CHAPTER-I

Introduction

1.1 Origin of Bell Metal

In the theory of human evolution, tools and weapons play a very important role. Human evolution changed forever with the beginning of Bronze Age which started in around 3300 to 3000 BCE in Greece and China[1]. Evidence of use of Bronze can also be seen in Indus Valley civilization. Numerous utensils and statuettes made from bronze were excavated from the ruins of Harappa and Mohenjodaro. The famous dancing girl statuette of Mohenjodaro was made from bronze. Before that Homo sapience used only stone as their tools and weapons. During the initial period of Chalcolithic[2] age, men learned how to mine copper. During this period, they were able to make small tools out of it and use them for their benefit and use. During the 1900 to 1700 BCE men started mixing copper and tin and were able to make bronze and make tools and weapons for general use. Bronze was made by mixing various proportions of copper and tin. Most common combinations were seven out of eight parts of copper and one part of tin ($7/8^{th}$ part copper and $1/8^{th}$ part tin). In China, they used 90% of copper and 10% tin to make bronze. Alchemists of those ages kept on mixing different combination of copper and tin so as to make gold but they failed to do so. During the process, different versions of bronze were discovered and used for making different tools and weapons. The Bronze Age came to an end with the emergence of the Iron Age in around 1000 BCE, but bronze remained in use for its different properties.

The legendary Indian sage and alchemist Charaka in his bid to create gold created bronze, the alloy by mixing copper and tin in proportion of the 78% copper and 22% tin. The mention of Bell metal can be found in *Charakasamhita* written around 400 A.D.[3] In the *Sharirasthana* Chapter of *Chrakasamhita* use of *Kāṃsya Patra* or bell metal utensils were mentioned (*Sharira 8/9*). It was prescribed in the manuscript that people should drink water

[1] https://www.britannica.com/event/Bronze-Age
[2] Copper Age which is the transitional period from stone to bronze age.
[3] http://www.atmashaktitrust.com/home/promotion-of-traditional-crafts

from bell metal utensils (*Kāṃsya Patra).* The mention of bell metal in *Charakasamhita* can also be found in *Chikitsa 24/154* where the term *Kāṃsya Bhajana* (Bell metal utensils) was used. Charaka also used bell metal to create *Vasthi Netram,* the most important apparatus in *Vasthi Sikitsha* [4] where *Ayurvedic* medicine are administered through anal, urinary or vaginal routes.

Bell metal is a hard alloy due to the increased proportion of tin. It is characterised by a sonorous sound when hit with an object. Due to its hardness, it can be hit by a hard object like metal rod or clappers repeatedly without cracking. Due this property of bell metal, it was used widely to make bells for use in Churches and ships. Hence, the term 'Bell Metal' was derived from two words *bell* and *metal*. The word *bell* was derived from the old English word *bellan* meaning 'to roar'. The word metal was derived from Latin *metallum* meaning mine or quarry[5]. Thus the term bell metal refers to the metal which is used to make bells. The most common bell metal products which we can see are bells and cymbals. Bell metal is the best alloy to make these because no other alloy can replicate its resonant sound.

In Assamese language bell metal is called '*Kaanh*' or '*Kaah*' (কাঁহ). It is derived from the Sanskrit word *Kāṃsya.* According to the 13th century epic of alchemy *Rasaprakāśasudhākara* commonly known as *Rasaśāstra, Kāṃsya* is a metal from the subgroup of mixed metal (*Miśraloha*)[6].

While most of the artisans kept making bells and small apparatus from bell metal, the craftsmen from Assam started product diversification and started making different products from this alloy such as utensils, showpieces, idols etc. Such diversification can also be seen from the craftsmen in states like Odisha and Kerala in India.

1.2 Bell Metal Industry in Indian Sub Continent and in India

Widespread use of Bell metal can also be found in the neighbouring countries of Pakistan, Bangladesh and Nepal. Brass and bell metal crafts can be seen in places like Peshawar, Wazirabad and Nizamabad areas of Pakistan. In Bangladesh, bell and brass metal

[4] Speciality treatment of *Ayurveda*.
[5] https://www.etymonline.com/word/bell-metal#:~:text=bell%2Dmetal%20(n.),tin%20than%20usual%20in%20bronze.
[6] https://www.wisdomlib.org/definition/kamsya

craft can be seen in places like Dhamrai near Dhaka, Kansharipara village in Islampur and Dariabad of Jamalpur district, Palong in Faridpur, Charabari and Bamil in Tangail district etc. Thus we can say that bell metal craft is very much prevalent in the Indian sub continent.

Bell metal craft can be seen in many states and areas of India. The bell metal crafts can be seen in the states of Bihar, Uttar Pradesh, Odisha, Kerala, Tamil Nadu, West Bengal, Jammu and Kashmir, Manipur and Assam. Bell metal handicraft plays an important role in the socio cultural and economic life of people living in these states.

Bell metal artisans locally known as *kansari* can be found in many places in Odisha. The most prominent among them are Balakati and Kantillo of the undivided district of Puri, Bhuban in Dhenkanal district, Bellaguntha in Ganjam district, Baidyarajpur, Bindhanima, Bhatimunda, Ganraba and Kanpur village in Cuttack district and Remuna in Balasore district. The *Kansaris* of Odisha uses two types of techniques to produce bell metal products- a) beating the hot bell metal into different shapes and b) casting them into moulds. The second technique is generally used to cast idols and showpieces, while the former one is used to make utensils.

Bell metal craft can also be found in Mannar, Trivandrum, Irinjalakuda, Kasargod, Koftagiri, Angadipram, and Payannur area of Kerala. Mannar in Alappuzha district of Kerala is known as the bell metal town of Kerala. After Moradabad of Uttar Pradesh, Mannar is the second biggest metal town in India and famous for the Brass and Bell metal products and the workshops. While the artisans of Moradabad primarily produce brass metal products, those of Mannar produce both brass and bell metal products. Some of the most famous bell metal products of Mannar include world's biggest Temple bell at Mohannagar in Shimla and the temple lamp at Chettikulangara Devi Temple which is considered as the world's biggest. The artisans of Mannar use the sand box molding[7] method and the lost wax molding[8] method for creating its products. The artisans of Mannar are from the Viswakarma community. The new generation of Viswakarma community is not willing to continue the occupation. Therefore, they are hiring artisans from Moradabad and other places of Bihar and UP.

[7] Hot bell metal is poured into moulds made in sand.
[8] Hot bell metal is poured into moulds made from wax.

Bell metal art can be found in Nachiarkovil and Kumbakonam in the Thanjavur district of Tamil Nadu. They usually make bells and other decorative items using the lost wax casting method of molding. But of late the bell metal artisans of Tamil Nadu have shifted towards brass metal because brass metal is softer metal and hence easier to mould. One of the reasons of this shift is scarcity of raw bell metal. Moreover, brass metal is relatively cheaper and thus has a higher demand in the market.

Apart from this, bell metal craft can also be found in Burdwan, Bakura, Purulia and Midanpore districts of West Bengal. On the other hand, brass metal artisans can be found in almost all districts of West Bengal. The bell metal artisans of West Bengal also primarily use molding method of bell metal casting.

1.3 Bell Metal Industry of Assam and Sarthebari

The bell metal Industry of Assam existed in places like Titabar, Raha and Sarthebari, but the industry in Titabar and Raha is no more under operation. Brass metal craft in Assam can be seen in the town of Hajo, but they do not produce bell metal products. At present, Sarthebari is the only place in Assam where the bell metal craft is prevailing. Though there is no evidence, legend says some artisans from Raha may have settled in Sarthebari. The justification is that there is a design of *Kahi*[9] prevailing in Sarthebari called *Rahaila Kahi* (Kahi from Raha). At present, the bell metal production units can be seen in Sarthebari Town area and its adjourning villages. Bell metal production units can be seen in Sarthebari Revenue Circle of Barpeta district, in Sarthebari town area and nine revenue villages i.e. Namshala, Gomura, Karakuchi, Kamarpara, Lachima, Hilepara, Batia, Amrikhawa and Palla. Artisans in the bell metal production units of Sarthebari area produce a number of unique products which are not known to be produced anywhere else. Following are the most common bell metal products produced in Sarthebari.

1.3.1 *Kahi*

Dinner plates made from bell metal are called *Kahi* in Assamese. *Kahi* can be of various sizes and designs. The most common and popular design of *Kahi* is *Jail Kahi* designed by Pushparam Tamuli Kohar (Deka, 1995). Another design of *Kahi* is *Sus Kahi* or *Rahaila Kahi*. *Jail* and *Sus kahi* can vary from 8 inch to 14 inch in diameter. The weight of

[9] Dinner Plate made from bell metal.

Jail Kahi may vary from 800 gms to 3 Kgs, whereas the minimum weight of *Sus Kahi* is 2 Kgs. Hence *Sus Kahi* is not very popular as they are heavier and hence very costly, as compared to *Jail Kahi*. Another design of *Kahi* which is made in Sarthebari is *Daffla*[10] *Kahi*. These are very big *Kahis* which may go up to 2 to 3 feet in diameter and can weigh upto 8 to 10 Kgs. *Daffla Kahi* are used by the Nyishi tribe[11] of Arunachal Pradesh. The conjugal family of Nyishis stay in the same tree house and have dinner from the same plate. That is why they need big plates for having dinner. Traders from Bhutan and Arunachal Pradesh come to Sarthebari and collect pre ordered *Kahi* which they sell in Bhutan and Arunachal Pradesh. *Kahi* is an integral part of Assamese culture and tradition. In every marriage in Assam the parents of the bride gifts the newly wedded couple with a set of two *Kahis*. The newly wedded couple have their first dinner on those two *Kahis* gifted to them by the parents of the bride. The relatives of the couple also bless them with *Kahi* as gifts. In *Annaprasanna* [12] also the invited guest gifts the child with *Kahi*.

1.3.2. Maihang or Baan Kahi

Traditionally Assamese people had their food sitting on ground on a flat stool of 3 to 4 inch height called *Pira* in Assamese. Usually the Kings and the noble men found it hard to lift food from the ground level to their mouths which is at an elevated level. Thus *Maihang* or *Baan Kahi* were developed, which is basically a dinner plate mounted on a stand. In *Annaprasanna,* the child is fed the first morsel of rice from a *Maihang*.

1.3.3. Bata

Bata is similar to a *Maihang,* but a little bit smaller with minor differences in design. It is more intricately designed then a *Maihang*. *Tamul Paan* [13] is an integral part of Assamese culture and society. When a guest visits a home, they are first offered *Tamul Paan*.

[10] Slang for Nyishi tribe of Arunachal Pradesh. The derogatory term *Daffla* which means wild or unruly people is constitutionally replaced by the term Nyishi, hence it is unconstitutional to use the term in writing. But as still this term is used in local terminology of the bell metal artisans we are compelled to do so for the purpose of knowledge.
[11] https://nenow.in/north-east-news/arunachal-pradesh/assams-writers-urged-to-stop-using-dafla.html
[12] The ceremony where the child takes rice for the first time.
[13] Areca Nut and Beetle leaves.

When a devotee visits a Temple or a *Satra* [14] they must offer *Tamul Paan* to the almighty. Again if a person has committed a social crime for what he/she needs to beg pardon from the community, he/she must kneel down before the elders with *Tamul Paan*. Thus we can say that *Tamul Paan* is an integral part of the society. The most essential rule of offering *Tamul Paan* in Assamese society is that it must be offered on a *Bata*. Again when a younger takes blessings from an elder by offering gifts, it must be placed on a *Bata*. Thus *Bata* is considered a sacred item in Assamese society and in every religious institution *Prasad*[15] is offered to almighty in a *Bata*. Every Assamese household, rich or poor has at least one *Bata* at home.

1.3.4 Bati

Bati refers to bowl. Bowls can be of various sizes. The most common size of *Bati* is of 4 to 6 inch in diameter and can weigh up to 250 to 400 gms. Some *Batis* are bigger in size, whose weight can go up to 1 kg. But now a days such big *Batis* are rarely made as they have very less demand. These big sized *Batis* were known as *Hatikhujia Bati* (Elephant footed bowl) as they are as big as the footmark of an elephant.

1.3.5 Baanbati

Baanbati is similar to *Maihang.* They are bowls mounted on a stand with intricate design and aesthetic beauty. These are luxury items which are rarely used in day to day life of an Assamese household. *Baanbatis* are used in special occasions like *Annaprasanna*, *Aathmongola*[16], marriage etc. *Baanbatis* are also used to serve *Doi Chira*[17] in the time of *Bihu*[18].

1.3.6 Taal

Taal refers to cymbals. Assam was the main workplace of Shri Manta Sankardev , the great Vaishnavite saint who introduced the *Naam Dharma* religion in Assam in the 15th

[14] Vaishnab Monasteries set up by Sri Manta Sankardev, Sri Sri Madhabdev and their disciples in the 16th Century and later on.
[15] Sacred food offerings to the almighty made from soaked lentils and coconut.
[16] After marriage the family of the bride invites the groom and some his friends and younger relatives for the first time. This is the first formal meal that the groom has in the place of in laws.
[17] Traditional food item made with puffed rice, curd and jaggery.
[18] The state festival of Assam.

and 16th Century CE. He had great influence in language, culture and religious practice in Assam. Most of the Assamese people follow the religion of *Naam Dharma* introduced by Shri Manta Sankardev. He and his disciples, Sri Manta Madhabdev, Sri Sri Haridev and Sri Sri Damodardev and others set up numerous monasteries called *Satras* in the whole of Assam where people pray and practice religious activities every day. One of the most important parts of the religious prayers in a *Satra* is *Naam Prasanga* where people sing in praise of Lord Krishna using cymbals and *Nagara*[19]. Thus cymbals, called *Taal* or *Bhortaal* are an integral part of the socio religious customs and tradition of the State of Assam. Sarthebari is the only place where *Bhortaals* are produced.

Again the religion of Buddhism is very prominent in the neighbouring states of Assam particularly in Arunachal Pradesh. The most prominent tribe of Arunachal Pradesh, the Nyishis are followers of Tibetan Buddhism. Along with that the neighbouring country Bhutan is also a Buddhist country with numerous monasteries. In Buddhist religion, cymbals play a very important role. No Buddhist monastery can complete their prayers without the holy sound of cymbals. The cymbals used in Buddhist Monasteries are called *Pachang Taal or Bhutiya*[20] *Taal*. But the basic design and sound effect of the *Pachang Taal* is different from the *Bhortaal*. While the sound of the *Bhortaal* is more sonorous, the sound of the *Pachang Taal* is deep. Traders from Bhutan and Arunachal Pradesh regularly visit Sarthebari, collect *Pachang Taal* from the *Kohars*[21] and supply them to the monasteries all over the world including Korea, Japan, China etc. But the local traders have no international connection and hence they have not been able to export *Pachang Taal* directly to these countries.

1.3.8 ***Lota***

Lota is a small pot which looks like a pitcher. While a pitcher can hold more than one litre of liquid, *Lota* can hold only up to half litre of water. Usually *Lotas* are used as water glasses in the traditional Assamese society. But making of *Lota* from bell metal is very hard and now a day's very few *Kohars* make *Lota* from bell metal. Market demand for *Lota*

[19] A set of two Drums made from clay and animal skin.
[20] Slang for Bhutanese people.
[21] Master craftsman of a bell metal production unit.

is also declining due to its high price. People prefer *Lota* made from brass metal as it is cheaper. As brass metal is softer than bell metal, it is easier for the brass metal artisans to make *Lota* from brass metal. Hence, brass metal *Lota* has almost replaced the bell metal *Lota*. Hence in the context of bell metal industry, significance of Lota is declining rapidly.

1.3.9 Other Items

Apart from the above seven items *Kohars* of Sarthebari produce items like school bell, decorative items, musical instruments like singing bowls [22]etc. Singing bowls are rarely used in Assam or in India. It is mostly used by the Buddhist and the Tibetans for meditation. It is claimed that the sound of singing bowls have powerful healing property and widely used in sound therapy of alternative medicine. Use of singing bowls can also be found in the famous Italian opera. The singing bowls produced in Sarthebari are collected by the traders of Bhutan and they export them all over the world.

1.4 Historical Background of Bell Metal Industry of Sarthebari

It is not known when the bell metal industry was started in Assam or at Sarthebari in particular. There is reference of bell metal products in the Varman[23] Dynasty (350 CE to 655CE) of *Kamrupa*[24]. Legend says that King Bhaskar Varman of Varman dynasty presented some utensils made of Bell metal to King Harshabardhana of Kannauj[25] in the 7th Century CE. Thus it can be said that bell metal craft in Assam has been flourishing since 7th Century CE. But during the course of time, the bell metal craft of Assam declined. At present the bell metal craft of Assam is confined to only Sarthebari, a small town of Barpeta district. The bell metal artisans of Sarthebari have been maintaining this art form in the traditional way without any major change in the production technique. They do not use molding technique like most artisans of other parts of India involved in this craft. The artisans of Sarthebari produce bell metal products by beating hot bell metal into different shapes.

[22] https://www.verywellmind.com/tibetan-singing-bowls-for-healing-89828
[23] First rulers of the ancient Kingdom of Kamrupa.
[24] The ancient Kingdom of Kamrupa existed from 4th to 11th Century CE in present day Assam with its capital in present day Guwahati.
[25] Ancient kingdom in present day Uttar Pradesh.

Mention of the Bell metal craft of Sarthebari in history can be found in the days of Ahom[26] king Siva Singha (1714-44). A Kohar of Sarthebari, Jeudhan Kohar gifted a tiger made of wood and bell metal to the King. It is said that when shaken the tiger emanated sound like that of a real tiger. The king was so impressed with the gift that he gave 100 *Puras*[27] of *Lakheraj*[28] land to Jeudhan Kohar and gave him the title Choudhury.[29]

The Bell metal industry of Sarthebari came into prominence in the 19th century. Pusparam Tamuli Kohar, one of the most famous *Kohar*s of Sarthebari areas and a prominent local figure, lead the people of the area in a peasant revolution against the British rulers in 1894. For that he was arrested and put in jail at Barpeta by the British Government. While in jail, the jailor was so impressed with his personality that he asked Pusparam Kohar what he can do for him. Pushparam Kohar asked the jailor to make arrangement for a Garhshall in Barpeta Jail. After that he started making and designing various bell metal products inside Barpeta Jail. The design of '*Jail Kahi*' was made at that time hence the name is coined. The British Government officials were very much impressed with his work and he was released from jail. After that he created a '*Jaat Kahi*' which was sent for display in an exhibition in London in the 7th decade of 19th century. Queen Victoria of the British Empire was so impressed with the work of Pushparam Kohar that she ordered the then Sub Divisional Officer of Barpeta to honour him with the title 'Jaigir'.[30] It should also be noted that another famous *Kohar* from Sarthebari, Gangaram Kohar exhibited his bell metal products in Indian National Congress Conference held at Pandu in 1926. Again Hareswar Deka and Bhagaban Deka was awarded medals by President of India in 1964 and 1984 respectively for their expertise in bell metal craft.

1.5 Artisans in a Bell Metal Production Unit

The production process of bell metal is a manual job with little use of machinery. The production procedure of the industry is very unique. Each production unit consists of

[26] The Ahom Dynasty rules the Ahom Kingdom of modern day Assam from 1228 CE to 1826 CE for 598 years.
[27] Unit of land area in Assam. One *Pura* equals four *Bighas* which is equal to 1.322 Acre.
[28] Land, for which no revenue has to be paid to the King.
[29] Tamuli, Nabajit.(2009) " Sarthebarir Kah Silpa- Atit aru Bartamanor ek Parjalochana" *Barkah- Souvenir* , Platinum Jubilee Celebration of Assam Cooperative Bell metal Utensils Manufacturing Society Ltd, Sarthebari, pp.1-6.
[30] Tamuli, Trithalochan.(2009) " Sarthebarir Kah Silpa" *Barkah- Souvenir* , Platinum Jubilee Celebration of Assam Cooperative Bell metal Utensils Manufacturing Society Ltd, Sarthebari, pp.39-41.

one master craftsman (*Kohar*) and four to five supporting artisans called *Aidhas*. All the supporting artisans have been assigned different roles in the production of the bell metals. They are termed as – *Gureila or Guiral, Maithner, Kaitner*, *Kanghoha* and *Jogali*. Following are the different job profile of the artisans working in a *Garhshall*.

1.5.1 *Kohar*

Kohar is the master craftsman of the *Garhshall***.** He is the most experienced and most qualified of all the artisans in a *Garhshall.* He is the owner of the *Garhshall* which essentially is situated within his house premises. He is also in charge of the whole operation. He is the person who knows when to put the metal in the furnace and when to take them out. Just by seeing the colour of heated metal in the furnace called *Afar,* he knows the temperature of the metal. The *Kohar* knows all the tricks of the trade of making bell metal products and can replace any artisan at any point of time. He is entrusted with the job of giving proper shape of the product and responsible for making the product. He is the one to whom all the other craftsmen of the *Garhshall* look up to.

1.5.2 *Gureila or Guiral*

In Assamese language, the word *Guri* means base. The *Gureila* or *Guiral* means the person who holds the base. In a *Garhshall,* the *Gureila* holds the *Gola*[31] with the help of a *Chepna*[32] and helps the *Kohar* to give the shape to the product. *Gureila* is the second most important artisan in a *Garhshall* after the *Kohar*. Because, if he cannot hold and rotate the *Gola* in the right way, the *Kohar* will not be able to give proper shape of the object they are making. He is also in charge of smoothening the edges of the product by giving them an even thickness.

1.5.3 *Maithner*

The word *Maithner* means hitter. He hits the *Gola* with a hammer to give its basic shape. While the *Gureila* holds the *Gola,* the *Maithner* and the *Kohar* together hits the hot Gola repeatedly to give its desired shape. While the *Kohar* gives the *Gola* its fine shape with

[31] Small disks of bell metal
[32] Object picker or tong of big size.

a small *Hathli*[33], the *Maithner* hits it with a big *Hathli*. The *Maithner* is actually the helper of the *Kohar* who can hit the *Gola* with brute force while the *Kohar* fine tunes the shape of the product. The *Maithner* is the third most important artisan in a *Garhshall* after *Kohar* and *Gureila*. The Maithner is also in charge of checking and rectifying the shape of the product.

1.5.4 ***Kaitner***

Kaitner means the person who cuts. He is entrusted with the job of cutting the metal sheets into the desired shape. Once the *Gola* is hit by the *Maithner* and the *Kohar*, the *Kaitner* cuts it into shape by refining and cleaning the product. The *Kaitner* is a very important part of the *Garhshall* as without him the product cannot be given the final shape.

1.5.5 ***Kanghoha***

Literally *Kanghoha* means polisher of the edges. In a *Garhshall,* the *Kanghoha* is entrusted with the job of polishing the bell metal products. For that he does not use any chemical polish or solution. He does it manually by scrapping the product with a *Reti*[34]. By scrapping off the dark patina from the bell metal product, he gives it the famous golden hue of bell metal. The *Kanghoha* also cuts intricate designs on the product.

1.5.6 ***Jogali***

Jogali is the apprentice of the *Garhshall*. He does not have any particular job to perform. He helps all the other *Aidhas* in their respective jobs and thus learns the trade gradually and gets promotion to an *Aidha*. Whenever a person wants to be a *Kohar*, he cannot become one directly. First he has to convince the *Kohar* that he really wants to enter the art of bell metal product making. If the *Kohar* is convinced that he is serious about the job then only the *Kohar* accepts him as a *Jogali* in his *Garhshall*. This thumb rule applies to all the prospective artisans of this trade. Even if the son of the *Kohar* wants to enter the trade, he has to enter the *Garhshall* as a *Jogali*, and after learning and mastering the art of bell metal product making, he will make the progression to an *Aidha* and ultimately become a

[33] Hammers weighing 1800 to 2300 grams
[34] File sharpening tool.

Kohar one day. If he does not have the requisite talent, he will have to remain as an *Aidha* in his entire life.

1.6 The Production Process

Depending on the nature of the products, number of members in the *Garhshall* may vary from five to seven members. However, one *Garhshall* was found to have fourteen members while another has only three members during field survey. The main raw material of this industry is bell metal and *Bogorir Angar* or charcoal from Indian Jujube Trees (Ziziphus *Mauritiana*). The *Kohars* use primarily scrap metals sourced from outside to make new products. The scrap metals are usually damaged and old bell metal products which are supplied by the cooperative[35] or *Mohajons*[36]. The scrapped metal is sourced from various places. One source is local, where people exchange old bell metal products for new ones from the society or *Mohajons*. But supply of scrap metal from local sources is very low and insignificant. Most of the scrap metal is supplied by some traders from Guwahati and Barpeta Road. These scrap metals come from all over India. Scrap metal even comes from countries like Pakistan and Bangladesh. According to the *Kohars*, the Pakistani scrap metal is the best in quality. But now a day's scrap metal supplied from Pakistan has dried up and negligible amount of Pakistani scrap metal come to Sarthebari, that too sporadically.

The *Kohars* use charcoal only from the trees from Indian Jujube Trees (Ziziphus *Mauritiana*). Locally known as *Bogori,* Indian Jujube trees are very hard and tough and traditionally used for agricultural tools over the years in countries like India and China. Firewood from this tree is also considered as a very good source of fuel. Because of its toughness, the charcoal from Indian Jujube trees emanates very high temperature which is perfect for a tough metal like bell metal. Earlier *Bogorir Angar* or charcoal from Indian Jujube trees was available locally as these trees were very common in the area. But now a day's these trees cannot be found in the area. Thus the *Kohar* have to source them from other places. Now a days the charcoal is brought from the state of Meghalaya. As Indian Jujube trees are widely found in the hills of Meghalaya, the local people of the hill area makes charcoal from them. Traders from Assam bring them to Sarthebari and sell them to the

[35] Assam Cooperative Bell metal Utensils Manufacturing Society Ltd.
[36] Individual Traders of Bell metal.

Kohars. It should be noted that the supply *Bogorir Angar* is becoming very erratic due to its shortage in the hills of Meghalaya. This has been one of the major problems faced by the *Kohars*.

For producing a set of bell metal products, the *Kohar* has to make preparation from one evening prior to the day of production. In the previous evening the *Kohar* collects the scrap metals from the *Mohajon* or the Cooperative. Next day early in the morning at around 5.00 AM to 6.00 A.M. the *Kohar* and his team of *Aidhas* start the production process. At first they put the scrap metal in the *Afar*[37] or *Bhatti* for softening. Then these pieces are put in a *Muhi*[38] and placed on the *Afar* or *Bhatti* until the meal inside becomes liquid. Then the *Muhis* are brought out of the *Afar* by holding with a *Sara*[39] or *Chepna* and the liquid metal is poured into *Aak*[40] or *Sacha*. The inside of the *Sacha* is rubbed with mustered oil so that the metal does not stick to it. After cooling down, the metal takes the shape of small disks, called *Golas.* If the *Garhshall* is producing *Kahi* or *Bati,* the *Kohar* takes the *Golas* to the rolling mill, where the mill workers immersed the *Golas* in salted water and heats them in a bid furnace. The heated Golas are then put in the rolling press and converts them into round sheets according to the size recommended by the *Kohar*. The sizes are usually in diameter in inch. Only *Golas* for *Kahi*, *Bati* and the top part of *Bata* and *Maihang* are brought to rolling mill. *Golas* made for *Taal*, *Baanbati*, *Lota* and the bottom part of *Bata* and *Maihang* are not brought to the rolling mills. Later, in the *Garhshall,* these *Golas* or round sheets are reheated again in the *Afar*. Usually more than one piece are kept together and the *Kohar* brings them out of the *Bhatti* when it attains the desired temperature by holding these with a *Sara*. Then he immerses them in salted water and immediately places them in an iron pillar called *Nairi*. Then the *Aidhas* start hitting them with *Hathli* to give the desired shape while the *Gureila* helps him by holding the *Gola* by *Chepna*. When the *Gola* acquires the required shape, the *Maithner* hits with a headless hammer called *Kamura* and refines the shape by putting them on the *Nairi*, after that the *Kaitner* cleans the metal sheets to get the shape of the product with a polisher called *Khanta* or *Reti*. Then the *Gureila* makes the sides of the product

[37] Furnace
[38] Pots made from cast iron.
[39] Tongs
[40] Small Shapers made from mud and soil.

smooth. At last, the *Kanghoha* polishes the product by fixing it to a *Kunda*[41] to give the final shape. They keep on repeating this process until all the raw materials which they have brought is finished. Sometime this takes as long as twelve hours to complete the process. However, the average working hour of a *Garhshall* is ten hours and thirty nine minutes. The *Kohar* then deposits the products to the *Mohajon* or the Cooperative and collects his making charge or *Gorhoni*. In the evening, total making charge or *Gorhoni* is distributed among all the members of the team by the *Kohar.* It is also a common practice that the *Mohajons* do not clear all the dues to the artisans daily. The artisans also like to keep a part of their *Gorhoni* with the *Mohajons* as a kind of savings deposits. Whenever they need cash, they take their share from the *Mohajon*. It is customary that the *Mohajons* and the Society clear all the dues of the *Kohars* and *Aidhas* just before the Annual *Sabha Mahotsav*. The *Sabha Mahotsav* of Sarthebari is an annual five to eight day long festival of the town which commences on the *Maghi Purnima*[42]. A trade fair is accompanied along with the festival and the bell metal artisans and their families purchase commodities of their need including garments and dresses from it. In that fair people of various places of Assam visit Sarthebari, primarily to purchase bell metal products.

Some *Kohars*, primarily those producing *Kahi*, *Bati* and *Bata* use the help of rolling mills in making their products. After making the *Gola* from the scrap metal, they take those to the rolling mill. In the mill the *Kohar* gives the workers the size of the plate in diameter. The workers in the mills heat the *Gola* and make a round sheet of exactly the diameter which the *Kohar* asks for. Later the *Kohar* takes these sheets to the *Garhshall* and makes *Kahis*. Rolling mill is also used by *Kohars* to make the top part of *Maihang* and *Bata*. This has saved lot of time and energy of the *Kohars* producing *Kahi* in spite of spending Rs.6/- per Kg.

It should be noted that the artisans do not have to buy the prime raw material *i.e.* virgin bell metal. They primarily use scrap metal which comes in the form of broken bell metal products like utensils, decorative items, bells etc. They collect these from the Cooperative or Individual Traders (*Mohajons*) on the basis of weight. From these scrap metal

[41] Rotator
[42] Full moon night of the Assamese month of *Magh*.

they make bell metal products and deposit them the next day and collect the making charges or *Gorhoni*. A *Kohar* seldom collects all the raw materials from one *Mohajon* or the Cooperative exclusively. They have verbal contract with various *Mohajons*. The *Mohajons* puts advance orders for their product and supplies the *Kohar* with the required scrap metal. For example, if a *Mohajon* needs three *Kahis* of one kg each. Then he will contact a *Kohar* from his contract list and supplies him (The *Kohar*) with three kg of scrap metal. The next day the *Kohar* will make three *Kahis* of one Kg weight and give them to the *Mohajon*. It should also be noted that there is some loss of the metal in the production process due to heat and polishing. Therefore, an amount of 15 grams per Kilogram of scrap metal is considered as lost weight. But the *Kohars* or the artisans have to buy the charcoal and the cost of this is shared by all the artisans of the production unit.

Each bell metal production unit or *Garhshall* consists of one master craftsman (*Kohar*) and a group of supporting artisans (*Aidhas*). The *Kohar* is the owner of the production unit and is responsible for its operation. An artisan can become *Kohar* only through experience and expertise. Usually this responsibility is passed on from father to son, but for that the son must be worthy of the responsibility, otherwise he will not be able to manage the *Garhshall* and the *Aidhas* will leave and join other *Garhshalls*. Therefore, it is not very easy to become a *Kohar*. A *Kohar* has to start from a *Jogali*. Then he gradually learns the art and becomes an *Aidha*. After that when he becomes an expert in all the parts of the production process and then only he can be a *Kohar* and take the mantle from his father. If an *Aidha* wants to become a *Kohar*, he has to first organise a group of *Aidhas* who want to work with him, then he must open a *Garhshall* or bell metal production unit in his own premises. Then only he can start production. But this is not easy because an *Aidha* does not usually want to leave an established *Garhshall* easily. Once an *Aidha* leaves an established *Garhshall,* it is very hard to go back there. If the new *Kohar* cannot continue production, the *Aidhas* find it very difficult to get new employment opportunity in another *Garhshall*. Few *Aidhas* take this risk. Moreover, the new *Kohar* has to make new connections with various *Mohajons* for supply of raw materials and sell of finished products, which is also not easy because few *Mohajons* will have confidence on a new *Kohar* and supply him raw materials worth thousands of Rupees without any security. Hence the number of *Garhshall* remains

static over the years in Sarthebari. In each *Garhshall* the number of *Aidhas* is different. But on an average, it is five to six persons depending on the product.

1.7 Present Status of Bell Metal Industry of Sarthebari

If Mannar is known as the metal town of Kerala, then Sarthebari is the metal town of Assam. Bell metal craft is the most famous identity of the town of Sarthebari. If a person enters the Sarthebari market area he/ she can feel the difference with the market of a similar town. Because in Sarthebari he/she will find that every third shop in the market is a metal shop selling bell metal product. The bell metal industry of Sarthebari can be classified into two sectors- production and marketing.

1.7.1 Production Sector

Bell metal production units can be found in Sarthebari town area and its nine adjoining villages. There are total 303 units of production or *Kohar Sal* or *Garhshall* in this area. The total number of people directly engaged in the production of bell metal stands at 1953. All the artisans involved in the production are males and as this craft need very hard labour, no child is employed. Thus bell metal Industry is an entirely male dominated industry with no child labour. Each production unit consists of one Master Craftsman (*Kohar*) and four to five supporting artisans (*Aidhas*) viz. *Gureila or Guiral, Maithner, Kaitner*, *Kanghoha* and *Jogali* as mentioned earlier. All the supporting artisans have been assigned different roles in the production of the bell metals. Depending on the nature of the products and number of members in the *Garhshall*, one member may take up more than one responsibility. All the 1953 artisans engaged directly in the production of bell metal are found to be locals of the area.

There are two rolling mills in Sarthebari. In the rolling mills, they press the *Golas* brought in by the *Kohars* to a flat sheet. These sheets are then used by the *Kohars* to make *Kahis* and the top part of *Maihang* and *Bata*. Basically rolling mill is the most important modern technology introduced in the bell metal industry in the recent years. As a result of introduction of rolling mill, the *Kohars* are able to save time and hence can produce more *Kahis*. Thus introduction of rolling mills has enabled the *Kohars* to increase productivity. Out of the two rolling mills, one is managed by the Cooperative and the other one is owned

by a private entreprenuer. In total, twenty one (21) people are engaged in the two rolling mills. They belong to the state of Haryana. As the labourers of the rolling mills are not local, they are not taken into consideration in the ambit of this study.

Table- 1.1 shows number of *Garhshalls* and number of artisans engaged in the production of bell metal products.

Table-1.1
Number of Artisans involved in Production Units of Bell metal

Village Name	Unit No.	*Kohar*	Supporting Artisans	Total	Percentage
Sarthebari	133	133	725	858	43.93
Namsala	46	46	270	316	16.18
Gomurah	60	60	304	364	18.64
Karakuchi	22	22	111	133	6.81
Kamarpara	2	2	11	13	0.67
Lachima	12	12	69	81	4.15
Hilepara	1	1	5	6	0.31
Batia	4	4	24	28	1.43
Amrikhowa	20	20	113	133	6.81
Palla	3	3	18	21	1.08
Total	303	303	1650	1953	100

Source: Director of Economics and Statistics, Barpeta

Among all the villages, Sarthebari ranks the top with highest number of direct employment with 133 *Kohars* and 725 supporting artisans i.e. a total of 858 persons. Next to Sarthebari, Gomurah ranks second where 364 artisans are directly employed in the production process. Out of them, 60 are *Kohars* and the remaining 304 are supporting artisans. Third rank is occupied by Namshala where 316 artisans are employed, out of which 46 are *Kohars* and 270 are supporting artisans. Villages of Amrikhawa and Karakuchi are in the fourth position with 133 direct employments each. Amrikhawa has 20 *Kohars* and 113 supporting artisans. On the other hand, Karakuchi has 22 *Kohars* and 111 supporting artisans. Other villages in the area have 144 direct employments with 22 *Kohar*s and 149 supporting artisans. Among the villages, Sarthebari accounts for 43.93 per cent of the total employment whereas there is only one production unit in Hilepara with only 6 number of persons are employed which accounts for 0.31 per cent of employment in the industry.

1.7.2 Marketing Sector

There are 73 traders in the survey area who are engaged in selling of bell metal products produced in the area. There are two showrooms of the "The Assam Co-Operative Bell-metal Utensils Manufacturing Society Limited", 41 private shops run by *Mohajons* and 30 *Arabdaris* or visiting salesmen. The total number of people engaged in the marketing of final products stands at 243. Like in production, marketing is also controlled by male. There is no woman in the sales of bell metal utensils. Out of these 243 persons, one is an employee of The Assam Co-Operative Bell-metal Utensils Manufacturing Society Limited and the other 242 are owners and employees of the various sell points.

Thus the total number of people engaged in both the production and marketing of bell metals in Sarthebari area stands at 2196. This is 10.14 per cent of the total population of the area. The share of bell metal in the generation of employment in the production and marketing among male population in the Sarthebari circle rises to 20.17 per cent.[43]

1.8 Objectives of the Study

The bell metal industry of Sarthebari is one of the most unique handicraft industries of Assam. As it is the only cluster of bell metal industries in the state it enjoys monopoly status over its products. This study is an attempt to analyse the bell metal industry of Sarthebari from the point of view of a student of Economics. The objectives of the present study is

a) to examine the role played by the Bell Metal industry of Sarthebari in income and employment generation of Sarthebari.

b) to investigate the techniques of production in this industry on the basis of production functions and also to study the factor intensity of the industry.

c) to analyse the profitability of the industry through various methods of capital budgeting and to test whether it is a profitable industry or not.

d) to examine the socio economic condition of the artisans involved in the Bell Metal industry of Sarthebari.

[43] Directorate of Economics and Statistics, Government of Assam.

e) to investigate the weakness and problems, if any, and suggest measures to rectify these so that this industry can grow further.

1.9 Hypothesis

Based on the above objectives the following Hypotheses are formed:

1.9.1 The bell metal industry has given significant contribution toward the employment and income generation in Sarthebari.

1.9.2 It is a labour intensive industry which needs increased amount of labour for expansion.

1.9.3 This labour intensive industry is a highly profitable one.

1.9.4 Socio-economic conditions of the bell metal artisans are not satisfactory.

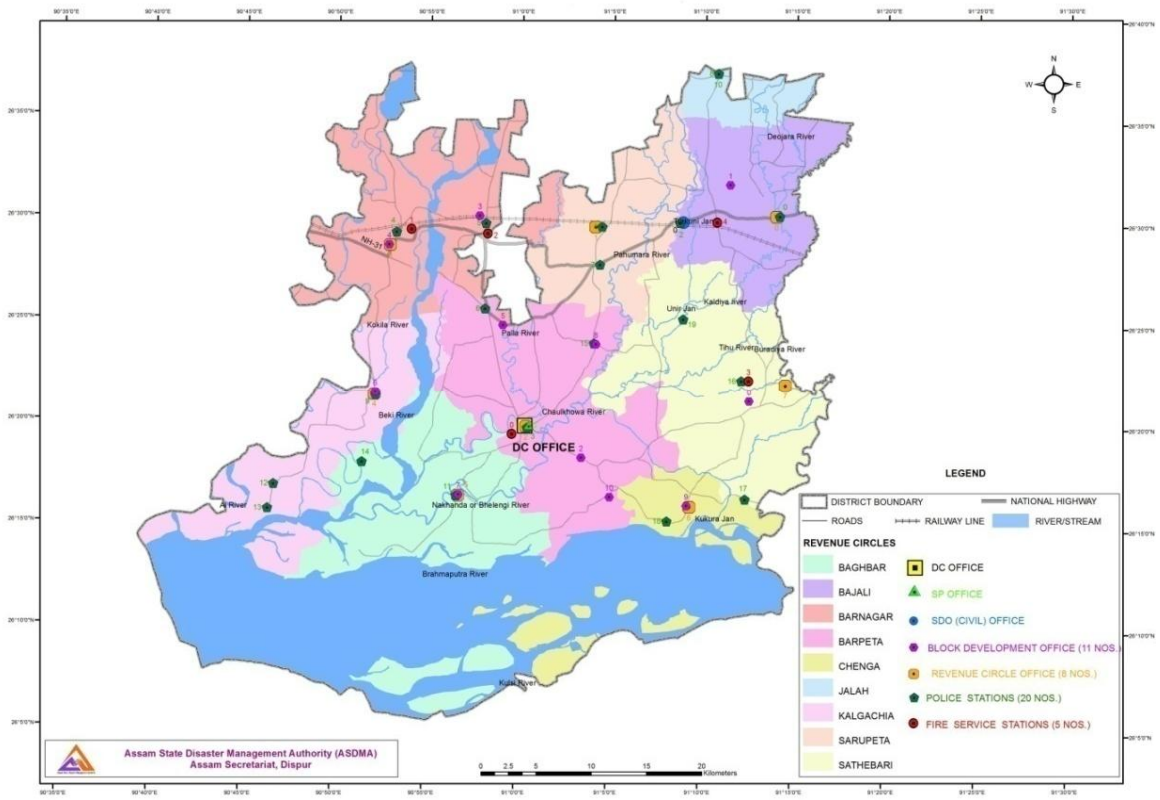
1.10 Study Area

Barpeta is one of the thirty five [44] districts of the state of Assam with a geographical area of 2282 Sq. Kilometres. According to the 2011 population census, the total population of the district stands at 1.69 million with 0.867 million males and 0.826 million females. Barpeta district has two sub divisions- Barpeta (Sadar) and Bajali and eight revenue circles. The old Barpeta district had 9 revenue circles. But Jalah Revenue Circle was curved out of Barpeta to form a part of the Baska District under BTAD[45]. Prior to January 2021, Barpeta district has eight (8) Revenue Circles[46]- Barpeta, Chenga, Baghbar, Kalgachia, Sarthebari, Barnagar, Bajali and Sarupeta. The Bajali subdivision of Barpeta district was converted to a district on 12 January 2021, but till now all the administrative departments are not shifted to Bajali from Barpeta. At present Barpeta District has six Revenue Circles- Barpeta, Chenga, Baghbar, Kalgachia, Sarthebari and Barnagar and Bajali district has two Revenue Circles- Bajali and Sarupeta . After formation of Bajali district the present population of Barpeta district stands at 14,39,806 (2011 Census). After Bajali becomes a full fledged district, the Sarthebari revenue Circle will be a part of Bajali district.

[44] Assam has thirty three full fledged districts, while the 34th and 35th districts Bajali and Tamulpur have not been accorded full administrative power.
[45] https://www.bodoland.gov.in/district.php
[46] https://barpeta.assam.gov.in/portlets/district-profile

Figure 1.1 shows the Barpeta District Administrative Map. This Official map of Barpeta District shows all the nine revenue circles including Jalah.

Map-1.1: Administrative Map of Barpeta District



Source: District Administration, Barpeta

Sarthebari Revenue circle was established in 02/10/1977[47] with an area of 266.174 Sq. KM. This revenue circle has only one town (Sarthebari) and 128 villages. According to 2011 census, the total population of the revenue circle stands at 193 thousands. Sarthebari has two *Mouzas*[48] - Sarukhetri and Paka. Sarukhetri has 66 revenue villages and Paka has 63 revenue villages. The Sarthebari Town area and its adjacent villages fall under the administration of Sarukhetri *Mouza*.

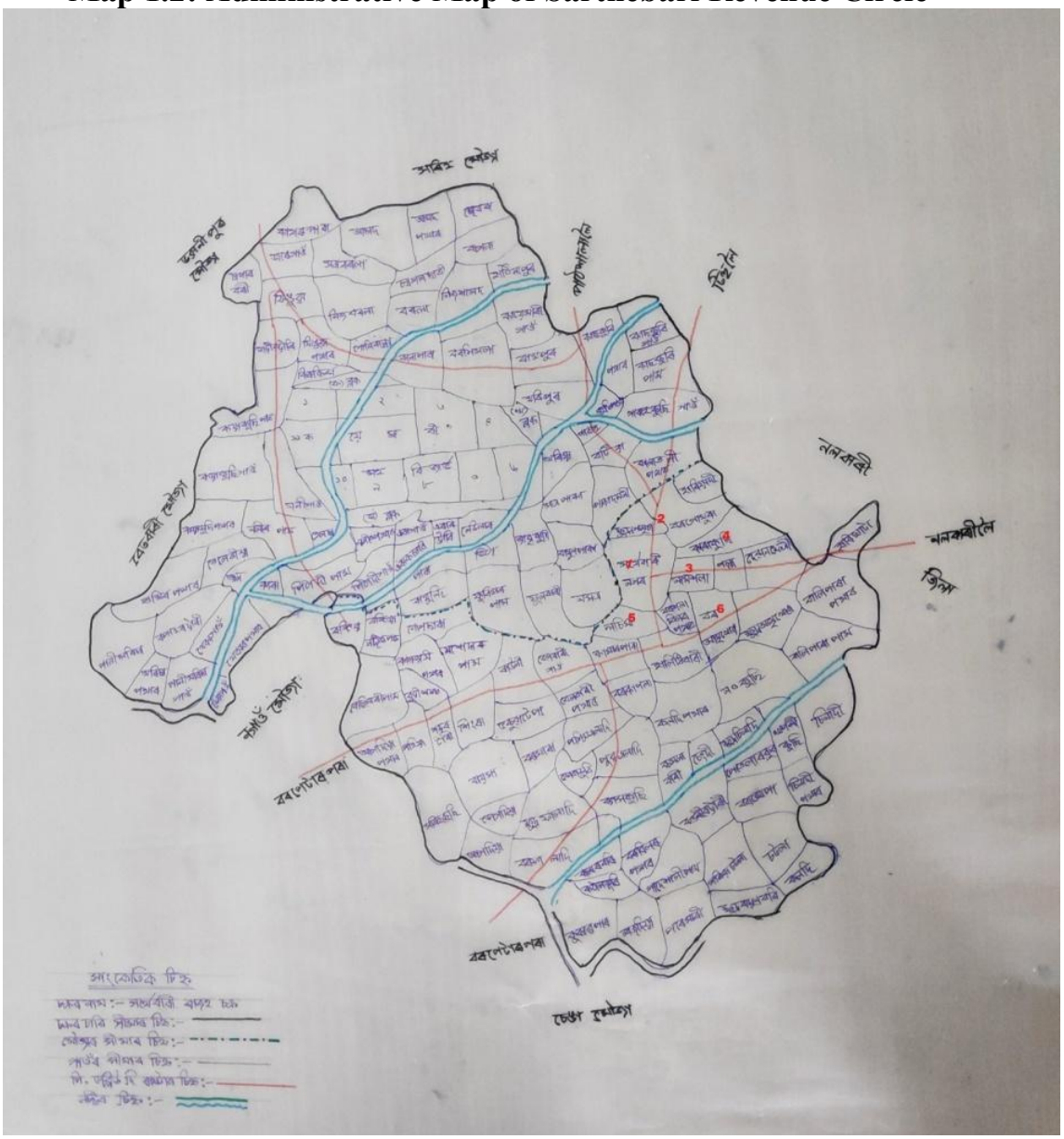
Sarthebari is the only town in the revenue circle. It has a town committee with ten wards and an area of 2.9 Sq. KM. The population of Sarthebari town committee area stands

[47] www.barpeta.gov.in official website of Barpeta District Administration.
[48] Administrative area which is smaller than a revenue circle can be seen in Eastern India.

at 6913 with 3442 males and 3471 females (2011 census). Map 1.2 shows the Sarthebari Revenue Circle. The clusters which we have studied are shown in the map as Sarthebari (1), Gomurah (2), Namshala (3), Karakuchi (4), Lachima (5) and Amrikhawa (6).

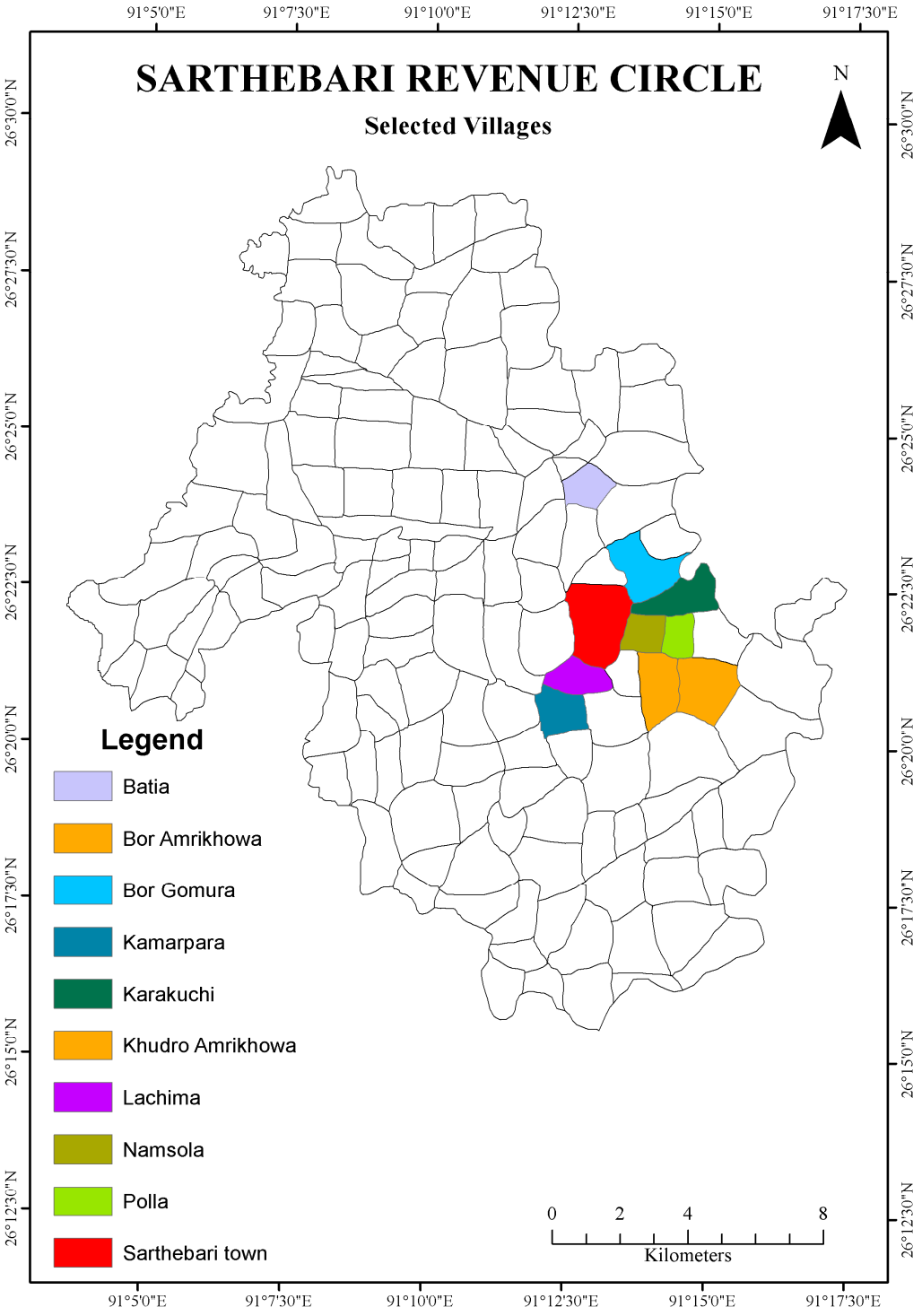
Map 1.3 gives the close-up of the study area.

Map 1.2: Administrative Map of Sarthebari Revenue Circle



Source: Revenue Circle Office, Sarthebari.

Map 1.3: Administrative Map of Sarthebari Revenue Circle with the Study Area



Source: Revenue Circle Office, Sarthebari

1.11 Significance of the Study

The bell metal industry of Sarthebari is unique in many aspects. If we compare it with the bell metal industries of other places in India, we observe that the bell metal industry of Sarthebari is different from them in two aspects. First, as regards the production technique, the artisans of Sarthebari do not use the molding technique. Except only a handful of bell metal artisans of Odisha, all the other bell metal artisans of India use the moulding technique of bell metal production. The artisans of Sarthebari use the hitting method where hot bell metal is hit repeatedly to form different objects. The production technique of bell metal in Sarthebari remains almost static since time immemorial; they even do not use chemicals for polishing the products. Secondly, the product profile of bell metal industry of Sarthebari is entirely different. The bell metal artisans of Sarthebari do not produce decorative items or bells. Mostly they produce utensils and cymbals.

In Barpeta district, agriculture is the prime occupation of the majority of the people. According to the 2011 census, 33.2% of the total population of Barpeta district is workers[49]. Out of them 36.5% are cultivators, 17.6% are agricultural workers, 5.4% are household industry workers and 40.5% are other workers. Thus more than half (54.1%) of the total worker population of Barpeta district are dependent on agriculture. Over the years, this district has been facing the seasonal problem of flood as it is one of the most flood prone districts of Assam. Most of the agriculture in the district is seasonal as no proper modernization of agriculture is available. There is not a single large scale industry in the district. The industrial scenario of the district consists of some brick kilns, pottery, gold smiths, fireworks, fisheries and food processing industries like bakery, oil mills and spice mills. But these industries have not been able to generate enough income and employment in the district. As a result, there has been a large scale outflow of labour from Barpeta to other districts of Assam as well as to other states like Kerala, Karnataka, Tamil Nadu, Maharashtra, Meghalaya, Arunachal Pradesh, Mizoram, West Bengal etc. Of late, many unskilled labourers have started to go to Middle East countries to work in the construction sectors.

[49] Census of India has defined that “All persons engaged in 'work' defined as participation in any economically productive activity with or without compensation, wages or profit are workers.”

Bell metal industry is a well established household industry which has been playing a very important role in income and employment generation in Sarthebari area of Barpeta district. Almost one out of four male workers of household industries of the district is engaged in the bell metal industry. But the industry has not been able to meet the growing demand of its products. As a result machine made imitation products has entered the market from other states of India. In the near future also, there is very little chance of reduction of demand for bell metal products as these are deeply rooted in the socio cultural and religious activities of the people of the state. There is also scope for international demand for these products especially from Buddhist dominated countries like China, Japan, South Korea etc. as some of these products can be made in Sarthebari only.

There have been a number of studies regarding the bell metal industries of different states of India. A few studies have also been made on the bell metal industry of Sarthebari. But the studies of the bell metal industry of Sarthebari are mainly concentrated on the design and production process front. No detail study has been made on the pure economic aspects of the bell metal industry of Sarthebari.

Therefore, it is very much necessary to study the Bell metal industry of Sarthebari in depth from the view point of Economic theory and looking for measures for its future development. There is a need to analyse the profitability, production function and factor intensity of the industry. Only an in depth study of the industry in these regard may help in finding ways to develop the industry more and turn into a more productive industry which will be beneficial to the artisans and to the state economy as a whole.

1.12 Plan of the Study

The study is divided into seven chapters. The chapterisation of the study is –

1.12.1 **Chapter I**: Introduction

1.12.2 **Chapter II**: Employment and Income Generation in the Bell Metal Industry of Sarthebari

1.12.3 **Chapter III**: Production Process and Factor Intensity of Bell Metal Industry of Sarthebari – A Cobb Douglas Production Function Analysis

1.12.4 **Chapter IV**: Capital Budgeting of Bell Metal Industry of Sarthebari

1.12.5 **Chapter V:** Socio Economic Conditions of the Artisans and Traders of Bell Metal Industry of Sarthebari

1.12.6 **Chapter VI**: Problems and Prospects of Bell metal Industry of Sarthebari

1.12.7 **Chapter VII**: Summary, Conclusion and Policy Recommendation.