CHAPTER 1

CONCEPTUAL BACKGROUND

1.1. INTRODUCTION

According to the Food and Agriculture Organization (FAO) of the United Nations, in the last few decades, employment in fishing and aquaculture worldwide has grown faster than the world's population and traditional employment in agriculture. Most of this growth took place during the 1980s and 90s and mainly in Asian countries, where 85.5% of world fishers and fish farmers dwell.

Owing to the vast water spread area, India ranks third in the world in total fish production with an annual fish production of about 7.13 million tonnes, of which the inland fisheries and aquaculture account for 4.22 million tonnes. India houses more than 10% of global fish biodiversity and produce about 4.7% of world's fish. It occupies about 3% of the global fish market, with the annual export earnings from fish and shell fish over INR 8,000 crores. Krishnaiah, 2010 reported that the fisheries sector contributed 6.1 lakh tonnes in quantity to the Gross Domestic Products (GDP) during 2009-10, which was 1.1% of the total GDP and 4.72% of the agricultural GDP. This study was planned soon after this report was published.

India's North East region is comprised of eight states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. Geomorphologically, it is one of the most diverse regions of India. North East covers high altitude Himalayan districts

i.e. North Sikkim, Upper Subansiri, Dibang Valley as well as low lying flood affected districts like Goalpara, Dhubri, Morigaon etc. Due to this enormous altitudinal variation, North East offers diversified climatic conditions. It has the biggest river in India, Brahmaputra, some of the biggest waterfalls like Naokhilikai, Seven sisters, Dienthlien, Panimur, numerous hill-streams, lakes and flood plain wetlands, locally known as *beels*. North East is located at the junction of two hotspots of biodiversity, i.e. the Eastern Himalayas and Indo-Burma. North East is thus the abode of numerous species of flora and fauna. It houses 52 different types of forests and correspondingly the faunal composition also vary. It houses some of the most threatened and endemic animals and plants. Due to the vast water spread area, North East houses several hundred fish species and has been identified as a hotspot of fish biodiversity by Kottelat and Whitten (1996).

With a stretch of 19,150 km of rivers, 1,43,740 ha of floodplain wetlands, 23,972 ha of reservoirs, 40,809 ha of ponds and 2780 ha of paddy-cum-fish culture areas, North East India is a hotspot of Fish mega diversity (NWIA, 2011). It falls in a transition between two Hotspots of biodiversity – the **Himalayas** and the **Indo-burma** hotspots. Thus, the faunal composition of the region shows representatives of both these mega diversity regions. According to Kottelat (1989), the diversity is due to geomorphology, constitution of the hills, plateaus, and valleys. Due to various tectonic events, especially the collision of the Indian, Chinese and Burmese plates, this region has got the characteristic drainage pattern including the Ganga-Brahmaputra, Koladyne and Chindwin-Irrawady systems. Same events also led to the formation of the mighty Himalayas and the Indo-Burmese range. Due to the great altitudinal variations and serpentine terrains, the region is rich with torrential hill-streams, rivers, lakes, and swamps.

Assam, located on the Brahmaputra and Barak flood plains, is the state with maximum valley area in North East. The Brahmaputra Valley is approximately 80 to 100 km wide and about 1000 km long. Kalita, in his unpublished PhD thesis[1] (2011) has mentioned that the two mighty river systems, the Brahmaputra & Barak along with their tributaries, and more than 1 lakh hectare of floodplain wetlands, lakes and ponds makes the state of Assam a treasure house of fish germplasm.

[1] http://hdl.handle.net/10603/115270

The Brahmaputra is one of the longest rivers in the world with a length of 3848 km from it's origin at Angsi glacier on the Himalayas to it's confluence at Bay of Bengal in Bangladesh. It is known as Yarlung Tsangpo in Tibet and as Siang in Arunachal Pradesh. After its confluence with river Lohit and Dibang, it enters Assam in the name of Brahmaputra. In Assam, it flows from East to West and finally it takes a Southward bend at the Assam-Bangladesh border. With the tributaries on North and South Banks, the cumulative length of the Brahmaputra river system is 4000+ km. Due to the hilly terrain, the river network in Assam travels through a wide range of altitudinal variations and through serpentine undulating plains. Smaller springs and rivulets merge to form streams and tributaries of Brahmaputra. Proper rainfall, humidity and nutrient rich soil support growth of different vegetations and hence, most of the catchment areas are lush green. Rain carry a heavy amount of humus and nutrient into the wetlands and rivers. Thus, the primary productivity of the water bodies is very high. Assam witnesses a wide variation of temperature in a year. Many of the Northern Tributaries originating in the Himalayas are glacier-fed and they maintain a good volume of water even in the non-rainy season. The rivers in the hilly areas are turbulent. As they reach the plain, they become calm.

The Brahmaputra river is up to 16 km wide at many places. Assam is located between the latitudes of 24°8' N - 28°2' N and longitudes of 89°42' E - 96° E. The Eastern border of Assam is bound by Arunachal, Nagaland and Manipur; Western boundary is formed by West-Bengal and Bangladesh. Bhutan and Arunachal Pradesh lies on the North of Assam and the Southern boundary is bound by Meghalaya, Tripura and Mizoram. Total Geographical area of the state is 78,438 km². The Karbi Anglong and North Cachar Hills and the ones in Guwahati and North Guwahati areas (along with the Khasi and Garo Hills) are originally parts of the South Indian Plateau. Average height of these hills in Assam varies from 300 to 400 mt. Numerous small and big streams flow through these hills. The Barak Valley located in the south of the state is separated by the Karbi Anglong and North Cachar Hills from the Brahmaputra Valley. The Barak originates from the Barail Range in the border areas of Assam, Nagaland and Manipur and flows through the district of Cachar, to ultimately confluence with the Brahmaputra in Bangladesh.

Assam is one of the heaviest rainfall states in the country and it is very humid. The world's wettest place Cherrapunjee is located at the South western border of Assam and hence, the

South Western districts receive very heavy rain every year. The high-altitude hilly areas have sub-alpine climate, while the plains of Assam have excessive sultriness. Due to the South West monsoon, Assam experience an average annual rainfall of about 120 inches or more. Assam witnesses a wide fluctuation in Temperature. The winter minimum temperature in Assam falls to 6^0 C and the maximum summer temperature reaches to 39^0 - 40^0 C. Due to variation in temperature, altitude, variations in water velocity and rich food base, the diversity of aquatic fauna is very high in the state. Therefore, majority of the communities living in Assam are fish eaters. Sugunan (2001) reported that due to the vast water spread area, fish is abundantly available and about 90% of the ethnic communities living in the Northeast region are fishiterian. Sarmah Thakur (2007) reported that a traditional square meal of the tribal people constitute rice, boiled vegetables with chillies, salt and fish or meat curry.

Assam has a total of more than 7 lakh ha waterbodies, out of which, more than 1 lakh hectare are beels. These include oxbow lakes, tectonic lakes, flood plain wetlands, marshes and swampy areas. The floodplain wetlands are inundated during the floods every year and they receive rich alluvium during the flood. This is one of the major causes of high primary productivity of the floodplain wetlands. Many fishes, including the major carps, minor carps, channas and catfishes prefer beels as their breeding grounds.

The History of Assam suggests that it was ruled by the Ahom dynasty for more than 600 years. Some historians opined that the name of ‘Assam’ has been derived from the word ‘Ahom’. Another school of thought believes that the name "Assam" is derived from the term "Asom" which, in Sanskrit, refers to unequal or unrivalled. The uneven topography of the land, full of hills and plains might, have contributed to the name.

The current state capital of Assam is Guwahati, which was earlier known as *Pragjyotishpura* or *The Eastern City of Light*. Other important towns in the South Western Assam includes Goalpara, Lakhipur, Dudhnai, Bijoynagar, Mirza, and Sonapur. The population of Assam is 31,205,576 according to 2011 census and is scattered over 26312 villages.

Assam is mostly an agrarian state and it produces a significant part of the total tea production of the world. Assam produces more than half of India's petroleum resources. According to National Wetland Atlas, SAC, ISRO, 2011, the total estimated wetlands area of the state of Assam is 764372 ha. Due to the presence of over 7.5 lakh ha of wetlands, Assam is rich in fish production. Sugunan (2001) had reported that Assam had more than doubled the fish production from 76,000 ton in 1990-91 to 153,000 ton in 1994-95. But, thereafter the growth rate declined and one of the major causes of the decline is, use of inappropriate fishing gears like mosquito net and mass fishing methods like poisoning and blasting. Eroding value system and loss of traditional gears and techniques has contributed significantly towards the fish depletion. This has far reaching implications on the economy and livelihood of the fishing communities.

In Northern and North-Western India, fishing is considered as an untouchable practice. But, in Assam, most communities are involved in fishing. Although only a few indigenous communities are engaged in commercial fishing, most of them are artisanal fishers, operating on inland freshwater fishery resources. Many of these fishing communities are also involved in activities like making and repairing fishing gears, harvesting, post-harvest processing and marketing of fishes. Women folk in many communities in Assam are also involved in fishing. Communities use different types of fishing gears and technologies to suit the local requirements which are part of their lifestyle. Community-fishing on particular occasions, songs and rituals related to fishing are part of the rich Assamese folk culture.

1.2. **PROBLEM STATEMENT**

This study was based on the following problem statements -

- Fishing gears in South Western Assam (covering Goalpara, Kamrup and Kamrup Metro districts) have not been documented well so far.
- There are different types of water bodies demanding different types of gears in different seasons; if these are not documented, there may be a technology loss.
- Cultural aspects of the communities related to fish and fishing is not documented well scientifically so far, excepting some of the economic aspects.

- Modern culture is influencing the traditional culture and some indigenous traditional knowledge (ITK)s are gradually being lost.
- Some ITKs may disappear without being documented.

1.3. RESEARCH QUESTION

The following research questions were framed at the beginning of the research –

- Whether the cultures of the fishing communities in South Western Assam have direct linkages with fish, fishing gears, practices and technologies they use?
- Whether different communities use different fishing gears and modus operandi of the gears differ from community to community and water body characteristics?
- What are the traditional knowledge and practices of the respective communities that has linkage to fishing and if any of those knowledge can be adapted to suit the needs of the modern freshwater pisciculture?

These preliminary research questions laid the foundation for the preliminary studies that in turn led to the formulation of the following **detail research questions** –

1. What are the major waterbodies in the three study districts?
2. What are the fishes available in the study area? Do these fishes all have socio-economic value? What are the conservation threats?
3. What are the fishing gears and implements used by the communities in the study area? What are the fabrication materials of these gears? If the modus operandi vary from community to community and from wetland type to type?
4. How is the demographic profile of the study area and what are the communities involved in fishing? Do they fish in all types of water bodies?
5. Whether the cultures of the fishing communities in the study area have direct linkages with fish, fishing gears, practices and technologies they use and what are the traditional knowledge and practices linked to fish or fishing?

1.4. SIGNIFICANCE OF THE STUDY

- This study will add to the growing literature on the fisherman communities and fishing technologies
- No similar detailed scientific study has been carried out in North East India. Thus, this study will form the base for a new direction of study on the fishermen communities in North East
- It will educate and create awareness among the general public about the fishers and their culture
- In future, it could be used as a source material by students and researchers of cultural and fisheries studies

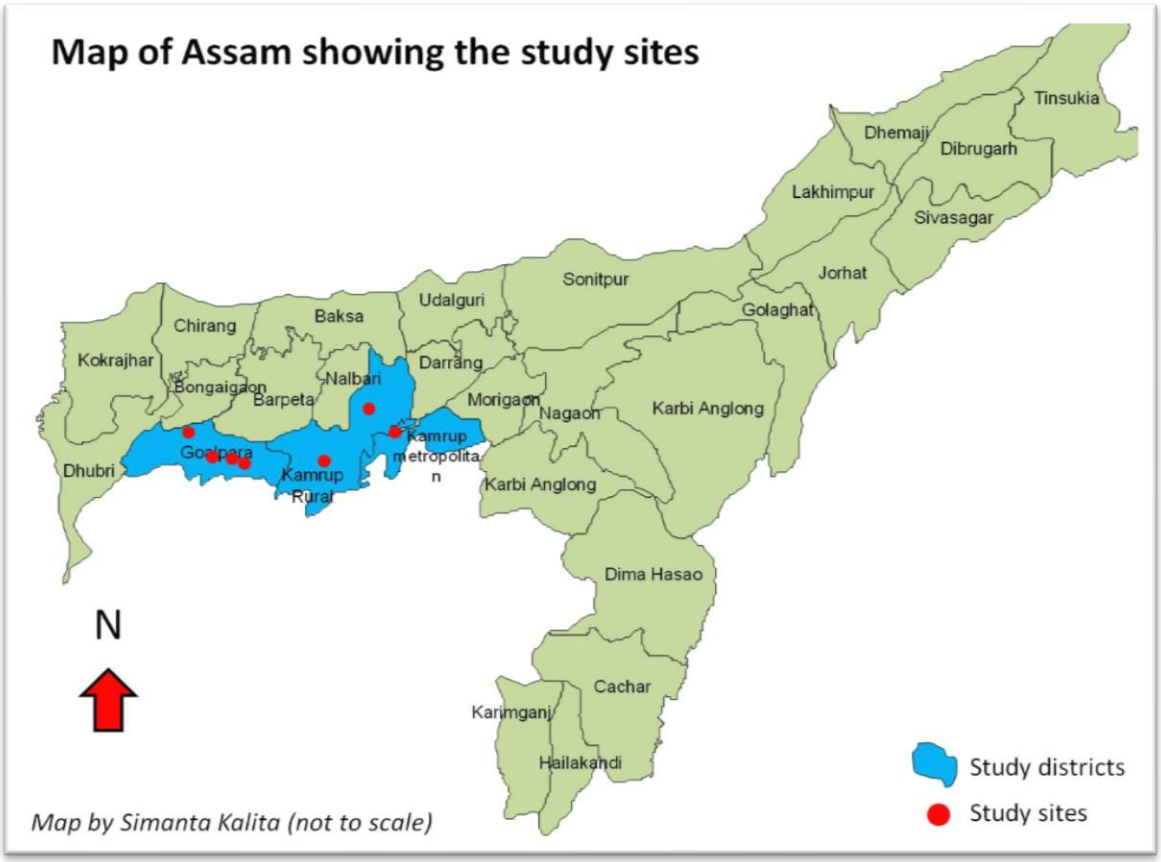
1.5. OBJECTIVE OF THE STUDY

The study intended to –

1. Document the different types of waterbodies found in the study area
2. Document the different fish species found in the study area
3. Document all possible types of fishing gears and traditional technologies used for fishing and study the designs, types of raw materials (particularly bio-resources) used for the fabrication of the gears and the modus operandi of all the gears documented
4. Explore and find out the demographic profile and communities in the study area who are involved in fishing and the types of fishing they are involved in
5. Explore and document the traditional knowledge (ITK), practices and cultural elements of the communities that have linkages to fishing and fish conservation.

1.6. THE STUDY AREA

This study has been carried out in three South Western districts of the Assam, namely Goalpara, Kamrup and Kamrup Metro (Fig. 1.1). Goalpara and Kamrup metro districts are located on the South bank of river Brahmaputra, whereas Kamrup district is spread over both North and South bank of the Brahmaputra river.



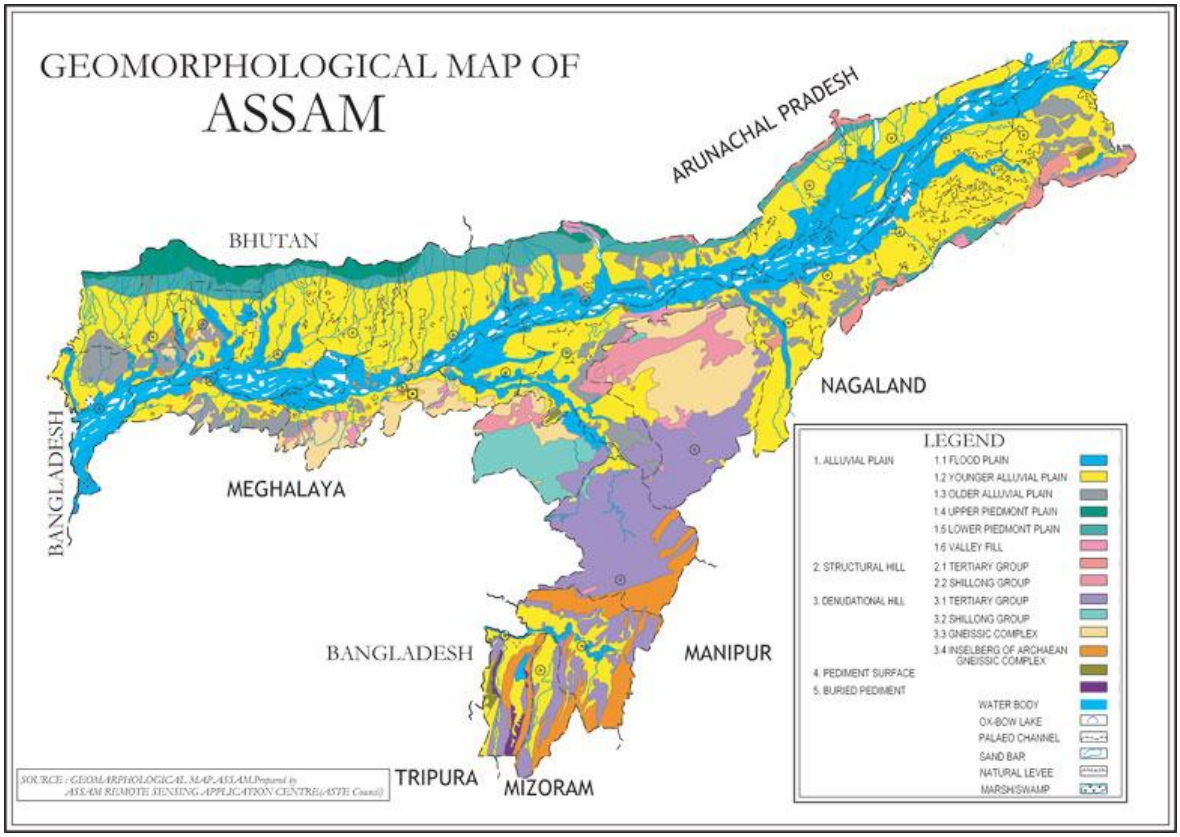
Source: Kalita et.al. (2019), Fishing Communities and Traditional Fishing Gears in South-West Assam, IOSR-JAVS

Fig 1.1: Map of Assam showing the study districts and sites (not to scale)

1.6.1. **Geomorphology of Assam**

The geomorphology of Assam is quite diversified with the undulating hills, serpentine river basins and flood plains. The following types of plains and hills are found in the three study districts of Goalpara, Kamrup and Kamrup Metro (Fig. 1.2).

A. Plains
    a. Flood plain
    b. Younger alluvial plain
    c. Older alluvial plain
    d. Valley fill
B. Hills – Gneissic complex



Source: Assam Remote Sensing Application Centre

Fig. 1.2: Geomorphological map of Assam

1.6.2. **District overview of Goalpara:**

Goalpara district (Fig. 1.3) is situated on the South bank of river Brahmaputra. It is the second westernmost district on south bank of the Brahmaputra, next to South Salmara. The boundary of the district is bound by Kamrup district in the East, South Salmara district in the West, river Brahmaputra in the North and the East and West Garo Hills of the state of Meghalaya in the South.

The name ‘Goalpara’ has been derived from the word 'Gwaltippia' meaning Guwali village or village of the milk producing community ‘Guwal’. Sir Edward Gait, based on the report of Chinese traveler 'Hiuentsang' had concluded that the erstwhile capital of state of the Kumar Bhaskar Varman was probably located in Goalpara. The area was under Coach dynasty until it came under the British rule in 1765. In 1826 the British accessed Assam and Goalpara was annexed to Assam in 1874, along with the creation of V headquarters of Dhubri. On 1st of July, 1983, two districts were split from Goalpara : Dhubri and

Kokrajhar. On 29th of September 1989, Bongaigaon district was created from parts of Goalpara and Kokrajhar[2]

Fig. 1.3: Map of Goalpara district (prepared using Google map online internet tool)

Total area of the district is 1824 sq.km. Administrative head quarter of the district is Goalpara town, which is located on the South bank of the Brahmaputra at 26° 9'41.36"N and 90°37'42.89"E. Goalpara district is consists of 5 revenue circles – Lakhipur, Balijana, Matia, Dudhnoi and Rangjuli and 8 development blocks, namely – Balijana, Jaleswar, Kharmuza, Krishnai, Kuchdhowa, Lakhipur, Matia and Rangjuli.

1.6.3. **District overview of Kamrup**

Kamrup district (Fig. 1.4) is spread on the North and South bank of river Brahmaputra. It has two sub divisions- Kamrup Sadar and Rangia. Kamrup Sadar is located on the South Bank of river Brahmaputra and Rangia sub division is located on the North bank. The Eastern boundary of the Kamrup district is bound by Kamrup Metro and Darrang districts, Western boundary is bound by Goalpara & Barpeta districts, Northern boundary is bound by Nalbari and Baksa districts and the Southern boundary is bound by the state of Meghalaya.

[2] http://www.goalpara.gov.in/

The word ‘Kam-rup’ has a root in Indian Hindu mythology. The story goes like this – once, Daksha, the father of Sati and father-in-law of lord Shiva organized a Jagna (sacrifice ceremony). He didn’t invite his daughter and son-in-law. Sati attended the ceremony without invitation. Daksha passed insulting comments on Shiva. This was intolerable for Sati and she sacrificed her life in the Jagna itself. This made lord Shiva angry. He took the body of Sati on his shoulder and started to move around the world. All God and Goddesses approached lord Vishnu and Vishnu used his ‘Sudarshan chakra’, a circular plate like weapon to cut Sati’s dead body into 51 pieces. Mythology says that Sati’s genital part fell on Nilachal hill, where subsequently the Kamakhya temple was made.

After lord Vishnu cut Sati’s body, Shiva started a penance to acquire supreme power. At this, again all God and Goddesses approached lord Kama-deva, who is the lord of beauty. Kamadeva metamorphosed himself into a beautiful lady and successfully broke the penance of lord Shiva by preforming a dance and shooting lord Shiva with a floral arrow. Mythology says, the place where Kamadeva succeeded to break the penance of lord Shiva was subsequently named as Kamarupa. The entire state of Assam was once known as Kamarupa.

Fig. 1.4: Map of Kamrup district (prepared using Google map online internet tool)

The total area of the Kamrup district is 3105 sq.km. Area of Kamrup Sadar sub-division is 2197.48 Sq. Km. and of Rangia sub-division is 543.26 Sq. Km. Administrative head quarter

of the district is Amingaon, which is located on the North bank of Brahmaputra at 26°11'32.87"N and 91°40'20.79"E. There are 11 revenue circles, namely – Boko, Chamaria, Chaygaon, Hajo, Nagarbera, North Guwahati, Palashbari, Goroimari, Rangia, Koya, and Kamalpur. There are 14 development blocks, namely – Bongaon, Bezera, Boko, Chaygaon, Chayani, Chamaria, Hajo, Suwalkuchi, Rani, Rampur, Goroimari, Kamalpur, Rangia, and Bihdia Jajikona.

1.6.4. **District overview of Kamrup Metro**

Kamrup Metro district (Fig. 1.5) is located on the South bank of river Brahmaputra. The Eastern boundary of the Kamrup Metro district is bound by Morigaon district, Western boundary is bound by Kamrup district, Northern boundary is bound by river Brahmaputra and the Southern boundary is bound by the state of Meghalaya.

Kamrup Metropolitan district was created by bifurcating the erstwhile Kamrup district on 3rd February 2003. The Administrative head quarter of the district is Guwahati located at 26°11'21.18"N and 91°44'43.62"E. Guwahati derived its name from two words – 'Guwa' meaning Areca nut and 'Hut' meaning market. Durig the Ahom dynasty, Guwahati used to be the seat of Barphukans and the battle of Saraighat was fought in Guwahati. Currently, Guwahati is the political and commercial capital of Assam.

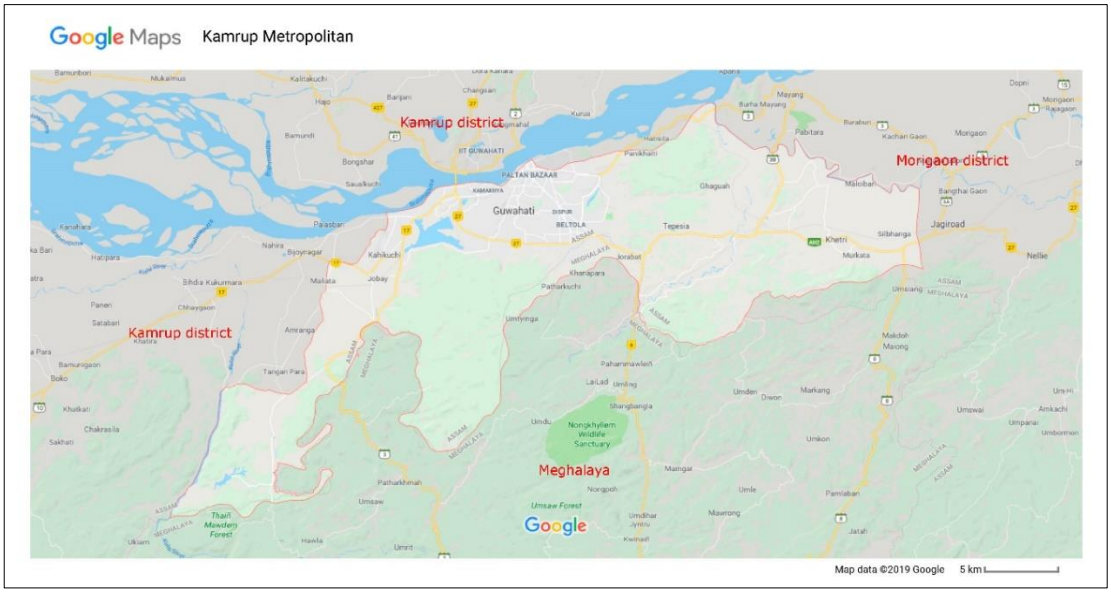


Fig. 1.5: Map of Kamrup Metro district (prepared using Google map online internet tool)

The total area of Kamrup Metro district is 1,528 sq.km. Kamrup Metro has one sub-division – Kamrup Metro Sadar sub-division. It has five Revenue circles, namely Sonapur, Guwahati, Azara, Chandrapur and Dispur. There are three development blocks in the district, namely Chandrapur, Dimoria and Rani development blocks

1.7. CHAPTER PLAN:

The contents of this thesis has been arranged into the following chapters –

CHAPTER 1 – Conceptual Background

This chapter introduces the current research study, narrates the problem statement, mentions about the research questions, significance, objectives, gives a detailed account of the study area, chapter plan and delimitations of the study

CHAPTER 2 – Review of Related Literature

This chapter reviews the collected literature in seven different categories. Over 150 references including books, PhD thesis, research papers have been reviewed and analyzed in length.

CHAPTER 3 – Methodology

This chapter gives the methodologies used for the study including study of the water bodies, fish collection and identification, study of the fishing gears and crafts, study of the fishing communities and cultural links to fish and fishing

CHAPTER 4 – Research Findings

This chapter included the findings narrated in five sub-units – Water spread areas, Fish Diversity and their Conservation Challenges, Fishing Gears, Fishing Communities and Fish as ingrained in Culture.

CHAPTER 5 – Discussion and Recommendations

This chapter summarizes the findings and discuss in an analytical manner. Based on the findings of the study, this chapter offers recommendations for future studies and conservation of fish and traditional knowledge associated with fishing

1.8. DELIMITATION OF THE STUDY:

As many as twelve communities were found to be involved in fishing during the study. They are quite widely spread all over the three study districts. While this presented an opportunity to study more diversified types of geographies and waterbodies, it also posed as a challenge from time and resources point of view.

In certain localities like the Assam-Meghalaya border areas, electric fishing, fishing using poison etc mass killing of fish is happening. While this could be observed, no photograph could be collected as the community didn't cooperate for it.

Fishing households of the communities are quite widely spread around the waterbodies. All individuals of fishing households are not educated or knowledgeable to share information. Some of them were hesitant to share information because Assam was undergoing the process of National Register of Citizen (NRC) updation and they felt it unsafe to share information about members of their family. Hence, for the sample survey, proper randomization could not be possible. Rather, knowledgeable individuals were selected with help of the key informers. A sample population of 384 individuals was covered to meet the minimum requirement of 95% confidence level and 5% error margin.
