

Traditional Fish Preservation in South Western Assam in India

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ABSTRACT: This study explored the traditional fish preservation methods used by different communities living in South Salmara, Goalpara, Kamrup, Kamrup Metro and Morigaon districts in South Western Assam, India. Fourteen communities living in the area have been found to be involved in different traditional fish preservation practices. Out of them, Bengali-speaking Kaibarta, Riparian Muslim and Khasi communities are exporting processed fish varieties to outside the region and the rest of the communities are preparing processed fishes mostly for household consumption and selling in the local markets. Sixty-one different fish species belonging to seven orders and twenty families are used to prepare five different types of processed fish varieties. Other than fishes, local prawns are also dried. The most popular types of fish processing methods in the region are sun-drying, smoking and shidal (a type of fermented fish paste).

KEYWORDS: Tradition, Fish preservation, Sun-drying, Smoking, Salting, Shidal

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I. INTRODUCTION

The richness of piscian diversity has been the heritage of North East (NE) India. Located in one of the thirty-six hotspots of biodiversity, i.e. the Eastern Himalayas, NE India is the abode of numerous species of flora and fauna including freshwater fishes. Owing to the undulating hills, meandering rivers and profusely wet monsoon, this part of the world is rich in aquatic biodiversity. Kottelat and Whitten (1996) described North East India as one of the hotspots of freshwater fish biodiversity in the world. Fishes are abundantly available during the rains, but not so plentiful during the dry season. So, people in the olden days started preparing dry fish to be consumed during the lean season. Later, it became a taste and people accepted it as a delicacy. Fresh fishes are not plentifully available in hilly areas and the people in hills are dependent on the fish supply from the valleys. In olden days due to transportation and cold storage problems, fresh fishes were not easily available in the hills. As a result, people living on the hills developed preference of dry fishes over fresh fishes. Preparation of dry fish and fish pickles is an age-old practice in India and Bangladesh. Mention of fish drying is found in the famous Assamese story book 'BurhiAair Sadhu' by LakshminathBezbaruah (1911). Dutta et.al. (1992) for the first time investigated the fish preservation methods adopted by different tribes in Assam in a detailed manner. Muzaddadi and Basu (2002, 2003 and 2012) studied various aspects of preparing *Shidal*, a special type of fishpaste in Assam and Tripura. They have narrated the ingredients, types of utensils used, preparation processes and microbiological changes in *Shidal* preparation. More recent study done by Sharma et.al. (2013) elaborated about *Hukoti*, another type of traditional dry fish prepared by the tribal communities in the Eastern Assam. Studies done in different parts of the globe shows that processed fish is a delicacy in many parts of the world and fish processing offers a very profitable business opportunity. Saisithi's (1994) work on *Fish Sauce*, a type of traditional fermented fish, is a testimony that processed fish is consumed in different parts of the globe. This communication explored the communities involved in fish processing and the techniques used by them. Practices of fourteen communities living in the five study districts located on the South bank of river Brahmaputra in the westernmost part of the state of Assam bordering Bangladesh and Meghalaya were studied during the year 2017 to 2020.

II. OBJECTIVES OF THE PRESENT STUDY

The present study intended to explore and find out -

- the communities in the study area who are involved in fishing
- the types of traditional fish preservation methods
- the species of fishes used for different processed fishes

III. MATERIALS AND METHODS

The present study was carried out in South Salmara, Goalpara, Kamrup, Kamrup Metro and Morigaondistricts in the province of Assam in India. South Salmara is the westernmost district of Assam in the south bank of the Brahmaputra. The boundary of South Salmara is bounded by Goalpara district in the East, Bangladesh in the West, river Brahmaputra in the North and the state of Meghalaya in the South. Goalpara district is the second westernmost district next to South Salmara. The boundary of the district is bound by Kamrup district in the East, South Salmaradistrict in the West, river Brahmaputra in the North and the state of Meghalaya in the South. Kamrup (also known as Kamrup Rural) is the third westernmost district next to Goalpara. It has two subdivisions and the Rangia subdivision is located on the northern bank of the Brahmaputra. The Eastern boundary of the Kamrup district is bound by Kamrup Metro and Darrang districts, Western boundary is bound by Goalpara & Nalbari districts, Northern boundary is bound by Baksa district and the Southern boundary is bound by the state of Meghalaya. The Eastern boundary of Kamrup Metro district is bound by Morigaon district, Western boundary is bound by Kamrup district, Northern Boundary is bound by Darrang and Kamrup districts and South boundary is bound by Meghalaya hills. The Eastern boundary of Morigaon district is bound by Nagaon district, Western boundary is bound by Kamrup Metro district, Northern boundary is bound by Darrang district and Southern boundary is bound by West KarbiAnglong district and the state of Meghalaya.

The study area has different types of water bodies including river Brahmaputra, it's tributaries and the four largewetlands of the valley namely *Deepor*, *Urpad*, *Kumri* and *Morakolongbeels*. According to *National Wetland Atlas: Assam*, 2011, the total estimated wetlands area of the state of Assam is 7,64,372 ha out of which 1,05,613 ha, i.e. 13.82% is spread in these five (5) study districts.

At first, a recce visit was made across all the five districts to identify the important pockets for the study. In consultation with Fisheries Department Officials, Researchers in Gauhati University, Local Colleges and Fishermen Community leaders, specific target villages and markets were identified. Visits have been made to fishing communities living near the major water bodies and major fish markets. Fishing villages located near the following water bodies were visited –

- A. South banks of the Brahmaputra from South Salmara to Morigaon;
- B. Major tributaries of the Brahmaputra
 - a. Jinjiram river (South Salmara district);
 - b. Dudhnai, Krishnai and Jinaririvers (Goalpara district),
 - c. Singra, Boko, Chaygaon and Kulsi rivers (Kamrup district),
 - d. Digaruriver (Kamrup metro district),
 - e. Kopili river (Morigaon & Kamrup Metro districts) and
- A. Major wetlands –
 - a. *Urpad beel* and *Kumri beel* (Goalpara district),
 - b. *Deepor beel* (Kamrup Metro district) and
 - c. *Morakolongbeel* (Morigaon).

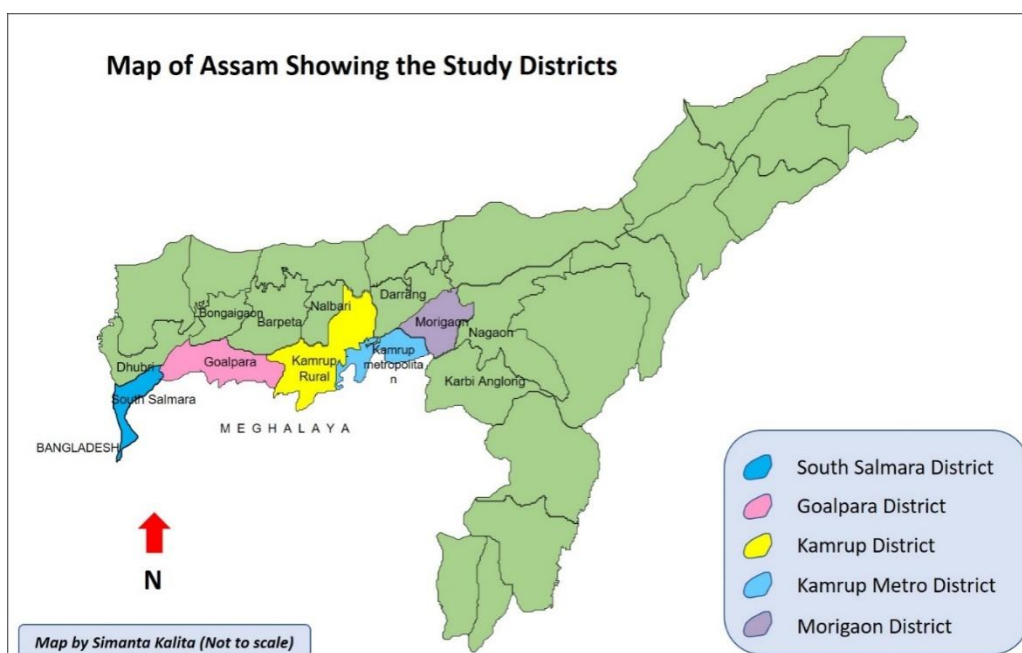


Fig: map of Assam showing the study districts

The population selected for the research study included the different communities engaged in fishing that lives near the major water bodies listed above.

The study has been broadly divided into two parts – documentation through semi-structured interviews and photo documentation. A stratified random sampling was done using a semi-structured questionnaire to collect data about the communities, fish processing methods, raw materials, and fish species involved. A source list was prepared taking clue from the District Fisheries Officials, Block Development Offices and Researchers in Gauhati University and local colleges. A sample size of 200 individuals, including representatives from different communities, researchers, Fisheries Department personnel and community leaders was considered for the survey. Secondary data were collected from published papers, and various government departments. Apart from the questionnaire, personal interviews, group interviews, focus group discussions were also carried out. The set of data collected are qualitative and have been tabulated using computers. Digital photo documentation of the fish processing processes, processed fish and fish markets were done using Nikon make DSLR camera D 7000 and D 500.

The largest dry fish market of Asia, located at Jagiroad in the Morigaon district, was visited. Fish vendors and customers were interviewed about the import and export of fishes.

IV. Results

4.1 Communities involved in traditional fish preservation in the area

Following fourteen communities living in the study area have been found to be involved in commercial fishing of varied degrees. Assamese speaking Kaibartas, Bengali speaking Kaibartas and Riparian Muslims are primarily fishermen and the primary livelihood of a sizeable population of these three communities is fishing. On the other hand, some members of the other eleven communities listed in table 1 are involved in commercial fishing and fish processing while the primary livelihood of most of them are not fish dependent. Involvement of the fourteen communities in different types of fish processing methods are listed in table 1 below -

Table 1: Communities involved in traditional fish preservation (in alphabetic order)

Community names	Sun-drying	Smoking	Salting	Shidal	Pickling
The Bodos	+	+	-	-	-
The Garos	+	+	-	-	-
The Hajongs	+	+	-	-	-
The Kaibartas (Assamese speaking)	+	+	+	+	-
The Kaibartas (Bengali speaking)	+	+	+	+	-
The Kalitas	+	+	-	-	-
The Karbis	+	+	-	-	-
The Khasis	+	+	-	-	+
The Koch Rajbongshi	+	+	-	-	-
The Naths	+	+	-	-	-
The Rabhas	+	+	-	-	-
The Riparian Muslims	+	+	+	+	-
The Sutradhars	+	+	-	-	-
The Tiwas	+	+	-	-	-

4.2 Types and methods of traditional fish preservation

Five different types of fish drying methods were found in the study area. These are –

4.2.1 Sun-drying

Sun-drying is the most common type of traditional processing found in the region. It is a simple method in which fishes are dried under the sunlight until the body moisture of the fishes evaporate due to the sun temperature. The processes for sun-drying of big fishes and small fishes are slightly different.

Big fishes:

Step 1: Fishes are washed and cleaned properly with clean water so that no dirt remains.

Step 2: The abdomen of the fish is cut open and the viscera is discarded.

Step 3: The operculum and gills are removed and cleaned with clean water.

Step 4: (Optional): Some fishermen descale the fishes which makes the drying fast.

Step 5: A bamboo platform (machan) is made outdoor

Step 6: Fishes are spread over the bamboo platform in a thin layer. If the quantity of fish is less, then Bamboo sieve (Chaloni) is also used

Step 7: Fishes are exposed under direct sunlight for several days continuously until the fishes are completely dry

Small fishes:

Step 1: Fishes are washed and cleaned properly with clean water so that no dirt remains.

Step 2: Viscera of each individual fish is squeezed out without making a big incision in the abdomen.

Step 3: A bamboo platform (machan) is made outdoor

Step 4: Fishes are spread over the bamboo platform in a thin layer. If the quantity of fish is less, then Bamboo sieve (Chaloni) is also used

Step 5: Fishes are exposed under direct sunlight for several days continuously until the fishes are completely dry

Location of sun-drying:

1. Sun-drying is an outdoor process and it requires an open space where direct sunlight falls continuously for a long duration of the day.

2. On the banks of the waterbody (along the banks of the waterbodies including Brahmaputra and some beels) or

3. On an open field in the village

4. In the courtyard of individual households

Duration of sun-drying:

Duration of sun-drying depends on the following factors –

a. Size of the fish – bigger the fish, longer the time needed

b. Fat content of the fish – higher the fat content, longer the time needed

c. Moisture content of the fish – higher the moisture content, longer the time needed

Duration of sun-drying also depends on the purpose of the processing. If the fishes are dried for household consumption, and to be stored for short duration, then many communities keep a small amount of moisture and don't completely dry the fish. Because complete drying changes the taste irreversibly. On the other hand, if the fishes are dried for commercial purpose to be stored for longer duration or to be exported to longer distance, then they prefer to dry it completely. Because, if the fishes have moisture, then they catch fungus and the market value falls drastically.

Modern influence on traditional sun-drying:

It was observed in Goalpara district that for export quality processing, Muslim fishermen treat the fishes in dilute Potassium permanganate (KMnO_4) solution, locally known as Potash.

Pros:

a. Simple and easy to do

b. No technical know how needed

c. No specialized equipment needed

d. No cost of energy or chemical treatment

Cons:

a. During the entire period of sun-drying, fishes should be guarded from predators like crow, cat, dog etc.

b. If over dried, the taste of the fish changes irreversibly

c. If not dried properly and moisture content remains, fungal infection occurs

4.2.2 Smoking

Smoking is another common type of traditional processing found in the region. It is mostly an indoor method in which fishes are dried over fire until the body moisture of the fishes evaporates due to the heat from the fire. Washing and preparatory processes are similar to sun-drying. The steps included in the process are –

Big fishes:

Step 1: Fishes are washed and cleaned properly with clean water so that no dirt remains.

Step 2: The abdomen of the fish is cut open and the viscera is discarded.

Step 3: The operculum and gills are removed and cleaned with clean water.

Step 4: (Optional): Some fishermen descale the fishes which makes the drying fast.

Step 5: A bamboo platform (machan) or hanging bamboo platform is made over a furnace

Step 6: Fishes are spread on the platform in a thin layer. For small quantity of fishes, bamboo sieve (Chaloni) is also used.

Step 5: Firewood is burned in the furnace and the fishes are kept on the bamboo platform for several days continuously until the fishes are dry.

Small fishes:

Step 1: Fishes are washed and cleaned properly with clean water so that no dirt remains.

Step 2: Viscera of each individual fish is squeezed out without making a big incision in the abdomen.

Step 3: A bamboo platform (machan) or hanging bamboo platform is made over a furnace

Step 4: Fishes are spread on the platform in a thin layer. For small quantity of fishes, bamboo sieve (Chaloni) is also used.

Step 5: Firewood is burned in the furnace and the fishes are kept on the bamboo platform for several days continuously until the fishes are dry.

Location of smoking:

Smoking is mostly an indoor process. Some fishermen smoke fishes over their regular furnace where they cook their food or boil water with firewood. Some fishermen make a special fish smoking shed and a special open-mouthed furnace for fish smoking.

Duration of smoking:

Duration of smoking depends on the following factors –

- a. Size of the fish – bigger the fish, longer the time needed
- b. Fat content of the fish – higher the fat content, longer the time needed
- c. Moisture content of the fish – higher the moisture content, longer the time needed
- d. Weather condition – during rainy days, it takes more time

Similar to sun-drying, duration of smoking also depends on the purpose of the processing. If the fishes are dried for household consumption, and to be stored for short duration, then many communities keep a small amount of moisture and don't completely dry the fish. Because complete drying changes the taste irreversibly. On the other hand, if the fishes are dried for commercial purpose to be stored for longer duration or to be exported to longer distance, then they prefer to dry it completely. Because, if the fishes have moisture, then they catch fungus and the market value falls drastically.

Smoking is mostly done by tribal communities. Although some of them do it for selling in the market, the scale is much smaller than sun-drying.

Depending on the variety of firewood used, the smoked fish taste varies, because the fragrance or smell released from the smoke of the firewood is different for different varieties of wood.

Pros:

- a. Simple and easy to do
- b. No technical know-how needed
- c. No specialized equipment needed
- d. Can be done indoor, even in own kitchen.
- e. Since it is an indoor process, normally there is no need to guard the fishes from predators

Cons:

- a. It is an energy dependent process and can't be done without firewood. Since firewood availability is reducing, this practice is also diminishing. Some fishermen tried Charcoal and Coal as alternatives. But, the results were not satisfactory to them.
- b. If over dried, the taste of the fish changes irreversibly
- c. If not dried properly and moisture content remains, fungal infection occurs

4.2.3 Salting

Salting is not so common as a practice in this region. Normally Riparian Muslims do salting at a commercial scale. It involves partial chemical treatment by Sodium Chloride, partial sun drying and partial smoking. Following are the steps of salting -

Step 1: Fishes are cleaned and washed in the similar way like sun-drying. Processes for big and small fishes vary similar to sun-drying

Step 2: A thick layer of salt (Sodium chloride) (NaCl) is applied over the fish. Normally the salt melts upon applying over the fishes.

Step 3: The fishes are sundried for initial drying until the salt layer over the fishes dries.

Step 4: Half dried fishes are then smoked for the removal of moisture.

Normally in Salting, moisture is not completely removed. Due to the Salt layer, Salted fishes don't get fungus even if some amount of moisture remains in the body.

Location of salting:

Up to Step 3 mentioned above, processes are outdoor. Step 4 is an indoor process.

Duration of salting:

The total process of salting requires about 1 – 2 weeks depending on the size, fat and moisture content of the fishes.

Pros:

- a. Simple and easy to do
- b. No technical know-how needed
- c. No specialized equipment needed
- d. Sodium Chloride or Common salt is low cost and readily available in any local market
- e. Salt acts as a preservative. It can be stored for a longer duration and can be transported to longer distances.
- f. Chances of fungal infection is minimal, hence fetch good market price

Cons:

- a. The smoking phase is an energy dependent process and can't be done without firewood.
- b. Needs guarding during the sun-drying phase

Some fishermen add turmeric powder at the time of salting. This helps in keeping the fishes for longer duration as turmeric acts as a natural antibacterial agent. The taste of fishes with turmeric and without turmeric are different.

4.2.4 Pickling:

Fish pickle is a delicacy in North East India. Fish pickles made by the *Khasi* community is famous. Normally pickle is made from small fishes. Steps of the pickling process are –

Step 1: Fishes are cleaned, washed and degutted in the similar way like sun-drying. Normally only small fishes are used for pickling

Step 2: Cleaned fishes are sun dried for two-three days. Some add salt at the time of sun-drying. But some fishermen dry it without salt.

Step 3: Partially sun-dried fishes are dipped in Mustard oil filled in glass jars. Some prefer raw mustard oil; some prefer boiled and cooled mustard oil.

Step 4: To add flavour, chilly or spices are added at this stage

Step 5: Glass jars filled with fishes are exposed to sun light continuously for 10-15 days.

In step 2, during the sun-drying, moisture is not completely removed. Once the fishes are dipped in oil, they don't get fungus.

Location of pickling:

Steps 1,2 and 5 mentioned above are outdoor. Step 3 and 4 are indoor processes.

Pros:

- a. Simple and easy to do
- b. No technical know-how needed
- c. No specialized equipment needed
- d. Mustard oil is low cost and readily available in any local market
- e. Oil and salt acts as a preservative and hence it can be stored for a longer duration and can be transported to longer distances.
- f. Chances of fungal infection is minimal, hence fetch good market price

Cons:

- a. Needs guarding during the sun-drying phase

Some fishermen add turmeric powder at the time of salting. This helps in keeping the fishes for longer duration as turmeric acts as a natural antibacterial agent. The taste of fishes with turmeric and without turmeric are different.

4.2.5 Shidal:

Shidal is a semi fermented fish preparation mostly prepared by the *Bengali Kaibartas* and *Riparian Muslim* fishermen in the study area. Small fishes are preferred for *Shidal* preparation. Small fishes belonging to the genus *Pethia* and *Puntius* are most preferred for *Shidal*. The process includes the following steps –

Step 1: Fishes are cleaned, washed and degutted in the similar way like sun-drying.

Step 2: Fishes are semi dried outdoor in sun light to evaporate about fifty percent moisture

Step 3: An earthen pot (locally known as Matka or Kolsi or Koloh) is taken and smeared with oil from inside and dried properly. Size of the pot depends on the quantity of the fishes to be fermented. This oiling and drying is continued till the earthen wall of the pot is completely saturated with oil.

Step 4: Semi dried fishes are kept inside the pot up to the neck of the oil saturated pot.

Step 5: Over the fishes, powdered dry fish layer is given. Some fishermen put a paste of the dry fish powder. This layer is put from the neck to the rim of the pot.

Step 6: The mouth of the pot is covered by a banana leaf so that there is no passage for air.

Step 7: The covered pot is kept on a high platform above the ground for 2 – 3 days

Step 8: The mouth of the pot is sealed with a clay layer. Some fishermen remove the banana leaf before putting the clay layer.

Step 9: Leave the pot for 3-4 months on a raised platform in a dry place so that it can't absorb moisture. Depending on the taste to be created, number of days to be fermented is decided.

Step 10: Monitor the pot at regular interval to see if the clay cover layer is cracked. In the event of any crack, another layer of clay is applied over it so that the pot becomes air-tight.

Step 11: After 3-4 months, the clay seal is broken and the fermented fish is taken out.

Step 12: The fermented fish is crushed to paste using a traditional grinder.

Step 13: This paste is bottled in air-tight bottles.

Location of shidal preparation:

Steps 1 and 2 mentioned above are outdoor and steps 3 to 11 are indoor.

Pros:

- a. All the raw materials needed are low cost and locally available
- b. The final product fetches high market price as it is a delicacy in North East India
- c. It can be stored for a longer duration and can be transported to longer distances.

Cons:

- a. It needs prior experience because timings and perfection in every step is essential
- b. Needs guarding during the sun-drying phase
- c. If the earthen pot is not saturated with oil properly and if it absorbs moisture, fungal infection is commonly seen and the taste of the fish is spoiled and it fetches low market price.
- d. This traditional technology makes use of the indigenous anaerobic microbes that ferments the fish inside the sealed pot in absence of oxygen and excess moisture. If the pot is not properly air sealed, then the anaerobic fermentation is not perfect

Some communities call it *Hidal*, and some call it *Sidal*. While the products of other four types of processing are whole fishes, *Shidal* is marketed in paste form.

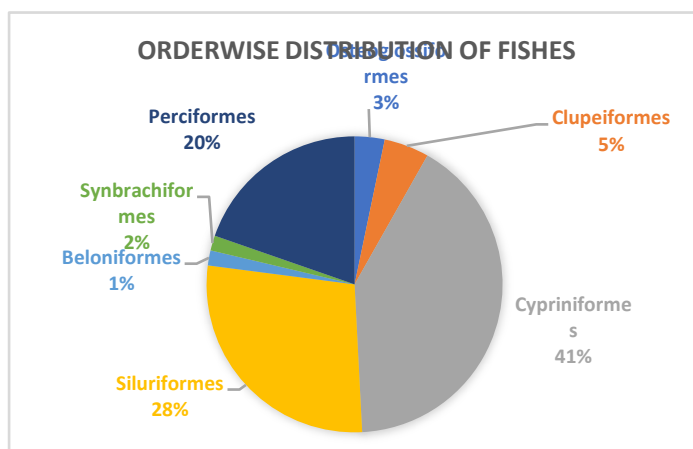
4.3 Variety of fishes used in various processes of fish preservation:

A total of 61 species of fishes were found to be used for different types of processed fish preparations. They belong to the following 7 orders –

1. Osteoglossiformes
2. Clupeiformes
3. Cypriniformes
4. Siluriformes
5. Beloniformes
6. Synbranchiformes
7. Perciformes

They belong to the following 20 Families –

1. Notopteridae
2. Clupeidae
3. Engraulididae
4. Cyprinidae
5. Cobitidae
6. Bagridae
7. Siluridae
8. Ailiidae
9. Schilbeidae
10. Clariidae
11. Heteropneustidae
12. Belonidae
13. Synbranchidae
14. Ambassidae
15. Nandidae
16. Gobiidae
17. Anabantidae
18. Belontiidae
19. Channidae
20. Mastacembelidae



The following table 2 shows the name of 61 species of fishes that are used in different types of traditional processed fish preparations –

Table: 2: Fish species used in various preservation methods

Sl. No	Taxon	Name of the taxon	Local names	Sun-drying	Smoking	Salting	Pickle	Shidal
A.	Order	Osteoglossiformes						
	Suborder	NOTOPTEROIDEI						
I.	Family	NOTOPTERIDAE						
1.	<i>Species</i>	<i>Chitalachitala</i> (Hamilton, 1822)	Chital	+	+	-	-	-
2.	<i>Species</i>	<i>Notopterusnotopterus</i> (Palas, 1769)	Kanduli, Foli, Foila	+	+	-	-	-
B.	Order	Clupeiformes						
II.	Family	CLUPEIDAE						
	Subfamily	Alosinae						
3.	<i>Species</i>	<i>Gudusiachapra</i> (Hamilton, 1822)	Koroti, Korti	+	+	+	-	+
4.	<i>Species</i>	<i>Tenualosailisha</i> (Hamilton, 1822)	Ilish	+	+	+	-	-
III.	Family	ENGRAULIDIDAE						
	Subfamily	Engraulinae						
5.	<i>Species</i>	<i>Setipinnaphasa</i> (Hamilton, 1822)	Phasa	+	+	+	-	-
C.	Order	Cypriniformes						
IV.	Family	CYPRINIDAE						
	Subfamily	Cyprininae						
6.	<i>Species</i>	<i>Giblioncatla</i> (Hamilton, 1822)	Catla, Bhokua	+	+	+	-	-
7.	<i>Species</i>	<i>Cirrhinusmrigala</i> (Hamilton, 1822)	Mirka	+	+	+	-	-
8.	<i>Species</i>	<i>Cirrhinusreba</i> (Hamilton, 1822)	Lachim	+	+	+	-	-
9.	<i>Species</i>	<i>Cyprinus carpio</i> Linnaeus, 1758	Common carp	+	+	+	-	-
10.	<i>Species</i>	<i>Labeobata</i> (Hamilton, 1822)	Bhangon	+	+	+	-	-
11.	<i>Species</i>	<i>Labeoboga</i> (Hamilton, 1822)	Boga bhangon	+	+	+	-	-
12.	<i>Species</i>	<i>Labeogonius</i> (Hamilton, 1822)	Kuri, Kursa, Kuria	+	+	+	-	-
13.	<i>Species</i>	<i>Labeorohita</i> (Hamilton, 1822)	Rou, Rui	+	+	+	-	-
14.	<i>Species</i>	<i>Pethiaconchonus</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
15.	<i>Species</i>	<i>Pethiaphutunio</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
16.	<i>Species</i>	<i>Pethiaticto</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
17.	<i>Species</i>	<i>Puntius chola</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
18.	<i>Species</i>	<i>Puntius puntio</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
19.	<i>Species</i>	<i>Puntius sophore</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
20.	<i>Species</i>	<i>Puntius terio</i> (Hamilton, 1822)	Puthi	+	+	+	-	+
21.	<i>Species</i>	<i>Systemussarana</i> (Hamilton, 1822)	SeniPuthi	+	+	+	-	-
	Subfamily	Cultrinae						
22.	<i>Species</i>	<i>Salmostomabacaila</i> (Hamilton, 1822)	Selkona	+	+	+	-	-
23.	<i>Species</i>	<i>Salmostomaphulo</i> (Hamilton, 1822)	Selkona	+	+	+	-	-

Sl. No	Taxon	Name of the taxon	Local names	Sun-drying	Smoking	Salting	Pickle	Shidal
	Subfamily	Rasborinae						
24.	<i>Species</i>	<i>Amblypharyngodonmola</i> (Hamilton, 1822)	Mowa	+	+	+	-	-
25.	<i>Species</i>	<i>Aspidopariajaya</i> (Hamilton, 1822)	Borolia, Boirala	+	+	+	+	-
26.	<i>Species</i>	<i>Cabdiomorar</i> (Hamilton, 1822)	Borolia, Boirala	+	+	+	-	-
27.	<i>Species</i>	<i>Devariodevario</i> (Hamilton, 1822)	Lauputhi	+	+	+	-	+
28.	<i>Species</i>	<i>Rasbora daniconius</i> (Hamilton, 1822)	Dorikona	+	+	+	-	-
29.	<i>Species</i>	<i>Rasbora rasbora</i> (Hamilton, 1822)	Dorikona	+	+	+	-	-
V.	Family	COBITIDAE						
	Subfamily	Cobitinae						
30.	<i>Species</i>	<i>Lepidocephalichthysguntea</i> (Hamilton, 1822)	Botia	+	+	-	-	-
D.	Order	Siluriformes						
VI.	Family	BAGRIDAE						
31.	<i>Species</i>	<i>Sperataaor</i> (Hamilton, 1822)	Aari	+	+	-	-	-
32.	<i>Species</i>	<i>Sperataseenghala</i> (Sykes, 1839)	Aari	+	+	-	-	-
33.	<i>Species</i>	<i>Mystusbleekeri</i> (Day, 1877)	Tenga, Singora	+	+	-	-	-
34.	<i>Species</i>	<i>Mystuscavasius</i> (Day, 1877)	BorTengna/ Singora	+	+	-	-	-
35.	<i>Species</i>	<i>Mystustengara</i> (Hamilton, 1822)	Tengna, Singora	+	+	-	-	-
36.	<i>Species</i>	<i>Mystusvittatus</i> (Bloch, 1794)	Tengna, Singora	+	+	-	-	-
37.	<i>Species</i>	<i>Rita rita</i> (Hamilton, 1822)	Ritha	+	+	-	-	-
VI I.	Family	SILURIDAE						
38.	<i>Species</i>	<i>Ompokbimaculatus</i> (Bloch, 1794)	Pabho	+	+	-	-	-
39.	<i>Species</i>	<i>Ompokpabda</i> (Hamilton, 1822)	Pabho	+	+	-	-	-
40.	<i>Species</i>	<i>Ompokpabo</i> (Hamilton, 1822)	Pabho	+	+	-	-	-
41.	<i>Species</i>	<i>Wallago attu</i> (Bloch & Schneider, 1801)	Borali, Bowali	+	+	-	-	-
VI II.	Family	AILIIDAE						
	Subfamily	Ailiinae						
42.	<i>Species</i>	<i>Ailiacoila</i> (Hamilton, 1822)	Bahpatia, Kajoli	+	+	-	-	-
43.	<i>Species</i>	<i>Clupisomagarua</i> (Hamilton, 1822)	Neria	+	+	-	-	-
IX.	Family	SCHILBEIDAE						
	Subfamily	Schilbeinae						
44.	<i>Species</i>	<i>Eutropiichthysmurius</i> (Hamilton, 1822)	Vacha	+	+	-	-	-
45.	<i>Species</i>	<i>Pachypterusatherinoides</i> (Bloch, 1794)	Kajoli	+	+	-	-	-
X.	Family	CLARIIDAE						
46.	<i>Species</i>	<i>Clariasbatrachus</i> (Linnaeus, 1758)	Magur	+	+	-	-	-

Sl. No	Taxon	Name of the taxon	Local names	Sun-drying	Smoking	Salting	Pickle	Shidal
XI.	Family	HETEROPNEUSTIDAE						
47.	<i>Species</i>	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Singi	+	+	-	-	-
E.	Order	Belontiiformes						
XI I.	Family	BELONIDAE						
48.	<i>Species</i>	<i>Xenentodon cancila</i> (Hamilton, 1822)	Kokila	+	+	-	-	-
F.	Order	Synbranchiiformes						
XI II.	Family	SYNBRANCHIDAE						
49.	<i>Species</i>	<i>Monopterus albus</i> (Hamilton, 1822)	Kuchia	-	-	+	-	-
G.	Order	Perciformes						
	Suborder	PERCOIDEI						
XI V.	Family	AMBASSIDAE						
50.	<i>Species</i>	<i>Chanda nama</i> Hamilton, 1822	Chanda	+	+	+	-	-
51.	<i>Species</i>	<i>Parambassis ranga</i> (Hamilton, 1822)	Chanda	+	+	+	-	-
X V.	Family	NANDIDAE						
	Subfamily	Nandinae						
52.	<i>Species</i>	<i>Nandus nandus</i> (Hamilton, 1822)	Bhetki, Gedgedi	+	+	+	-	-
	Suborder	GOBIOIDEI						
X VI.	Family	GOBIDAE						
	Subfamily	Gobiinae						
53.	<i>Species</i>	<i>Glossogobius aureus</i> (Hamilton, 1822)	Patimutura, Panimutura	+	+	-	-	-
	Suborder	ANABANTOIDEI						
X VI I.	Family	ANABANTIDAE						
54.	<i>Species</i>	<i>Anabas testudineus</i> (Bloch, 1792)	Kawoi, Koi	+	+	-	-	-
X VI II.	Family	OSPHRONEMIDAE						
	Subfamily	Luciocephalinae						
55.	<i>Species</i>	<i>Trichogaster fasciatus</i> Bloch & Schneider, 1801	Kholihona, Kholixa	+	+	+	-	-
56.	<i>Species</i>	<i>Trichogaster lalius</i> (Hamilton, 1822)	Kholihona, Kholixa	+	+	+	-	-
	Suborder	CHANNOIDEI						
XI X.	Family	CHANNIDAE						
57.	<i>Species</i>	<i>Channa orientalis</i> Bloch & Schneider, 1801	Chengeli	+	+	+	-	-
58.	<i>Species</i>	<i>Channa punctata</i> (Bloch, 1793)	Goroi, Gorai	+	+	+	-	-
	Suborder	MASTACEMBELOIDEI						
X X.	Family	MASTACEMBELIDAE						
59.	<i>Species</i>	<i>Macrornathus saral</i> (Bloch & Schneider, 1801)	Turi, Tora	+	+	+	-	-
60.	<i>Species</i>	<i>Macrornathus pancalus</i> H	Turi, Tora	+	+	+	-	-

Sl. No	Taxon	Name of the taxon	Local names	Sun-drying	Smoking	Salting	Pickle	Shidal
		amilton, 1822						
61.	Species	<i>Mastacembelus armatus</i> (Lacepede, 1800)	Bami	+	+	+	-	-
		Total species 61						

V. DISCUSSION AND CONCLUSION

Altogether fourteen (14) communities were found to be involved in traditional fish processing in the study area. All the fourteen communities do *sun-drying* and *smoking*. But, only *Assamese Kaibartas*, *Bengali Kaibartas* and *Riparian Muslims* are doing it at a large scale to export to outside the state. Rest eleven communities do it for household consumption and selling in the local markets, especially in the weekly markets, locally known as *haats*. *Assamese Kaibartas*, *Bengali Kaibartas* and *Riparian Muslims* are also involved in *salting* at a commercial scale. *Shidal* is prepared by only *Riparian Muslims* and *Bengali Kaibartas*. *Fish pickle* is traditionally prepared only by the *Khasi community*. Although now-a-days other communities are also adopting to prepare fish pickles for commercial purpose, they are using modern methods and the essence of traditional fish pickling is lost.

All the sixty-one (61) species except *Monopterus albus* are used for sun-drying and smoking. Only the small fishes belonging to *Pethia* and *Puntius* genus are used for *shidal* and the scale-less fishes are avoided for *salting*.

The largest dry fish market of Asia is located at Jagiroad in Morigaon district. Interviews with the vendors in the dry fish market revealed that the local production meets only about 10% of the demand.

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Photographs

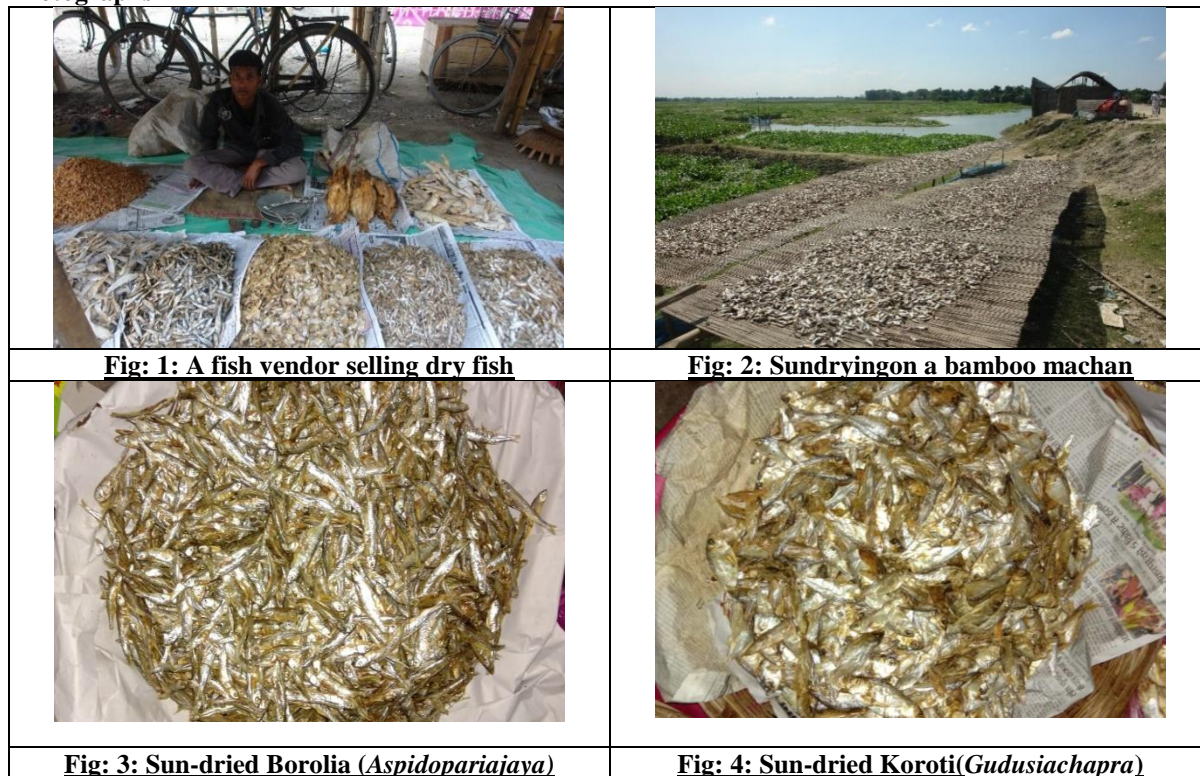




Fig: 5: Sun-dried Selkona (*Salmostomaphulo*)



Fig: 6: Sun-dried Prawn

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