Stable	Decreasing	Forest cover started to improve as people started leaving Jhum cultivation	Stable
40	Average	River quality and level remain the same	Population is low due to the migration of the people to the urban area	Stable	Very high	Forest cover was low due to Jhum practice	Stable
20 years from now	Less rainfall	River level may decrease if the ecology is disturbed.	Increase as a result of the expansion of the village	*Karietne* and *Kalui* population may be very high. *Kahane* population may be very low.	Harvesting may increase with modernisation of fishing gears.		Stable

Appendix 5 : Data collection on characteristics of fish

	Aquatic resources	**Appearance**	**Habitat**	**Life Cycle**	**Abundance**	**Food preference**	**Human Uses**	**Capture Techniques**	**Oral literature**
FISHES	Kahane	It lacks scales and has a whitish body on the ventral side.	Found in the rivers Duilum and Teupuiki.	Spawn during September and October.	All season	Algae	Consumption, commercial and medicinal	Using traps like *Sen* and *Hebah*, piscicidal plants.	*Kahane* is the tastiest among the rest of the fishes.
	Kakai	Black in colour, soft scales, small size and sensitive to temperature which alter their body colors.	Found in paddy fields	Spawn during July and August.	November	Insects	Consumption and medicinal	Hand gathering	
	Kan eune	Small size, yellowish body with black vertical stripes and lacks scales.	Found in river, paddy fields and spring	Spawn during May			Consumption and commercial	Using traps like *Sen* and *Hebah,* piscicidal plants.	

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Food preference	Human Uses	Capture Techniques	Oral literature
	Kagak	Brownish in color, large in size. Can weigh up to 2-3 kgs when fully matured.	Found in river and paddy fields		All season	Omnivorous	Consumption and commercial	Using trap like *Hebah*	
	Karietne	Roughly the size of a thumb. resembles a snakehead with an orange head region	Found in rivers	Spawn during September and October.	February and March.		Consumption and commercial	Using traps like *Sen* and *Hebah,* piscicidal plants.	
	Kahang	Presence of barbels, black and brown in color. It lacks scales.	Found in Duilum Roi	Spawn during March and April.	March and April	Algae	Consumption and commercial	Using traps like *Sen* and *Hebah,* piscicidal plants.	Referred to as a "human turned-fish" due to its connection to humans.
	Kapanne	Presence of barbels and lacks scales. Small in size, brownish in color	Found in Duilum Roi and streams		February and March.	Algae	Consumption and commercial	Using traps like *Sen* and *Hebah,* piscicidal plants.	

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Food preference	Human Uses	Capture Techniques	Oral literature
	Kalem	Weighs around 1-2 kgs.	Found in deep water		August and September	Omnivorous	Consumption and commercial	Using trap like *Hebah*	
	Kakiene	Small in size	Found in Teupuiki river		September and October.	Omnivorous	Consumption and commercial	Using traps like *Sen* and *Hebah*, piscicidal plants.	
	Poige ne	Presence of small reddish-orange head.	Found in rivers.	Spawn during August.			Consumption and commercial	Using traps like *Sen* and *Hebah,* piscicidal plants.	

Appendix 6: Data collection on characteristics of insects

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques	Oral literature
INSECTS	*Tansoikau*	Caterpillar-like, small in size, and dark blackish in color	Found in rivers and streams	Metamorphosis into winged insects.	January and February	Consumption	Hand gathering	
	Tangkieppe	Resembles a centipede, with a number of legs.	Found in rivers.	Metamorphosis into winged insect	January, February and December	Consumption	Hand gathering	
	Pingbe	caterpillar-like, small in size, and dark blackish in color	Found in rivers.		All season	Consumption	Hand gathering	
	Tangnwa	Resembles a maggot or larva, off-white in color.	Found in rivers.		All season	Few people consume	Hand gathering	
	Tangnet	It is a water leech which is black in color.	Found in rivers and paddy fields		All season	Inedible		
	Hekareu	Dark green and curls up into a round shape, similar to a millipede.	Found in rivers.			Consumption	Hand gathering	
	Tangkwanie	It is a small-sized prawn.	Found in rivers.		January, February and December	Consumption	Hand gathering	

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques	Oral literature
	Ngakbezang	It is a young tadpole of a toad.	Found in rivers.	Metamorphosis into an adult.		Non edible		
	Hechokwap	It has tails and a segmented abdomen	Found in rivers.		All season	Consumption	Hand gathering	
	Rinambe	Dark coffee colored and small in size, about the size of a nail.	Found in rivers.		January, February and December	Consumption	Hand gathering	
	Tangsoi	Earthworm	Found in paddy fields		All season	Non edible		
	Duitaube	Dragonfly	Found in paddy fields	Adults emerge from the nymph during October to November.	All season	Non edible		Believed the water to be clean when found in those water bodies.
	Neutoine	Small in size, brown-dark in color.	Found in paddy fields		All season	Consumption	Hand gathering	

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques	Oral literature
		Caterpillar-like, similar in color to *Tansoikau*, and small in size	Found in paddy fields		All season	Consumption	Hand gathering	
	Hebungbe	Beetle-like, needle-shaped mouthpart, and blue or black in color.	Found in paddy fields		All season	Consumption	Hand gathering	
	Helangdoi	Scorpion-like, small in size, non-poisonous, brown in color, and thumb-sized.	Found in paddy fields		All season	Consumption	Hand gathering	
	Tamriakbe	It is a spider that is yellowish with black coloration.	Found in paddy fields	Found carrying the eggs during May and June	May and June	Consumption	Hand gathering	
	Duikwabe	It is called a water guard, brown in colour	Found in paddy fields		All season	Inedible		

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques	Oral literature
	Tangdeukau	------	Found in paddy fields		June			
	Hereukau	Maggot-like and small in size.	Found in paddy fields	Undergoes hibernation	All season	Inedible		
	Tangking	Grasshopper-like and brown in colour	Found in paddy fields		All season	Consumption	Hand gathering	
	Bungnam	Beetle-like	Found in paddy fields		All season			
	Pippe	Caterpillar-like and small in size	Found in paddy fields		All season	consumption	Hand gathering	
	Langdoi	Scorpion-like, small in size, non-poisonous, brown in color, and thumb-sized.	Found in paddy fields		All season			

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques	Oral literature
	Tambane	It is a nymph of a Dragonfly	Found in paddy fields		All season	Consumption	Hand gathering	

Appendix 7 :Data collection on characteristics of frogs

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Food preference	Human Uses	Capture Techniques
FROGS	*Gauroine*	Yellowish-grey and thumb-sized	Found in paddy fields and rivers.		April to July	Small insects	Consumption	Hand gathering
	Hegumgau	Yellow and green, larger than thumb-sized	Found in paddy fields, banana plant, and along riverbanks.		March to May	Small insects	Consumption	Hand gathering
	Tangngakpe	Bumpy-backed toad	Found in dry land.			Omnivorous	Inedible	
	Gauja	Green to dark brown in color and larger than thumb-sized	Found everywhere, in streams, rivers, etc.		August and September	Small insects	Consumption	Hand gathering
	Chingkuigau	Brown and larger than thumb-sized	Found in tree holes.	They lay eggs in the river and	April, June and July	Small insects	Consumption	Hand gathering

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Food preference	Human Uses	Capture Techniques
				return to tree holes.				
	Gaukwa	Black and big in size	Found in rivers		All season	Small insects	Consumption	Hand gathering
	Gautang	Green-brown and big in size	Found in small streams and rivers.		August and September	Small insects	Consumption	Hand gathering
	Tangduine	*Gaukwa* tadpole	Found in rivers				Consumption	Hand gathering
	Duipwanne Pui	Late-stage *Gaudiak* frog tadpole	Found in paddy fields			Omnivorous		
	Duipwanne	Early-stage *Gaudiak* frog tadpole.	Found in paddy fields			Omnivorous		
	Gaudiak	Similar to *Hegumgau*, named *Gaudiak* for its green color	Found in paddy fields		March		Consumption	Hand gathering

Appendix 8 :Data collection on characteristics of crabs

	Aquatic resource	Appearance	Habitat	Life Cycle	Abundance	Food preference	Human Uses	Capture Techniques	Oral literature
CRABS	*Galam*	Black to dark green and large in size	Found underneath the rocks.	Find carrying the eggs during the month of August	August,September and October		Consumption and medicinal	Using baits like fresh meats and burned meat or rats	It is named for their free-roaming behaviour.
	Hedeuga	Yellowish, dark purple and red, small in size	Found in damp muddy areas, sides of streams		September	Grasshoppers	Consumption	Hand gathering	Found in swampy areas; hence called swampy crabs.
	Gachiine	Small in size	Found in rivers, underneath the rocks		January and February		Consumption	Hand gathering	
	Ganuane	Off-white in colour with a soft carapace	Found in moist mud, under the rocks and streams		Not abundant		Consumption	Hand gathering	Sheds their skin like snakes and are believed to reduce fertility if consumed by young men
	Gachang	Black-green	Found in paddy fields, underneath the rocks.		June and July		Consumption	Hand gathering	

Appendix 9 :Data collection on characteristics of snails

	Aquatic resources	Appearance	Habitat	Life Cycle	Abundance	Human Uses	Capture Techniques
SNAILS	*Tangnaikwa Kwasang*	Soft shell	Found in paddy fields	Dormant in soil when fields are dry and emerge from the soil during Spring	During Spring	Consumption, commercial and medicinal	Hand gathering
	Hezananai Kwa	Very small in size.	Found in paddy fields	Dormant in soil when fields are dry and emerge from the soil during Spring	During Spring	Few people consume	Hand gathering
	Heroi Naikwa	Hard shell	Found in paddy fields	Dormant in soil when fields are dry and emerge from the soil during Spring	During Spring	Consumption and commercial	Hand gathering
	Tangnaikwa Riingtie	Large and has more whorls	Found in paddy fields	Dormant in soil when fields are dry and emerge from the soil during Spring	During Spring	Consumption and commercial	Hand gathering

Appendix 10

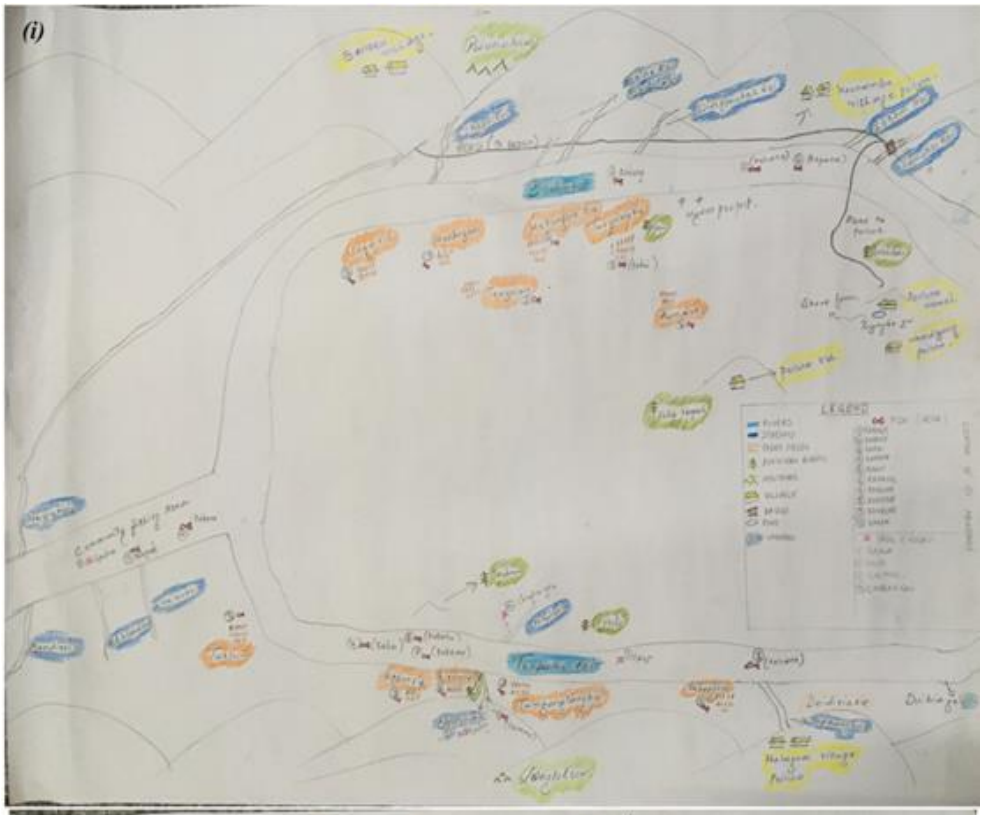
Data collection on characteristics of snakes

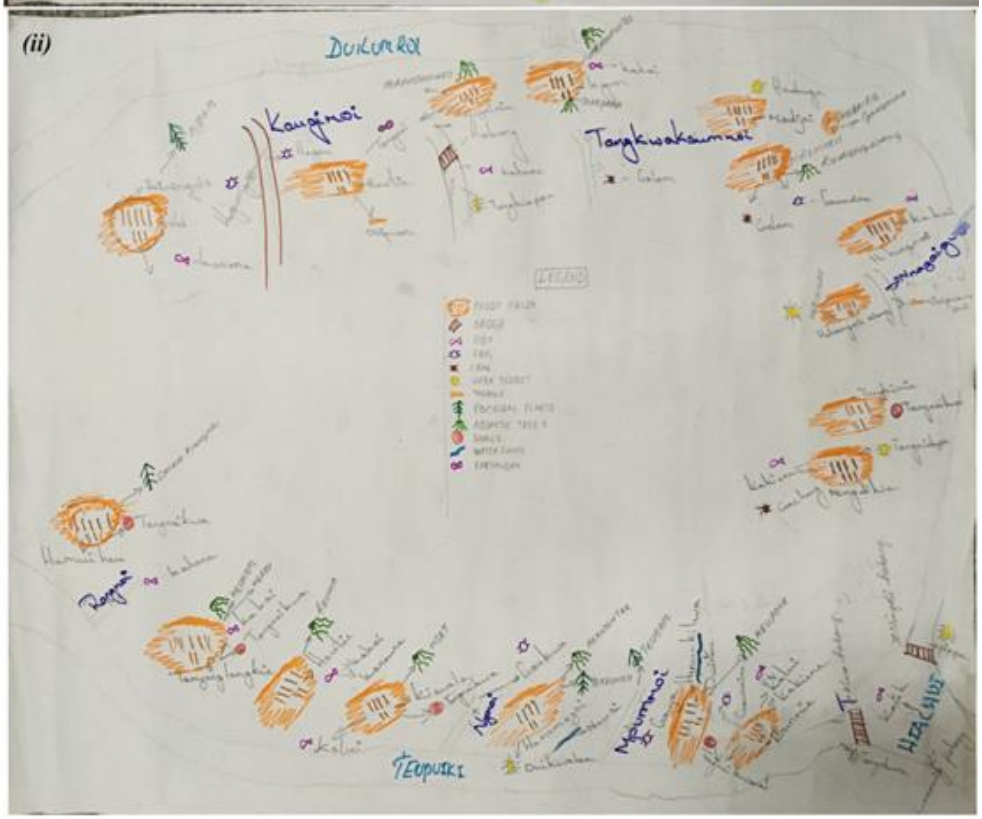
	Aquatic resources	Appearance	Habitat	Abundance	Food preference	Human Uses	Capture Techniques

SNAKE	*Neusi*	Head shaped like Kakai fish, with a white body and black stripes.	Found in paddy fields	During rainy season	It consumes fish	Consumption and medicinal	Hand gathering
	Duineu	Short In length,black and yellow with a smooth body	Found in paddy fields	During rainy season		Few people consume	Hand gathering

Appendix 11 :Mapping Exercises

Mapping of aquatic resources during group activity by menfolk (i) and youths (ii). Menfolk were people with ages ranging from 32 to 61 years and youths were of 20 to 34 years of age.





Appendix 12: Photo gallery

Figure A 1(i)

Figure A 1(ii)

Figure A1(i) Fishes dried over the hearth. The dried fish when added produces flavor even to the most simple dish. (ii) Hatching ground in the paddy field. Captured in the picture are tadpoles and varieties of snails.

Figure A 2(i)

Figure A 2(ii)

Figure A 2 (i) The woman is not only informative but also brings in the aquatic flora to the Investigators for specimen identification. (ii) After collection of all available aquatic floras, Investigator sorts them out.

Figure A 3 (i)

Figure A 3 (ii)

Figure A 3 (i) & (ii). Research team takes a tour around the fields and the river.

Figure A 4 (i)

Figure A 4 (ii)

Figure A 4 (i) & (ii).Womenfolk and the youth of Poilwa carry out the freelisting of the aquatic resources.

Figure A 3 (i)

Figure A 3 (ii)

Figure A 5 (iii)

Figure A 5 (iv)

Figure A 5 (v)

Figure A 5 (vi)

Figure A 5 (vii)

Figure A 5 (viii)

Figure A 5 (i) & (ii).Personal interviews conducted with a couple at Poilwa village. (iii), (iv), (v), (vi), (vii) & (viii) Personal interviews conducted with female informants at Poilwa village. The Investigators are assisted by a local Translator

Figure A 6 (i)

Figure A 6 (ii)

Figure A 6 (iii)

Figure A 6 (iv)

Figure A 6 (v)

Figure A 6 (vi)

Figure A 6 (vii)

Figure A 6 (i), (ii), (iii), (iv), (v), (vi), & (vii). Personal interviews conducted with male informants from Poilwa village and Poilwa Namci.

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered Offices
Bonn und Eschborn

Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Deutschland
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Deutschland
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de